

Finding Flowers, Trees, and More!



Plants Vol. 2 Wonder Workbook

CHICAGO
ACADEMY OF
SCIENCES

PEGGY NOTEBAERT
NATURE
MUSEUM

Exploring Plants with Seth Harper

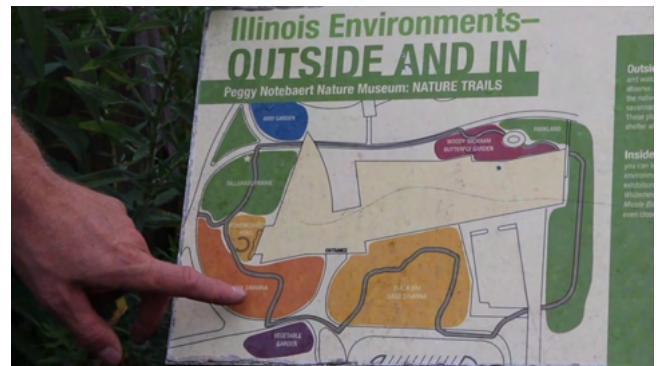
My name is Seth Harper, I'm the manager of horticulture here at the Peggy Notebaert Nature Museum, and that means my job is to take care of everything green here on the grounds.

Let's take a walk and look at some of the most important species that we're growing.

The Peggy Notebaert Nature Museum is the museum of the Chicago Academy of Sciences. When we moved from our old home in Lincoln Park up to this location, we were given a piece of land around it and we had to decide what to do with it.

We wanted to be able to represent different Illinois habitats on the grounds, so we began a prairie restoration back in the mid-2000s. It's called the Elizabeth Plotnick Tallgrass Prairie. Then in around 2010, we had a grant for creating the Nature Trails, which is a pathway leading all around the building, through different habitats, through the tallgrass prairie, and then over to the burr oak savanna, and then finally the black oak savanna.

We're going to get started in the prairie. A prairie is a grassland habitat and as such there are very few trees, if any. Our prairies here are dependent on fire to remain open, and because of those fires, there's a great diversity of plant life that thrives in a prairie that won't thrive anywhere else.



One of the most prominent flowers in the tallgrass prairie is the compass plant. Compass plants are called that because, theoretically, the leaves align in a north-south direction, although as you can see from this specimen, I don't think I'd want to try and find my way home with it. Many flowers in a prairie have this basic shape a daisy-like flower, and many of them are yellow, and so they become a little hard to tell apart, but these are all very important flowers because they're

prominent sources of nectar for various pollinators including butterflies and bees.

This is a compass flower cut in half and, as you can see, there's a lot going on here. All of these separate parts are actually tiny flowers complete in themselves. On the outside, you have what are called the ray flowers. This is a complete flower, but it looks like just one petal. Inside are disc flowers. The ones here in the center have not opened yet, here the ones around the outer edge have. Sometimes in composites, there are only ray flowers or there are only disc flowers. This is an example of a classic composite flower with both.



This plant is called big blue stem. The tallgrass prairie is named for several species of grass, which are very predominant, and many of them are quite tall, and this one in particular big blue stem can get up around six feet tall. This is the inflorescence, you can see the flowers are just starting. The big blue stem has these flower stalks that kind of split like this and end up looking almost like a bird's foot and so sometimes this plant is called turkey foot. Big blue stem is very tolerant of dryness, in fact, it has a special metabolic pathway that helps it use less water. Because of that it thrives in the late summer.

Big blue stem is also very fire tolerant, and the reason for that is grasses sprout from the base and grow upward. With big blue stem and other prairie grasses, that base is actually a couple inches under the ground, so fire races over top and the new grass can shoot up immediately afterwards. Most prairie fires happen in the spring and at this time the grasses are at their driest and fire can carry through the prairie quickly. This is what helps keep prairies open and by burning so easily, these grasses keep down other vegetation that might compete with them.

Another common feature of eastern prairies are plants in the mint family, such as bee balm. These plants tend to be very important nectar sources, they all rely on insect pollination. You can tell plants in the mint family, for one thing they tend to have a scent to their leaves.

They also will have typically square stems instead of round, and flowers will be arranged in a circle often around the stem itself.



Tallgrass prairie as an ecosystem is very unique, it's unique to this part of the world. There are many grassland ecosystems all over the world, but this particular one is native to here. It's a little unique because the prairies in the Midwest, especially towards the eastern half, are in areas that actually have enough rainfall to support larger plants such as trees and shrubs, but they remain open due to natural fires, due to grazing animals, and

especially due to the efforts of Native Americans who used this land extensively, both for game and for agriculture and they used fire as a tool for those ends.



Now we're standing in our black oak savanna here at the Nature Museum. Savannas are a unique ecosystem that represents a transition between woodland and prairie. On a savanna, you'll have an open country dotted with trees. Too many trees too close together, you're back in the woodland, and too many trees too far apart you're back in prairie. The savanna is in between. Fire is also important in savannas, it helps maintain the open spaces between

trees and because fires are fairly frequent in the savanna, only the most fire tolerant of trees can survive.

The most important of these are the black oaks and the burr oaks. Burr oak is the most important savanna tree in our area. It's the most fire-resistant tree due to the thick corky bark. It's a member of the white oak family, the white oak group. You can tell the white oak group because the leaves have rounded lobes and do not have a bristle at the tip of any of the lobes. The acorn cap itself covers almost the entire acorn, because of that these are sometimes called overcup oaks.



Black oaks are the other main important savanna tree in this area and in the entire Midwest region. Black oak savannas are much rarer than burr oak savannas and we're very fortunate to have a black oak savanna recreation here on the grounds. Black oaks thrive in sandy soil where many other species do not, and they are also reasonably fire tolerant, so in very sandy areas, particularly near the lake shores, you'll see black oak savannas develop. The area we're standing on is the hill in front of the Nature Museum, and as you can see here, this is very sandy soil. In fact, this is a remnant sand dune. The shore of Lake Michigan is right over there at the harbor, everything you see beyond



it was actually built when Lake Shore Drive was built out there, so this used to be the very shore of Lake Michigan and you can see here where a sand dune formed. A sand dune like this will slowly be covered and turned to woodland, but it may take 500 years for that to happen, and black oaks will be a big part of that process starting.

One of the most important vegetative features of our local savannas are sedges. Sedges form much of the grass-like ground cover of savannas, and they are grass-like, but they are not grasses.



Another common plant of savannas is the staghorn sumac. This is what we call a pioneer species. A pioneer species is one of the first species to arrive and colonize the land after disturbance such as flood, fire, or human interference. This sumac is part of a large colony that is actually all clonal, it's all one plant. The sumac sprouts and then sends lateral roots through the ground, and new shoots come up all around it forming an ever-expanding colony. As the colony ages, it begins to flower, and the younger shoots will produce male flowers, and older shoots towards the middle, will form

female flowers. This plant is great for a natural beverage. Just take the fruit and soak it overnight in cold water, sweeten it, and you'll have a drink sort of like lemonade.

Another plant that you can find here on the grounds of the Museum, or in a prairie, a savanna, or just about anywhere, is common milkweed. Common milkweed is the food source of most importance to monarch butterflies. Their caterpillars eat the leaves of various species of milkweed, but common milkweed is their preferred host. Milkweed flowers are also an important source of nectar for large bees and for butterflies. Common milkweed is one of many species we have here in Illinois. It's also a common species of disturbed areas and vacant lots.





Another interesting plant that you'll find on our grounds is the cardinal flower, *Lobelia cardinalis*. Cardinal flower is named for its bright red color. It's a somewhat unusual member of the bellflower family. Most members of the family are blue in color and are pollinated by bees and other insects, whereas cardinal flower has this bright, bright red color to attract hummingbirds for pollination. You can see the flower is bilaterally symmetrical with a large lip

on the bottom, and then this structure here is where the pollen is deposited on the face and the head of the hummingbird as it goes from one flower to another, and that's how it enacts pollination.

Let's end by taking a quick look at the blazing stars, a plant in the genus *liatris*. Blazing stars comprise about 50 species in North America, and they're members of the aster or composite family. So that means when we look at these individual bundles, we might think that each one is a flower, but, in fact, each one of these bundles themselves contains multiple complete flowers. In this group, which is the boneset group, the flowers have only the disc flowers like you would find in the center of a daisy. It does not have any of the petal-like ray flowers that one typically sees on daisy-like flowers. *Liatris* are common in many different habitats and they're an important component of the prairie flora because they provide a good deal of nectar and pollen for insects. These plants have an inflorescence that is what we call determinate. In other words, the inflorescence begins opening at the top and the newest flowers open down at the bottom. This is opposite of the way many inflorescences would be and it helps distinguish this plant.



What do you wonder about the prairie? The savanna?

What do you wonder about the plants?

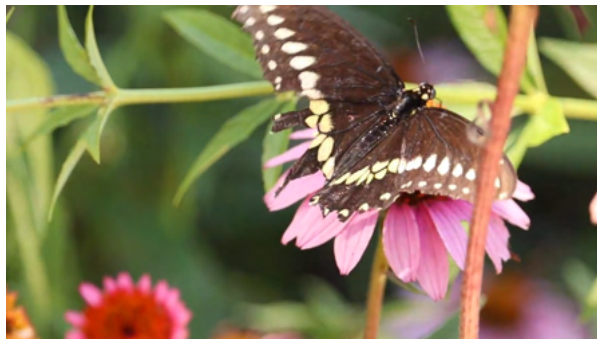
Image Investigator

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 and 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.

Rango de grado escolar (sugerido): K-5

Materiales:

- 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. Siga la 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:

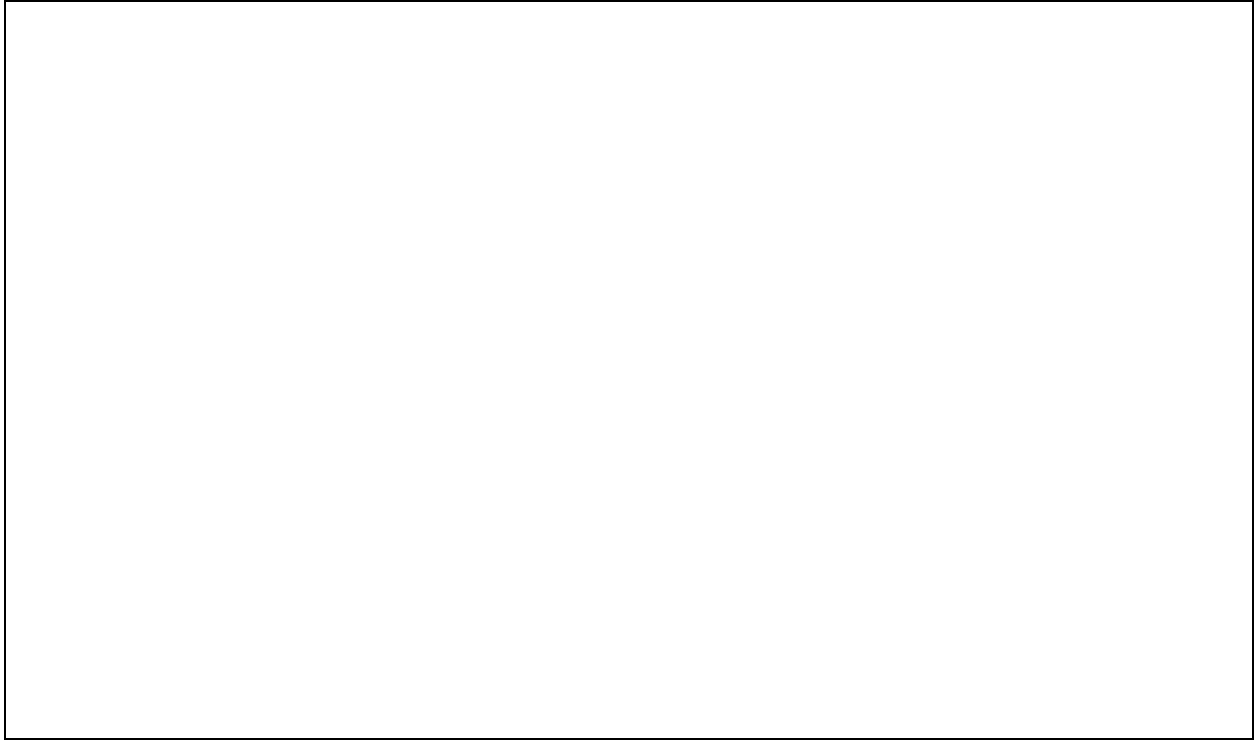
6. Ahora que sus alumnos han pensado en la imagen / video y lo que podría estar pasando, pídale que escriban una historia que lo explique usando la hoja de trabajo. Pueden usar palabras y / o imágenes para contar su historia.
7. ¡Haga que los estudiantes compartan su historia con alguien!

Extensions and Variations:

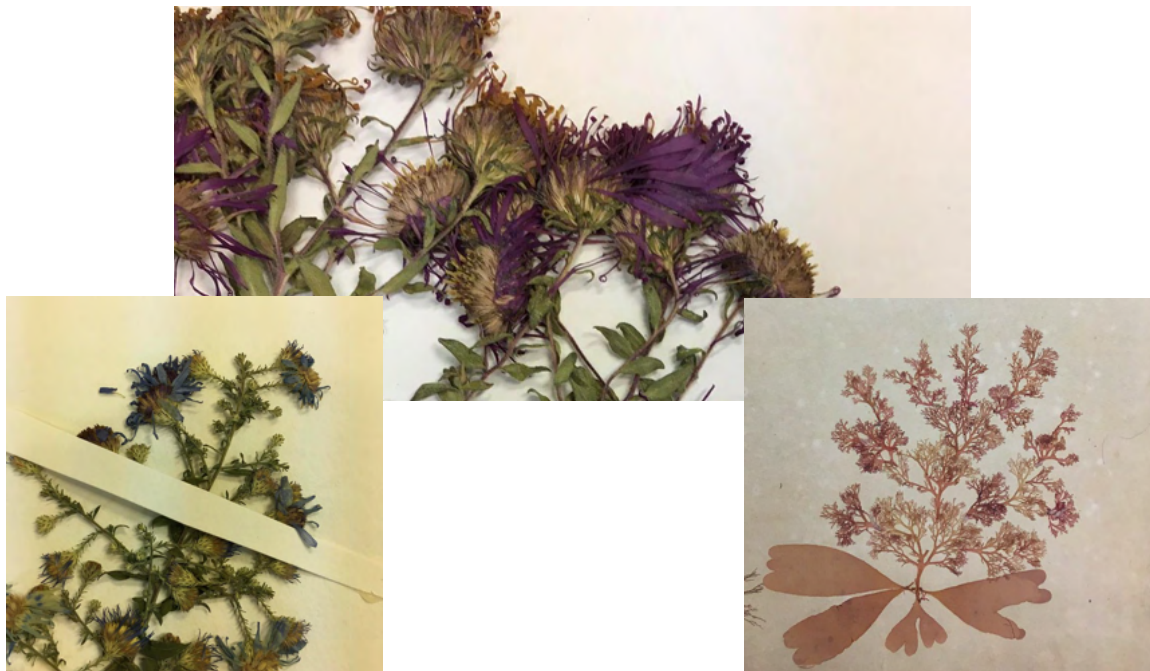
- Utiliza el mismo organizador gráfico, pero mira una imagen o video diferente. ¡Podría estar relacionado con cualquier contenido!
- ¡Tome todas las historias que crea su clase y compártalas en un libro para compartir!

Investigador de imagen:

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



Drawing from the Museum's Collections



Draw/Label:

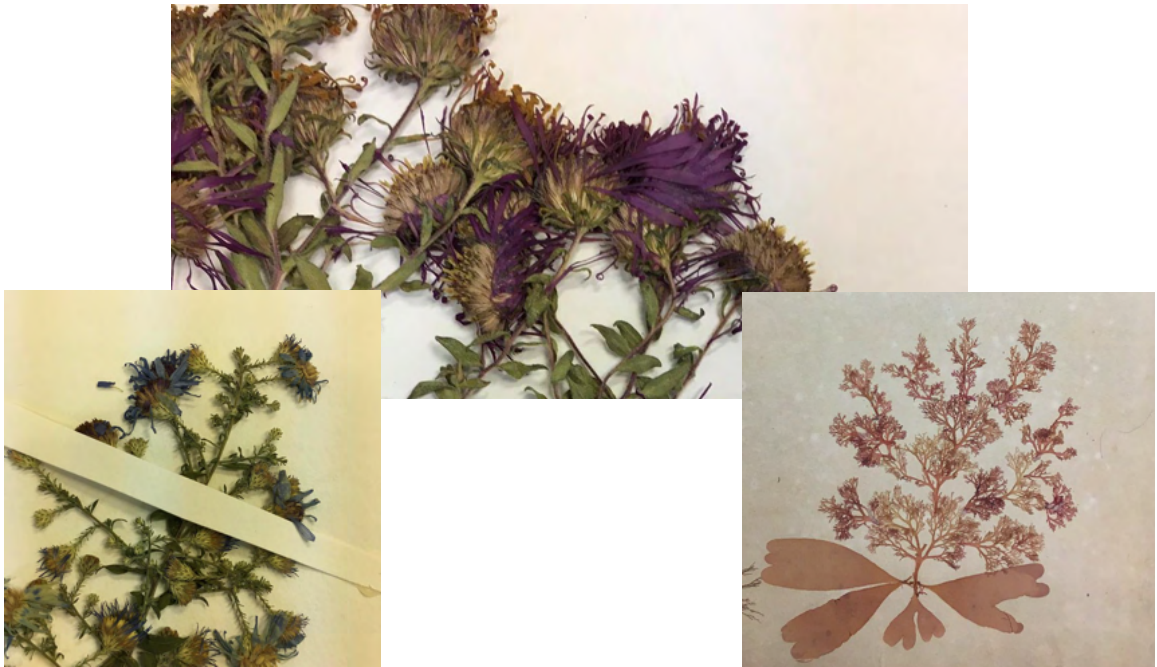
Use pictures and words to show what you notice about **ONE** of the specimens on this page.

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?

Let's Make Our Own Plant!

Plants usually have three main parts: roots, stems, and leaves

Roots:

Roots are often underground and take up water and nutrients from the soil. They help anchor the plant and keep it upright.

Can you think of any plant roots that you like to eat?

A crunchy, tasty orange carrot is the root of the carrot plant! It's called a taproot, and has adapted to store lots of nutrients for the rest of the plant.

Stems:

Stems are like the superhighway of the plant: they transport water and nutrients from the **roots** to the **leaves**. They also provide support and structure to keep the plant strong, and flexibility so the plant can bend in the wind without breaking. The place where a leaf or branch attaches to a stem is called a **node**. The part of the **stem** between leaves and branches is called an **internode**.

Can you think of any plant stems you like to eat?

Tubers such as potatoes are actually modified stems that grow underground! They store nutrients for the rest of the plant.

Leaves:

While the roots are busy drinking up water and nutrients from the soil, the **leaves** are busy photosynthesizing.

Photosynthesis is when plants use sunlight as energy to turn water and carbon dioxide into oxygen and sugars. The plants “breathe in” carbon dioxide and “breathe out” oxygen (thank you, plants!). They use the sugar as fuel for growing and making fruits, seeds, and flowers.

The part of the **leaf** that attaches to the **stem** is called a **petiole**. The thin, flat part of the leaf is called the **blade**. The lines running out from the center of the leaf are called the **veins**. They carry water and nutrients to the leaves, and provide structure. Many leaves have a vein going down the center called a **midrib**.

Can you think of any leaves you like to eat?

Salad greens like lettuce, spinach, and kale are all leaves! But did you know that an onion is a modified leaf? Just like a carrot (root) and potato (stem), it has adapted to store nutrients.

Flowers:

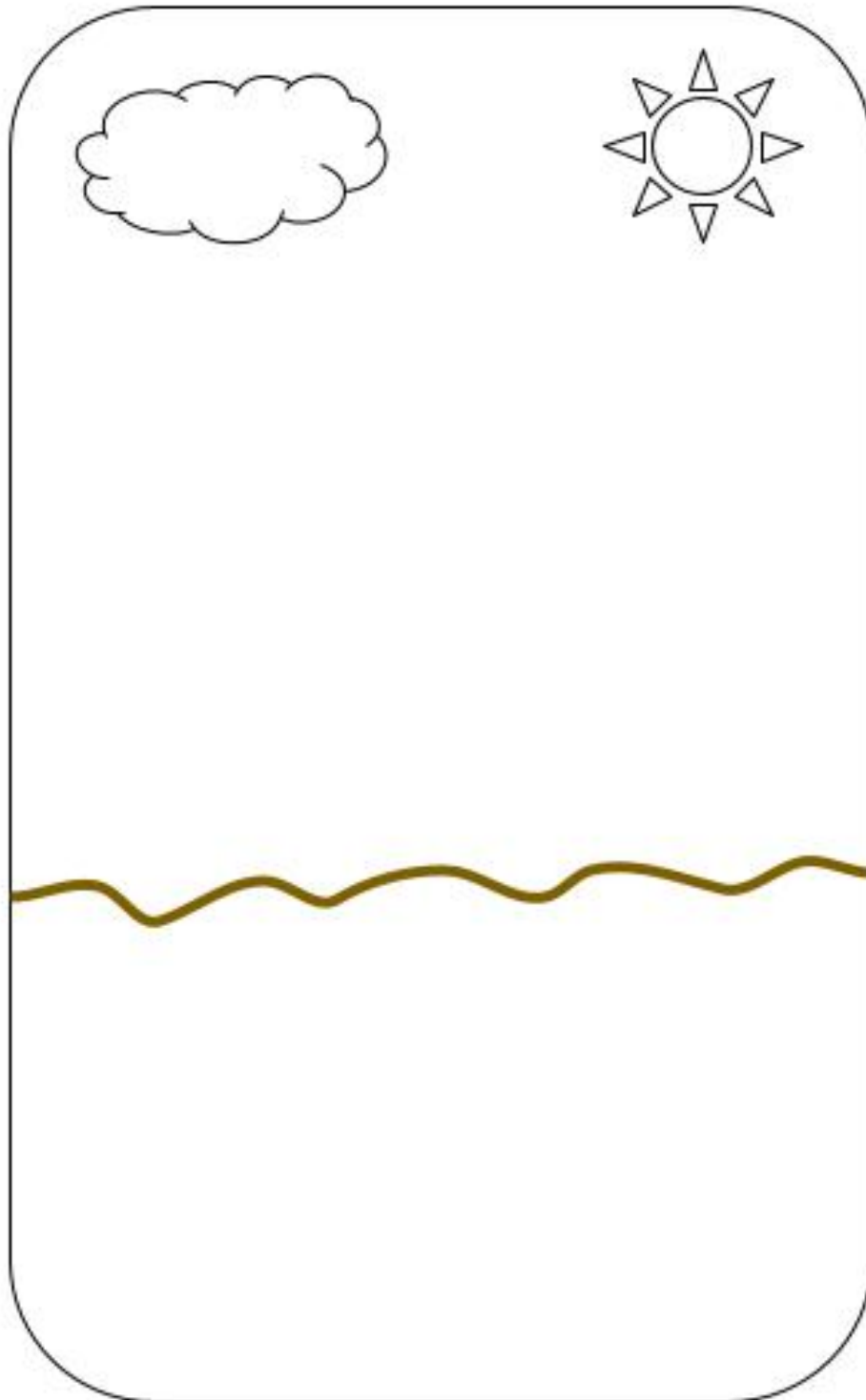
Not all plants have flowers! For plants that do, the primary purpose of the **flower** is to produce **seeds**, from which new plants will grow. To make a seed, the plant has to be pollinated. Bugs, birds, other animals, wind, and even people can transfer **pollen** between flowers. Some flowers can self-pollinate! **Fruit** develops from the flower around the seed, offering protection and a way to spread the seeds: when animals eat the fruit, they poop out the seeds somewhere else!

Can you think of any flowers you like to eat?

Nasturtium flowers are edible, and often put onto salad! Many flowers, such as chamomile, are used in tea. Squash blossoms can be fried for a delicious snack.

Design Your Own Plant

Use the word bank on the right to label the different parts of your plant. Think about how your plant gets water, sunlight and food; if it makes flowers and fruit; who pollinates your plant; and where it might grow! You don't have to use all the words--the most important parts are the roots, stems, and leaves!



WORD BANK

ROOTS
STEM
LEAF
FLOWER
SEED
POLLEN
FRUIT
PETIOLE
BLADE
VEIN
MIDRIB
NODE
INTERNODE

Color Exploration with a Flower Sensory Bin

A sensory bin is a bin or container full of items selected to stimulate the senses! This bin invites imaginative play, use of minor motor skills, and rich sensory experiences for young children. This colorful sensory bin is inspired by summer flowers and is a fun way to play with and explore colors!

Materials:

- Bin
- Potting Soil
- Real or fake flowers - a variety of colors and sizes!
- Real or fake leaves/ plants
- Small plastic plant pots (*Did you buy plants this summer? This is a great way to reuse those plastic pots!*)
- Additional toys - like spoons or cups for scooping



A Sensory Bin Guide for Grown Ups

A little on how and why: Especially, if this type of play is new to your child, be sure to set the expectations ahead of time (“A grown-up has to take the bin down” and “All the items have to stay together”). Provide some encouragement and guidance as needed. Invite your child to sort the objects (this is a great way to name and explore colors), suggest scooping and pouring (excellent for minor motor skills) and encourage pretend (let your child lead the way)!

Remember, many bins have small items which could be a choking hazard for young children.

On sustainability: There are lots ways to make your bin a bit more gentle on the earth!

- *Think about storage so the bin can be used over and over-* Play with and store items in the same container (just be sure you have a tight fitting lid)! Or, if that's too bulky, store the cleaned materials separately in smaller bins or zip top bags for reuse.

- *Use natural items* - Make the base natural and biodegradable. We love rice, beans, soil or sand, and strips of crimped paper as a base material. Add other natural objects with different textures and sizes like pinecones, wooden blocks, rocks or sticks.



- *Reuse*- Yes, those bins with perfectly themed toys on pinterest are sooo cute but, don't worry, the toys, spoons, containers and objects you already have are perfect for this project!

Nature Rubbings with Crayons & Watercolor

Local artist Katherine Lampert is showing us how to make our own nature rubbings using objects we can find in our backyard or local park.

SUPPLIES

- Wax crayon (any color works, clear or white will give an invisible design)
- Lightweight white paper, such as regular copy paper
- Watercolor paint
- Bag for collecting objects from nature

DIRECTIONS

Go on a nature hunt to collect objects that have some texture, such as leaves with bumpy veins, twigs, flowers and seed pods.

Back at your “studio” place a sheet of clean paper on your work surface. This will help eliminate the rubbing picking up any surface texture from the table. Arrange your nature objects, textured side up, on top of the paper. Place another sheet of paper on top.

Using a crayon, begin to create your rubbing. Experiment with pressing very lightly at first and add more pressure later if you want to add more texture.

Once finished, add a wash of watercolor paint over the top. If you used a clear or white crayon, watch your invisible design appear! If you used a colored crayon, try using paint colors that contrast with the crayon color so that your design really “pops.”



Pressing 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.

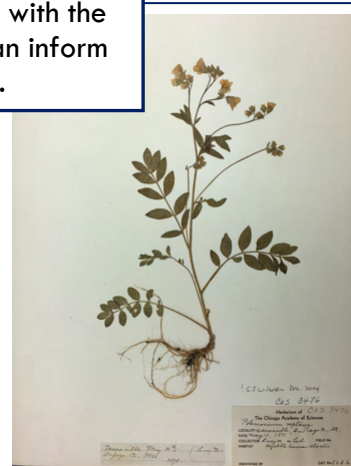
Supplies needed: • Plants • Paper • Heavy books • Cardboard (optional)

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 ok 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.



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

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.

Pressing the Plants

There are two key aspects to pressing plants effectively:

- removing moisture from the plant
- 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.

Supplies needed:

- Pressed plant specimens (see “Pressing Plant Specimens At Home” guide)
- White glue (Elmer’s school glue or similar)
- Jar with water
- Paint brush
- Paper plate and/or scratch paper
- Heavy paper for mounting specimen onto
- Forceps/tweezers (optional)
- Ink pen or pencil

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.



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.





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.

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.



Get creative!

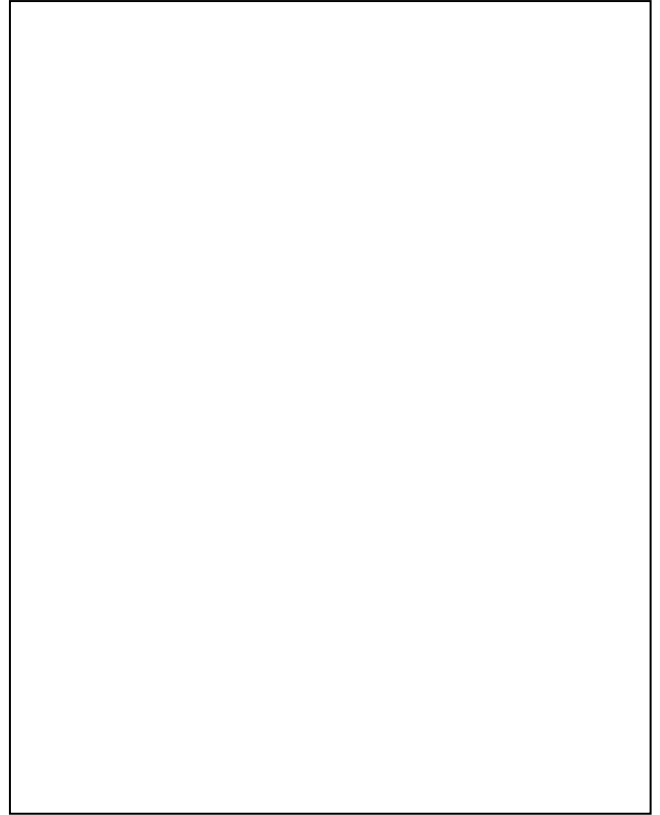
Paint the mounting sheet beforehand, use several plant specimens to create a design, or make notecards.

Neighborhood Species

Species name:

Description (color, size, etc.):

Diet:



Habitat (where did you see it?):

Behaviors (what was it doing?):

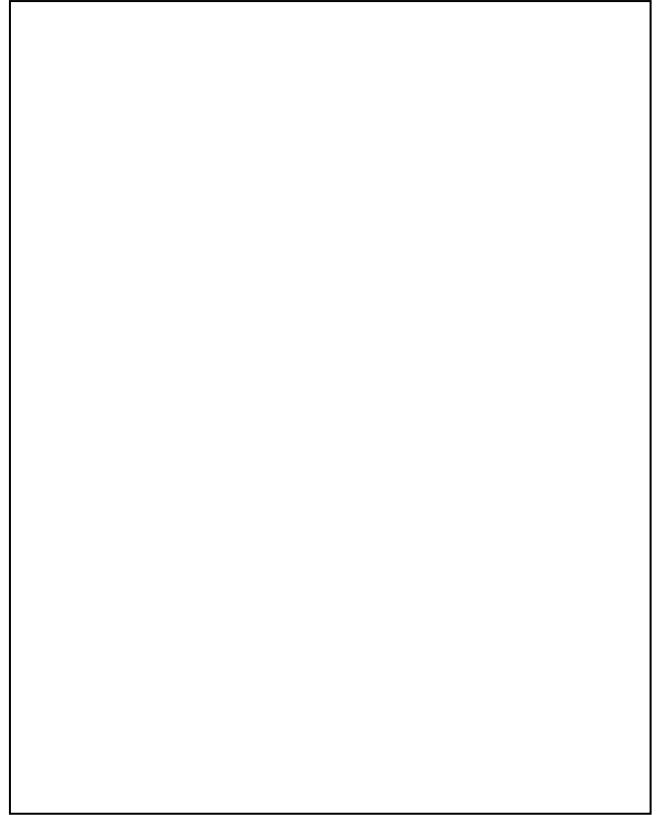
Drawing and research done by: _____

Neighborhood Species

Species name:

Description (color, size, etc.):

Diet:



Habitat (where did you see it?):

Behaviors (what was it doing?):

Drawing and research done by: _____

My Observations

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)

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Story Time Graphic Organizer

Story Time Book Title: _____

Use words and pictures to share about
a main idea in the story you read.

Describe some adventure or exploration that happened.

How is nature involved in the story?

As you were reading the story, how did you feel?

Does the story give you any ideas in your own life?

After reading the story, what do you wonder?

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