

Exploring Natural History Collections



MUSEUM COLLECTIONS VOL. 1

CHICAGO
ACADEMY OF
SCIENCES

PEGGY NOTEBAERT
NATURE
MUSEUM

Exploring Natural History Collections

**Peggy Notebaert Nature Museum
Wonder Workbook**

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About Natural History Collections



Specimens in a collection are like a physical snapshot in time, containing irreplaceable information. Often, the knowledge that can be obtained through careful study of these authentic artifacts was not anticipated when the specimen was collected.

Through such natural history specimens, we have a physical, empirical record of the past. We can use these specimens to interpret our present place in history which then allows us to anticipate future conditions. This power to hold the past, understand the context of the present, and predict the future makes natural history collections an important and unique human resource.

The number of specimens in each collection varies. Below is a “by the numbers” snapshot that just scratches the surface of the Chicago Academy of Sciences / Peggy Notebaert Nature Museum collections.

Nature Museum Collections By The Numbers:

- **500** linear feet of manuscripts & other paper records
- **1,300** motion picture films
- **2,300** cultural artifacts
- **5,200** mammals
- **11,100** geologic specimens
- **11,200** bird eggs & nests
- **13,900** birds
- **15,600** plants
- **23,200** amphibian & reptiles
- **23,200** fossils
- **71,100** insects & spiders
- **113,300** mollusks
- **100,000** photographic images

Collections FAQs



Q What kind of information does the Academy have about its collections?

A The data vary between different types of collections, but a specimen should always include a data tag with the common and scientific name, where, when, and who collected the specimen, a description of the specimen's habitat, and some basic measurements of the specimen such as weight in grams and length in millimeters. These data are used by a wide range of scientists from ecologists to taxonomists. Since we have so many specimens from more than a century ago, our collections are particularly valuable in showing change over time and predicting future trends.

Q How can we use this information?

A There are many uses for specimen data including morphological (attributes like size, shape, or color), chemical (attributes like DNA or isotopic signatures), and historical (attributes like distribution or population density). Because we have the actual specimens, we can learn facts about the past that were not known at the time. By comparing this with current data we can then anticipate future trends.

Another use for natural history collections is morphometrics—the analysis of a species based on measurements of many specimens. These data, along with distribution data also gleaned from museum collections, form the basis of field guides. If you've ever gone bird watching or used a book to identify a plant, you've used data from a collection.

Q How can our collections help us understand the past?

A The specimens in a natural history collection are like physical snapshots in time. They record data that cannot be reproduced. In many cases, questions that can be answered by the specimens were not anticipated when the specimens were collected. For example, all biological specimens contain DNA but, as far as scientists in the 1800's knew, DNA did not exist. Yet, as an intrinsic part of the specimen, they collected and preserved that data along with the specimens they deposited and today that DNA can help us understand more about the past and the present.

Q What kinds of information are scientists seeking?

A As our knowledge of the natural world grows and as we create new ways to gather information, the questions that can be answered by specimens increases. In the past, a scientist often used measurements of a specimen's bones to distinguish one species from another. Such measurements are still important data points but today we can also use DNA from those same specimens to understand the evolutionary path that resulted in the two species in the first place. Since the specimen is a physical record from the past, it contains irreplaceable information that awaits a creative scientist with the right tools. In the future, scientist will still be using old specimens to answer new questions.

Image Investigator

SUMMARY

Students observe an image and create an accompanying story to construct an explanation as to what might be going on in the image.

GRADE RANGE (SUGGESTED)

K–5

MATERIALS:

- An image or video
- Image Investigator worksheet



ENGAGE

1. Tell students that today we will be looking at an image/video to try to understand what might be happening in it, and uncover the story that it is telling.

PREPARE TO EXPLORE

2. Introduce the image/video you will be looking at. Ask students to look closely at the image for a minute or two or watch the video once or twice.

EXPLORE

3. Once students have had a minute to look at the image or watch the video, ask them “What is going on here?” The goal of this activity is to guide your student’s thinking and understanding as to what is going on in the image/video. Avoid inserting information—let students look closely and reason out their responses, rather than by discussing the facts.
4. Follow up the first question with, “What do you see that makes you say that?” to encourage students to back up their explanation with evidence from the image. This step can be repeated many times, having students build on their own ideas.
5. When a train of thought comes to an end, ask “What more can we find?” to pull out more evidence or to continue to build the explanation.

REFLECT & SHARE

6. Now that your students have thought about the image/video and what might be going on, have them write a story that explains it using the worksheet. They can use words and/or pictures to tell their story.
7. Have students share their story with someone!

Extensions and Variations:

- Use the same graphic organizer, but look at a different image or video. It could be related to any content!
- Take all of the stories your class creates and put them together in a book to share!

Image Investigator

Use words and/or pictures to tell a story about what you observed.



Investigador de imagen:

RESUMEN:

Los estudiantes observan una imagen y crean una historia que la acompaña para construir una explicación de lo que podría estar pasando en la imagen.

GRADE RANGE (SUGGESTED)

K–5

MATERIALS:

- Una imagen o video
- Hoja de trabajo del Investigador de Imágenes



ENGRANAR:

1. Diga a los estudiantes que hoy veremos una imagen / video para tratar de comprender lo que podría estar sucediendo en él y descubrir la historia que está contando.

PREPARAR PARA EXPLORAR:

2. Presente la imagen / video que estará viendo. Pida a los alumnos que observen detenidamente la imagen durante un minuto o dos o que vean el video una o dos veces.

EXPLORAR

3. Una vez que los estudiantes hayan tenido un minuto para mirar la imagen o ver el video, pregúnteles "¿Qué está pasando aquí?" El objetivo de esta actividad es guiar el pensamiento y la comprensión de su estudiante sobre lo que está sucediendo en la imagen / video. Evite insertar información: permita que los alumnos observen detenidamente y razonen sus respuestas, en lugar de discutir los hechos.
4. Siguela primera pregunta con: "¿Qué ves que te hace decir eso?" para alentar a los estudiantes a respaldar su explicación con evidencia de la imagen. Este paso puede repetirse muchas veces, haciendo que los estudiantes desarrollen sus propias ideas.
5. Cuando un tren de pensamiento llega a su fin, pregunte "¿Qué más podemos encontrar?" para sacar más evidencia o continuar construyendo la explicación.

REFLEXIONAR Y COMPARTIR

6. Ahora que sus alumnos han pensado en la imagen / video y lo que podría estar pasando, pídeles que escriban una historia que lo explique usando la hoja de trabajo. Pueden usar palabras y / o imágenes para contar su historia.
7. ¡Haga que los estudiantes compartan su historia con alguien!

Extensiones y variaciones:

- Utiliza el mismo organizador gráfico, pero mira una imagen o video diferente.
¡Podría estar relacionado con cualquier contenido!
- ¡Tome todas las historias que crea su clase y compártalas en un libro para compartir!

Investigador de imagen:

Utiliza palabras y / o dibujos para contar una historia sobre lo que observó.



Drawing from the Museum's Collections



DRAW/LABEL:

Use pictures and words to show what you notice about **ONE** of the specimens on this page.

THINK:

What can you learn about this organism from observing the specimen?

What questions do you have about this specimen?

Dibuja de la Colección del Museo



DIBUJA/ETIQUETA:

Usa dibujos y palabras para mostrar lo que notas sobre **UN** espécimen en esta página.

PIENSA:

¿Qué puedes aprender sobre este organismo al observar la muestra?

¿Cuáles preguntas tienes sobre este espécimen?

Preserving Collections



Hi everyone! I'm Dawn Roberts, the senior director of collections at the Nature Museum. Today, I'm going to talk with you about how we prepare some of our specimens and why good preparation leads into long-term preservation.

The following is a transcription from our Curious By Nature episode, "Preserving Natural History Collections". Check it out on the Peggy Notebaert Nature Museum Youtube channel!

This is a **long-tailed weasel**, a species that is very common in Illinois and North America. On this particular one, we've got our scientific labels that tell us what it is, where it was collected, and when it was collected. Those pieces of each specimen's story are vital for biodiversity studies.

For mammals, we prepare a skin and a skull. These are both really important for scientific study and for understanding each species. It is necessary to preserve the specimen well in order to study it, for both an artistic understanding and a scientific understanding.

How do we do that?

Well, when we have a brand-new specimen, we have to take everything out from the inside. So, we make an incision, typically down its belly, and we have to take out anything that's going to rot away.

Now, why do we do that? That sounds kind of gross, right?

Well, let me ask you this. Have you ever left a banana out for way too long on their kitchen counter? What happens to it? It gets all gross and smelly and starts oozing all over your counter, right?

This is why we do taxidermy. We don't want anything like that in our collection. We have to take out everything that would rot, so that we can preserve the skin, the hide, and the skeletal parts forever.



Preserving Collections

We have some specimens in our collection from the 1830s, and there are some collections that house specimens from even farther back than that. Good taxidermy takes practice.

Now this form is called a **study skin**. This is how most of our bird and mammal scientific specimens are prepared. Why do we prepare them like this? It is so they can fit in a drawer. It makes for much easier organization and storage of all of these specimens and their parts.

A **display mount** is one of the other forms of taxidermy that we do. Display mounts look a lot different than a study skin, don't they? Display mounts illustrate a behavior of that species, and they are often used in exhibits.

This is a **northern harrier**, which is a member of the hawk family. You can see that this one was taxidermied and placed in a mount position with what looks like a little vole that it had just caught. It's illustrating one of the main behaviors of this species. Creating an accurate-looking representation of an animal in a display mount form takes a lot of artistic talent as well as a comprehensive understanding of that particular species, its muscular system, and how it behaves in its natural environment. Although we also make display mounts of mammals, you can see that display mounts of birds can be really tricky because they're balancing on two legs rather than four, and it's really important to get their body balance correct on their legs.



What do you notice about the two different preservation techniques?

What do you wonder about preserving our collections? What questions would you ask Dawn if you could?

Create Your Own Taxidermy Model



There are many ways of preserving, or saving, an animal's body for study. Some animals in the Museum—like birds and mammals—are preserved by removing the soft insides of the animal's body and preparing and stuffing the skins. This process of keeping the outside of an animal's body and filling the insides to preserve the animal is called taxidermy.

At the Nature Museum, many taxidermied specimens are part of our collection. Collections are an essential part of a museum's research and education functions and also serve an important role in environmental conservation. Specimens—individual pieces from a collection—can be excellent tools for connecting people to a topic of study or interest, whether they're displayed in a museum or used in educational programming. They also allow people to have an up-close look at something that they couldn't otherwise access. Preserving and displaying specimens in different ways can tell us different things about the lives of the plants and animals in a collection.

What you need:

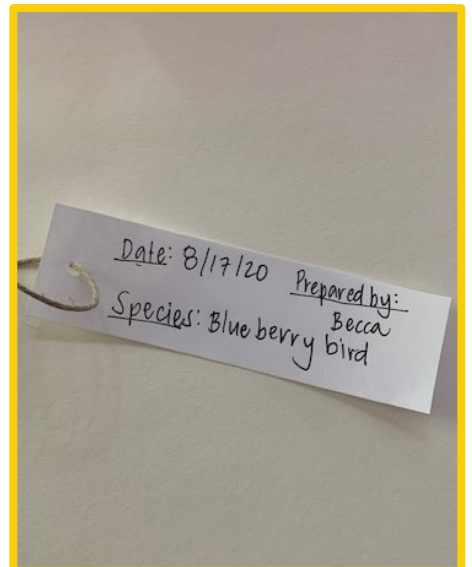
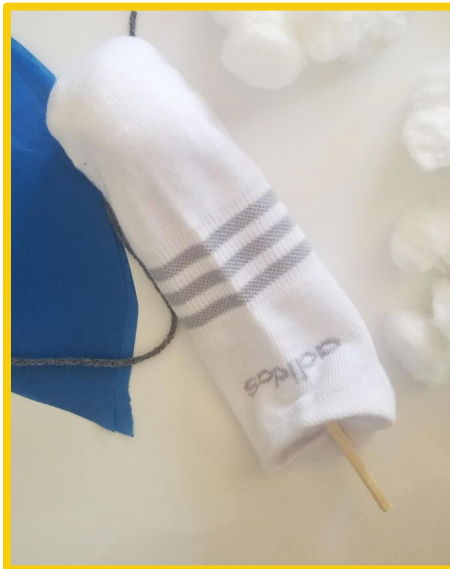
- ☐ Scrap fabric or tissue paper
- ☐ Cotton balls or quilt batting
- ☐ Yarn or string
- ☐ A popsicle stick or a chopstick



Create Your Own Taxidermy Model

Instructions:

1. Prepare your materials and start with a piece of fabric or tissue paper.
 - This represents the prepared skin and the fur or feathers.
2. Add filling and some structure using your cotton balls and stick.
 - this part of the model is similar to what happens during taxidermy the scientist uses foam/ stuffing and wire to create an accurate body shape inside).
3. Shape and close your model using your string or yarn.
 - this represents the way the scientist encloses the materials inside the taxidermied specimen
 - You can shape this and add details or patterns to the outside, if you like.
4. Create a data tag — include the date, your name and your animal's name!



Animal Home Investigation

What can we learn about an animal from its home? Dawn, our Senior Director of Collections, took some images of animal homes for you to observe! As you look at these images, what do you notice about the animal homes?



Hummingbird Nest / Chicago Academy of Sciences

What do you notice? What do you wonder?



Trapdoor Spider Burrow / Chicago Academy of Sciences

What do you notice? What do you wonder?



Paper Wasp Nest / Chicago Academy of Sciences

What do you notice? What do you wonder?

Animal Home Investigation



White-lipped Snail Shell / Chicago Academy of Sciences

What do you notice? What do you wonder?



Swallow Nest / Chicago Academy of Sciences

What do you notice? What do you wonder?

After looking at the images, pick two animal homes to explore further.

1. Record what you observe about each home by doing a scientific drawing. Use words and pictures!

Animal Home 1:

Animal Home 2:

Animal Home Investigation

2. Thinking about the two homes:

How are they SIMILAR?

How are they DIFFERENT?

3. What materials are the animal homes made out of? What can that tell us about where each animal might live?

4. What else can we learn about an animal by looking at its home?

5. What other things do you wonder about? Share them with us!

Extensions and Variations:

- Go on a walk around your neighborhood. What animal homes can you find?
- Now that you have had a chance to observe some animal homes, make one yourself! Use things you can find around your home—string, toothpicks, Play-Doh—and see if you can create an animal home inspired by what you observed.

Exploring Extinct Species



Hi everyone! I'm Dawn Roberts, the senior director of collections at the Nature Museum. Today, I'm going to talk with you about some very special specimens in our collection, extinct species.

The following is a transcription from our Curious By Nature episode, "Exploring Extinct Bird Species". Check it out on the Peggy Notebaert Nature Museum Youtube channel!

What does that mean for a species to be extinct? Quite simply, it means that the species is no more. For animals and plants, they might have once lived in great abundance. Now, however, you cannot find them anywhere in the world.

In Earth's 4.5 billion-year history, there have certainly been a lot of extinctions. Anybody who likes dinosaurs or Ice Age mammals knows that there are no dimetrodons or giant sloths in their neighborhood. Now, I want to talk with you about some species that have gone extinct within a *much* closer period of our history.

The first species that we'll take a look at is called the **passenger pigeon**. The passenger pigeon went extinct in 1914. Now, this bird used to be one of the most prolific and abundant animals around the Earth. Reportedly, you could see flocks of this species flying overhead and it would darken the sky for days at a time.

There are even journals in archives in which people have recorded that they saw flocks coming and everyone went inside. This is because there were so many birds coming through, that after the flock passed, everything was covered in bird poop. That would not be a mess I would NOT want to clean up!

Can you see the iridescence around the neck? This species is quite spectacular in body form. Just to compare, take a look at a rock dove (your normal sidewalk pigeon). Take a look at the body shape. What do you notice?

Common sidewalk pigeons are not very fast, are they? The passenger pigeon's body is a lot slimmer and longer. Thus, it is more aerodynamic and could fly much faster. There were even reports that passenger pigeons could fly upwards of 60 miles per hour!



Exploring Extinct Species

In a scientific collection, all of our specimens have labels that tell us what it is, where it was collected, and when it was collected. Those are really key pieces of information. One of the big purposes for a scientific collection like this one, is that all of these specimens have individual stories, and we use these stories to take a look at nature's history in the past, to learn about what's going on presently, and to potentially extrapolate what could happen in the future.

One of the things that scientists and biodiversity studies are pointing to, is that—because passenger pigeons had been so numerous—their extinction didn't just affect this one species. Instead, it had a ripple effect throughout ecosystems. In fact, the **American burying beetle**, which used to be in great numbers around North America, had a pretty severe population crash. Numerous scientists think that the American burying beetles' population decline is tied to the extinction of the passenger pigeon.

Let's take a look at another extinct bird species that we have in the collection. This is the **Carolina parakeet**. This one is a lot more colorful than the passenger pigeon. The Carolina parakeet was very social like almost every other parrot species, too. This species went extinct in 1917. This species definitely had a majority of its range around Florida and Georgia—mostly the warmer southern states. But, they did come up to the northern areas, like Illinois, New York, and even the southern parts of Canada.

So, why do we retain extinct species in our collection? What purpose do these specimens and the stories attached to them have in our understanding of nature today? Well, understanding human impact on nature is a definite part of the equation that scientists and biodiversity managers seek to understand. It is really important that we understand how we influence the environment and the world around us in both positive and negative ways.

The more we learn about how these species may have interacted in the ecosystem with plants, insects, other vertebrates, and people, can help us understand all of the relationships that we see out our window and in our neighborhood today in nature.



Credit: Lindsay Vivian / USFWS



Exploring Extinct Species

What are some things you notice about the passenger pigeon? What do you wonder?

What are some things you notice about the Carolina parakeet? What do you wonder?

What do you wonder about our collections?

What do you wonder about extinct species?

Are there other extinct species you'd like to learn more about?

Pressing Plants At Home

Pressing plants at home is an easy activity and a fun way to learn more about the plants in your yard or neighborhood.

What you need:

☐ Plants ☐ Paper ☐ Heavy books ☐ Cardboard (optional)

Collecting the Plants

Any or all parts of a plant can make a good pressing – a stem with flowers and leaves, leaves found on the ground, or just a flower. Make sure you collect from places where you have permission (your yard) or it's okay to collect (any public access way).

When collecting plants for a scientific collection, we collect as many parts of a plant as possible – stem, leaves, flowers, roots – as these aid with the identification process and can inform future study of the specimen.

If you are interested in identifying the plant, this is easier when it is fresh. Taking photos of the plant “in situ”, or where it is originally, gives you a record of the type of environment where the plant was growing. Plant identification books or apps such as iNaturalist can help you identify the specimen.



Bot-3476. Jacob's Ladder, *Polemonium reptans*.
Collected in Warrenville, IL, May 10, 1871.
From the *Chicago Academy of Sciences* collection.

Pressing Plants At Home

Collecting the Plants

There are two key aspects to pressing plants effectively:

1) Removing moisture from the plant 2) Flattening it with evenly distributed weight

Removing the moisture.

Pressing your plant between pieces of paper helps remove the moisture from the plant during the pressing process. Sandwich your plant specimen between two sheets of paper. It can be folded or two separate sheets, it can be newspaper, blotting paper, or printer paper—just make sure the paper covers the plant entirely.

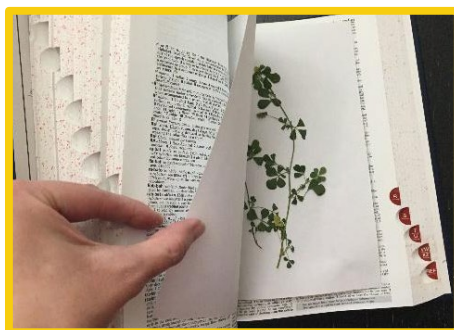
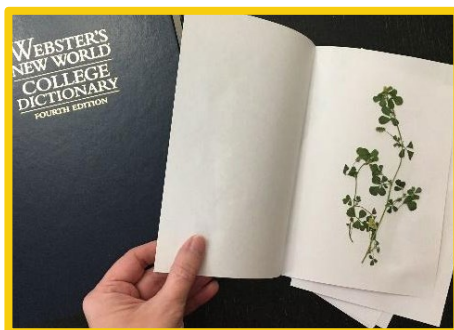


Flattening the plant.

Having an evenly distributed weight across your plant is key. A plant press is really just sheets of cardboard interleaved with paper, book-ended with boards and tied together with adjustable straps. You can make these pretty easily if you plan to do lots of plant pressing. Here's an example of a plant press:



If you don't have a plant press, no worries! You can place the papered plants within a heavy book or in between two pieces of cardboard. You want to ensure enough weight is applied to evenly flatten the plants, so stack a couple of heavy books on top. Allow 1-2 weeks for the plants to completely dry.



Mounting Plant Specimens At Home

Pressing plants at home is an easy activity and a fun way to learn more about the plants in your yard or neighborhood. This guide will show you how to mount your plant specimens.

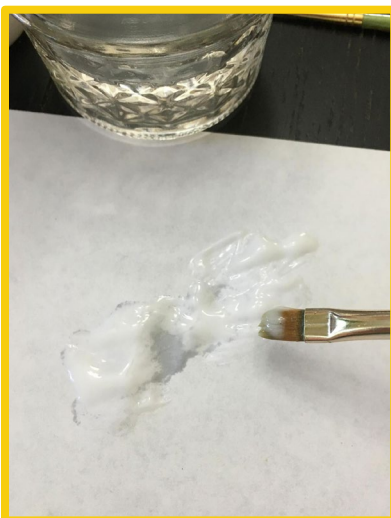
What you need:

- ☐ Pressed plant specimens
- ☐ White glue jar with water
- ☐ Paint brush
- ☐ Paper plate and/or scratch paper
- ☐ Heavy paper
- ☐ Forceps/tweezers (optional)
- ☐ Ink pen or pencil



Step 1: Set up your work area

Fill a jar with some water, pour some glue onto the paper plate or scratch paper. Have your heavy paper for mounting the specimen onto in front of you. Have your pressed plant specimen on a scratch piece of paper next to it.



Step 2: Applying glue to your specimen

Dip your brush into the water and then use your brush to gently pull out some of the glue, applying water a little at a time to thin the glue out and load it into your brush.

Decide which side of your plant you want to show, this will be the front side. Flip your plant so that the front side is face down. With your paint brush, gently paint the glue to the back side of your plant. Apply an even coat of glue on all parts of the plant.

Mounting Plant Specimens At Home



Step 3: Position your specimen

Gently lift your plant with your fingers or forceps and lay it glue-side down onto your mounting sheet. Gently pat the plant down onto the mounting sheet.

Step 4: Let the plant dry

You can label the sheet with the plant name (common and/or scientific), who collected it, the date collected, and location collected.



Bonus: Get creative!

Paint the mounting sheet beforehand, use several plant specimens to create a design, or make notecards.

Nature Journal

My Animal Drawing:

Animal species name:

Description (What did it look like? What color was it? How big was it?):

Diet (Was it eating? If so, what was it eating?):

Habitat (Where was it?):

Behaviors (What was it doing?):

Nature Journal

My Animal Drawing:

Animal species name:

Description (What did it look like? What color was it? How big was it?):

Diet (Was it eating? If so, what was it eating?):

Habitat (Where was it?):

Behaviors (What was it doing?):

My Observation Journal

I'm observing: _____

I notice:

(Use words and drawings to describe what you're observing.)

I wonder...

(Write all the questions you have about what you're observing.)

My Observation Journal

I'm observing: _____

I notice:

(Use words and drawings to describe what you're observing.)

I wonder...

(Write all the questions you have about what you're observing.)

Story Time Graphic Organizer

Story Time Book Title: _____

1a) Use words and pictures to share about the main idea in the story.

1b) Describe some adventure or exploration that happened.

2) How is nature involved in the story?

Story Time Graphic Organizer

Story Time Book Title: _____

3a) How does this story make you feel and why?

3b) Does the story give you any ideas about your own life?

4) After reading the story, what do you wonder?

Story Time Graphic Organizer

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Don't forget to share your
experience on social media!

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