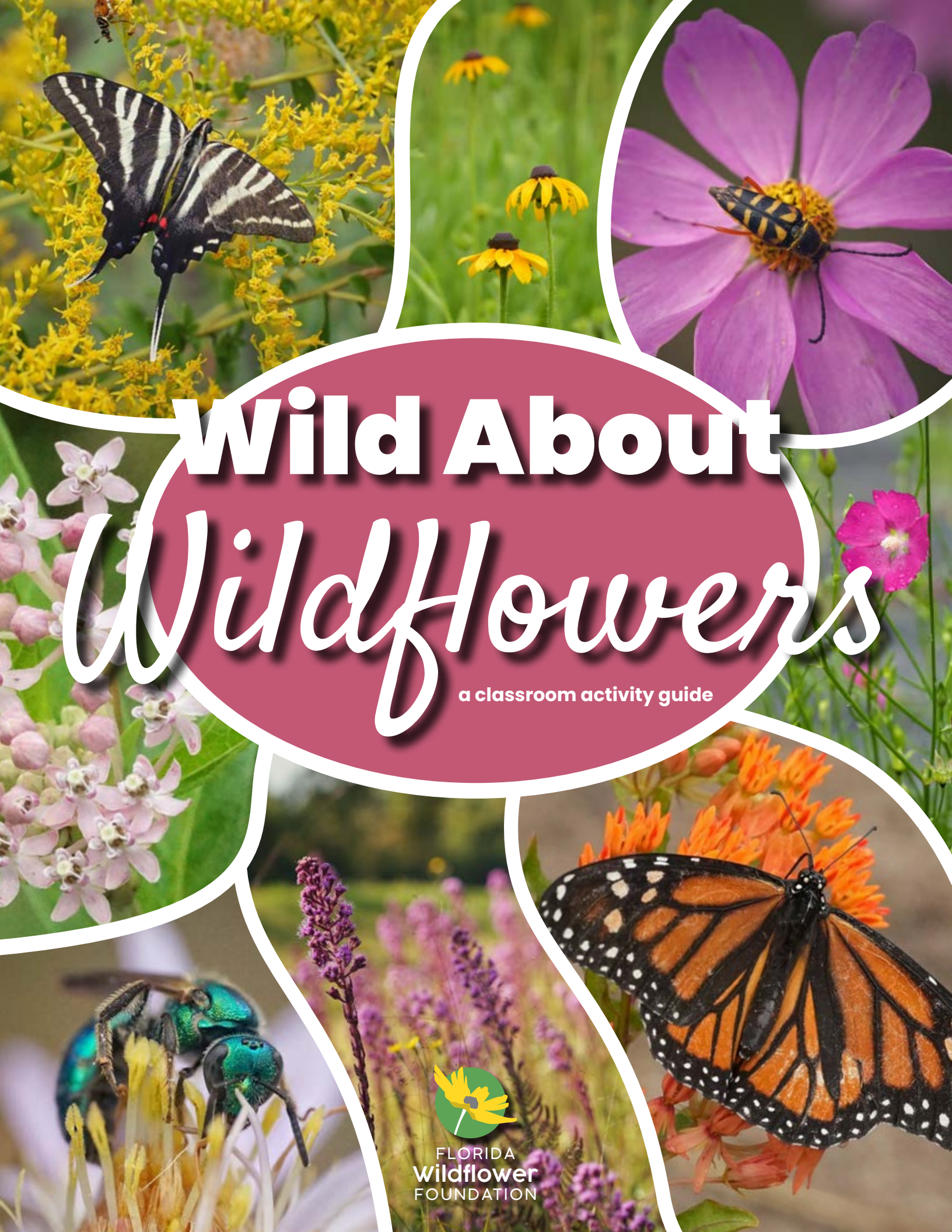


Wild About Wildflowers

a classroom activity guide

FLORIDA
Wildflower
FOUNDATION

This publication was produced by the Florida Wildflower Foundation with support provided by
the State Wildflower license plate and Wildflower Foundation, Miami.

Some activities have been adapted in part from *Exploring the Native Plant World*, developed by the Lady Bird Johnson Wildflower Center.

Photos by Emily Bell.

Cover (clockwise from upper left): Zebra swallowtail on Goldenrod (*Solidago* sp.); Woodland poppymallow (*Callirhoe papaver*), beetle on Swamp tickseed (*Coreopsis nudata*), Black-eyed Susan (*Rudbeckia hirta*), Monarch on Butterfly milkweed (*Asclepias tuberosa*), Hairy chaffhead (*Carphephorus paniculatus*), Sweat bee on Elliott's aster (*Symphyotrichum elliottii*), Pink aquatic milkweed (*Asclepias incarnata*)

Page ii (left to right): Spicebush swallowtail on aster (*Symphyotrichum* sp.); hummingbird on Dotted horsemint (*Monarda punctata*)

Page iii (top to bottom): Black swallowtail caterpillar on Spotted water hemlock (*Cicuta maculata*); Pine lily (*Lilium catesbaei*); Flat-collared bee wolf on Leavenworth's tickseed (*Coreopsis leavenworthii*)

Page xiii (collage, left to right, top to bottom): Monarch on Snow squarestem (*Melanthera nivea*); Sunshine mimosa (*Mimosa strigillosa*); Frogfruit (*Phyla nodiflora*), Purple passionflower (*Passiflora incarnata*); Bumble bee on Dotted horsemint (*Monarda punctata*); Forked bluecurls (*Trichostema dichotomum*); Scarlet hibiscus (*Hibiscus coccineus*); Sulphur butterfly on Firebush (*Hamelia patens*); Coral honeysuckle (*Lonicera sempervirens*)

Table of Contents

Overview

The purpose of the Florida Wildflower Foundation's *Wild About Wildflowers!* activity guide is to increase students' knowledge about Florida's wildflowers. The activities in this edition have been designed to meet specific third- and fourth-grade standards; however, many may be adapted to other grade levels and audiences.

For this guide, wildflowers are defined as flowers that grow in the wild or on their own, without cultivation. Florida wildflowers have adapted to the state's conditions and pests; typically require less water, fertilizer and pesticides than other flowers; and support a myriad of native wildlife, including bees, butterflies, hummingbirds and more.

This guide is organized into nine units that build on one another, moving from the structure of a single flower to the broader ecological and cultural roles wildflowers play. Units and activities may also be used individually and independently. Each unit contains a glossary of vocabulary terms that can be printed and provided to students, as well as a resources page with books and websites to help expand and enhance the activities.

In this guide, students will learn that, like animals, plants reproduce and have male and female parts. They will discover how reproduction works in flowering plants and the critical role each flower part plays in that process. Students will learn how wildflowers and other plants adapt to their environments, how those environments shape the way the organism looks and function, and how wildflowers interact with the animals and ecosystems around them. They will also explore the many benefits of wildflowers to humans — past and present— and develop practical skills for identifying and naming the wildflowers in their own communities.

In order to teach scientific concepts to students, other plants may be used for observation, experiments and investigations. Wildflowers have the same parts and processes as other flowering plants but are often smaller in size or more delicate to study. Students should be made aware that any substitute plants are models — similar in most characteristics to wildflowers but possibly varying in size, color, shape and other features. This guide is designed to help students learn about flowering plants, specifically Florida native wildflowers, and does not address the characteristics and habits of non-flowering plants.

Introduction

What is a native plant?

A native plant is a plant species that occurs naturally in a particular region, state, ecosystem and habitat without direct or indirect human introduction. Florida native plants were first recorded by botanists and explorers in the 1560s, but they existed here long before that, growing and adapting throughout Florida's long geological history.

Native plants are a part of the natural neighborhood — living components of local ecosystems that function alongside other organisms. They are a critical part of nature's web, having evolved over time to respond to local climate, soils and environmental conditions without human assistance.

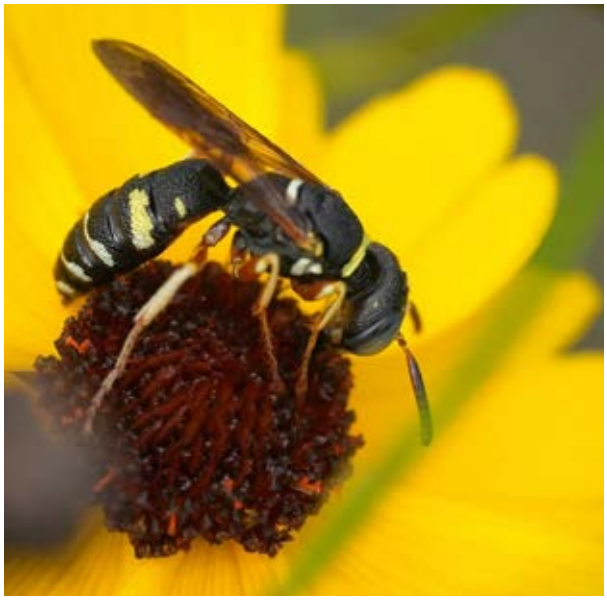
Native plants provide food and shelter for many kinds of animals, including humans. They help filter the air, reduce soil erosion, and support healthy soils and waterways. Because native plants fill specific ecological roles, or niches, within their ecosystem, they generally grow in balance with the surrounding environment. The interactions and interdependence of plants, animals and other organisms together form a biological community.

Native plants are in crisis.

Across the globe, native plant communities have been reduced or degraded by farming, ranching, urban development and the widespread use of chemicals. As habitats are lost or altered, many native plant species have become endangered, threatened or extinct. When plant diversity declines, soil erosion increases, ecosystems become less resilient, and the genetic diversity needed for healthy, balanced ecosystems is diminished.

The loss of native plants affects far more than plants alone. Animals that depend on them for food, shelter or reproduction may also decline when those plants disappear.

In many places, well-meaning landowners have replaced native plants with non-native species in yards and landscapes. Some non-native plants escape cultivation and become invasive, spreading aggressively and displacing native plants and the wildlife that depends on them.



The importance of native plants

There are many important reasons to use native plants in gardens and landscapes. Native plants are adapted to their region's soils, temperatures, rainfall patterns and natural disturbances. Once established, they typically require little supplemental water, fertilizer, pesticides or other chemicals.

In landscapes around schools, homes, businesses or roadsides, native plants can reduce maintenance needs while supporting local ecosystems. Beyond these practical benefits, native plants provide essential habitat for birds, butterflies, bees and many other animals. Planting native species offers ecological, economic and aesthetic benefits — a win for both people and nature.

One of the best ways to protect native plants is to learn about the species that belong in your region and how they support local ecosystems.

Why wildflowers?

Wildflowers do much more than give *La Florida* — the "land of flowers" — its unique sense of place. Because they have evolved alongside Florida's native insects, soils and climate over thousands of years, native wildflowers are uniquely suited to support the state's ecosystems in ways that other ornamental plants cannot.

Florida wildflowers support a myriad of native wildlife and provide essential habitat for bees and other pollinators. These pollinators play a vital role in food production — roughly one-third of the food we eat depends on animal pollination. Wildflowers also provide food and shelter for insects, birds, small mammals and other invertebrates, helping maintain the biodiversity needed to keep ecosystems healthy and in balance.

Wildflowers are also important to Florida's agricultural systems. Many crops rely on insects for pollination, and those insects depend on native wildflowers for nectar, pollen and habitat.

By creating wildflower habitats in neighborhoods, schools, parks and along roadsides, we can help support pollinators and other wildlife. When gardens and natural areas are connected, they can form "habitat highways" that give animals places to feed, rest, reproduce and move safely through the landscape — benefiting both nature and people.

Where do wildflowers grow?

Some wildflower species grow throughout Florida and neighboring states, while others occur only in specific regions due to differences in climate, soils or moisture. The area where a plant naturally occurs is called its growing range.

Some wildflowers grow only in Florida and nowhere else in the world. These are known as endemic species. Florida is home to many endemic wildflowers, and some are protected by law so they can grow undisturbed in their natural habitats.

Unfortunately, many Florida wildflowers are rare or endangered because their natural habitats have been lost or altered. Wildflowers should never be picked or dug up from the wild. Instead, enjoy them where they grow — or take a photo or make a drawing to remember your favorites.

Concepts and Objectives

Interdisciplinary connections bridge student knowledge and prevent artificial boundaries from developing. Science and math lessons go hand-in-hand when students are quantifying data and results. Science and language arts pair up naturally as children observe the natural world around them and begin the monumental task of describing and explaining their observations. Social studies connections bring the past with the present, making real the connections between people and their environment. Through these connections, students learn the necessary skills to interpret their observations of the natural world.

The activities in this guide are designed to build good observation skills, develop systems to collect, organize, display and explain data, and furnish a strong basis for future learning. Before we can understand anything, we must first see it clearly.

Students will learn the following concepts through the activities and lessons found in this guide:

Unit 1: Parts of a Wildflower

Students will learn the different parts of a flower and be able to identify them by name and function in both simple and compound flowers.

Unit 2: Wildflower Life Cycle

Students will learn about and observe the different phases of a wildflower's life cycle: seed germination, seedling growth, flower production, fruit and seed production, and seed release and distribution. They will also examine the parts of a seed.

Unit 3: Pollination

Students will learn about the process and necessity of pollination. They will investigate how different pollinators interact with different wildflowers, compare different forms of pollen, and examine methods by which pollen is transferred.

Unit 4: Seed Discovery

Students will investigate seed structure and diversity, explore how seeds travel from parent plants to new locations, and discover the strategies plants use to ensure their seeds land in favorable growing conditions.

Unit 5: Wildflower Adaptations

Students will learn what adaptation means, why and how wildflowers and other plants adapt, and what adaptations have been made by Florida wildflowers in different ecosystems.

Unit 6: Plant and Animal Interactions

Students will learn about symbiosis and investigate how wildflowers and animals interact through pollination, seed dispersal, food webs, and habitat sharing.

Unit 7: Wildflowers are Important

Students will learn how wildflowers are used by humans for food, medicine and other products, and will explore other benefits and ecosystem services that wildflowers provide.

Unit 8: Wildflower Identification

Students will learn to identify wildflowers by observing flower shapes, leaf patterns, and other distinctive features, developing skills they can use to recognize and name the wildflowers in their communities.

Unit 9: Learning Wildflower Names

Students will explore the origins of wildflower names, discover how the same plant can have different common names in different places, and learn why scientific naming matters.

Florida State Standards

The following **Grade 3 Florida State Standards** are addressed in the following activities:

Grade 3 English Language		Activity
ELA.3.C.1.3	Write opinions about a topic or text, include reasons supported by details from one or more sources, use transitions, and provide a conclusion.	**6.4**
ELA.3.C.1.4	Write expository texts about a topic, using one or more sources, providing an introduction, facts and details, some elaboration, transitions, and a conclusion.	**4.8, 7.4, 9.3**
ELA.3.C.2.1	Present information orally, in a logical sequence, using nonverbal cues, appropriate volume, and clear pronunciation.	**2.4, 5.5, 5.6, 5.7, 6.4, 7.4**
ELA.3.C.3.1	Follow the rules of standard English grammar, punctuation, capitalization, and spelling appropriate to grade level.	**4.8, 5.6, 5.7, 7.3, 7.4, 9.3**
ELA.3.C.4.1	Conduct research to answer a question, organizing information about the topic from multiple sources.	**4.8, 5.6, 5.7, 6.4, 7.1, 7.4, 9.3**
ELA.3.C.5.2	Use digital writing tools individually or collaboratively to plan, draft, and revise writing.	**5.5, 5.6, 5.7, 7.1, 7.4**
ELA.3.R.3.3	Compare and contrast how two authors present information on the same topic or theme.	**4.8**
ELA.3.V.1.1	Use grade-level academic vocabulary appropriately in speaking and writing.	**4.8**
Grade 3 Math		**Activity**
MA.3.DP.1.1	Collect and represent numerical and categorical data with whole-number values using tables, scaled pictographs, scaled bar graphs or line plots. Use appropriate titles, labels and units.	**2.3, 4.4**
MA.3.DP.1.2	Interpret data with whole-number values represented with tables, scaled pictographs, circle graphs, scaled bar graphs or line plots by solving one- and two-step problems.	**2.3**
MA.3.M.1.1	Select and use appropriate tools to measure the length of an object, the volume of liquid within a beaker and temperature.	**2.3, 4.4**
MA.3.M.1.2	Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures or liquid volumes.	**2.3**
MA.K12.MTR.1.1	Actively participate in effortful learning both individually and collectively.	**4.4**

(Continued on the following page.)

Grade 3 Science		Activity
SC.3.L.14.1	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.	**1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 4.1, 4.5, 4.8, 8.1, 8.2, 8.3, 8.4, 9.4**
SC.3.L.14.2	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.	**5.4, 6.1**
SC.3.N.1.1	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.	**3.1, 3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 6.1, 6.2, 6.3, 7.1, 7.4, 7.5, 8.1, 8.2, 8.4, 9.1, 9.2**
SC.3.N.1.2	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.	**3.5, 4.2, 4.3, 4.4, 5.3, 5.4, 6.2, 7.5, 8.3, 9.2**
SC.3.N.1.3	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.	**2.3, 4.4, 4.5, 4.6, 4.7, 4.8, 5.3, 6.2, 7.5, 8.3, 8.4, 9.1, 9.2, 9.3, 9.4**
SC.3.N.1.5	Recognize that scientists question, discuss, and check each other's evidence and explanations.	**4.2, 4.3, 5.4, 8.3, 9.4**
SC.3.N.1.6	Infer based on observation.	**3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 5.3, 6.1, 6.2, 6.3, 6.4, 8.1, 8.2, 8.3, 8.4, 9.1, 9.2, 9.4**
SC.3.N.1.7	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.	**2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 4.2, 4.4, 5.3, 5.5, 6.1**
SC.3.N.3.2	Recognize that scientists use models to help understand and explain how things work.	**3.1, 3.3, 3.4, 4.4, 5.1, 5.4, 6.3, 6.4, 9.4**
SC.3.N.3.3	Recognize that all models are approximations of natural phenomena as such, they do not perfectly account for all observations.	**3.1, 3.3, 3.4, 4.4, 6.4**

(Continued on the following page.)

The following **Grade 4 Florida State Standards** are addressed in the following activities:

Grade 4 English Language		Activity
ELA.4.C.1.3	Write to make a claim supporting a perspective with logical reasons, using evidence from multiple sources, elaboration, and an organizational structure with transitions.	**6.4**
ELA.4.C.1.4	Write expository texts about a topic, using multiple sources, elaboration, and an organizational structure with transitions.	**7.4**
ELA.4.C.2.1	Present information orally, in a logical sequence, using nonverbal cues, appropriate volume, and clear pronunciation.	**2.4, 5.5, 5.6, 6.4, 7.4**
ELA.4.C.3.1	Follow the rules of standard English grammar, punctuation, capitalization, and spelling appropriate to grade level.	**4.8, 5.5, 5.6, 7.3, 7.4, 9.3**
ELA.4.C.4.1	Conduct research to answer a question, organizing information about the topic, using multiple valid sources.	**4.8, 5.5, 5.6, 6.4, 7.1, 7.4, 9.3**
ELA.4.C.5.2	Use digital writing tools individually or collaboratively to plan, draft, and revise writing.	**5.5, 5.6, 7.1, 7.4**
ELA.4.V.1.1	Use grade-level academic vocabulary appropriately in speaking and writing.	**4.8**
Grade 4 Math		**Activity**
MA.4.DP.1.1	Collect and represent numerical data, including fractional values, using tables, stem-and-leaf plots or line plots.	**2.3, 4.4**
MA.4.DP.1.3	Solve real-world problems involving numerical data.	**2.3**
MA.K12.MTR.1.1	Actively participate in effortful learning both individually and collectively.	**4.4**
Grade 4 Science		**Activity**
SC.4.E.6.3	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.	**7.2**
SC.4.E.6.5	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.	**1.2, 1.3, 2.1, 2.2, 3.2, 3.3, 3.4, 4.4, 5.3, 6.2,**
SC.4.L.16.1	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.	**1.1, 1.2, 1.3, 2.2, 2.3, 2.4, 3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 4.3, 4.4, 4.8**
SC.4.L.16.2	Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.	**1.3, 5.1, 5.2, 5.4, 6.1, 6.4, 8.1, 8.2, 9.4**
SC.4.L.16.4	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.	**2.1, 2.3, 2.4, 8.4**
SC.4.L.17.2	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.	**6.3**

(Continued on the following page.)

Grade 4 Science (continued)		Activity
SC.4.L.17.3	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.	**6.3**
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment.	**4.1, 4.2, 4.8, 5.1, 5.4, 6.1, 6.3, 6.4, 7.3, 8.1, 8.2**
SC.4.N.1.1	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.	**3.1, 3.2, 3.5, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 6.1, 6.2, 6.3, 7.1, 7.4, 7.5, 8.1, 8.2, 8.4, 9.1, 9.2**
SC.4.N.1.2	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.	**3.3, 3.4, 3.5, 4.1, 4.2, 4.3, 4.4, 5.3, 6.2, 7.5, 8.3, 9.2**
SC.4.N.1.3	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.	**8.4**
SC.4.N.1.4	Attempt reasonable answers to scientific questions and cite evidence in support.	**3.1, 3.2, 3.5, 4.2, 4.3, 4.4, 5.1, 5.3, 5.4, 5.5, 5.6, 5.7, 6.1, 6.2, 7.2, 7.5, 8.3, 8.4, 9.4**
SC.4.N.1.5	Compare the methods and results of investigations done by other classmates.	**3.2, 4.2, 4.3, 4.4, 5.3, 7.5, 8.3**
SC.4.N.1.6	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.	**4.4, 4.5, 4.6, 4.7, 4.8, 5.3, 6.2, 7.5, 8.3, 8.4, 9.1, 9.2, 9.3, 9.4**
SC.4.N.1.7	Recognize and explain that scientists base their explanations on evidence.	**3.1, 3.2, 3.3, 3.4, 3.5, 4.2, 4.3, 4.4, 5.3, 5.5, 5.6, 5.7, 6.1, 8.4, 9.1, 9.2, 9.4**
SC.4.N.1.8	Recognize that science involves creativity in designing experiments.	**3.1, 4.4, 5.1**
SC.4.N.3.1	Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.	**2.2, 3.1, 3.3, 3.4, 4.4, 5.1, 5.4, 6.3, 6.4, 9.4**

Materials

The following materials are needed to complete the activities in this activity guide. See individual activities for quantities and instructions.

Item	Activity
antenna headbands (optional)	1.1
beans, dried (or other fast-sprouting seeds)	
boxes (or tubs)	3.1
camera (or tablet) (optional)	6.4
chart paper (or whiteboard)	4.8, 6.3
clipboards	6.4, 8.4
construction paper	1.2
craft sticks	4.4
crayons, colored pencils or markers	4.5, 4.6, 9.3, 9.4
cups	2.3, 3.3, 3.4, 6.3
flowers (composite)	1.3
flowers (simple)	1.2
hand lens	1.2, 1.3, 2.2, 3.2, 4.1, 5.3, 6.2
marbles	3.3, 3.4
masking tape	4.2
measuring tapes	4.4, 7.5
newspaper	2.3
paper clips	4.4
paper envelopes (or small paper bags)	4.5, 4.6
paper towels	2.2, 2.3
paper, graph	4.4, 4.6
paper, white/drawing	2.2, 3.2, 4.1, 4.4, 4.5, 4.8, 6.4, 9.2
photos of hard-coated seeds	4.7
plasti-bands	4.4
plastic knives	2.2
plastic sandwich bags	2.3

Item	Activity
plastic spoons	4.4
pom-poms, 1/2"	4.4
pom-poms, 5mm	3.3
Post-it notes	3.1
sandpaper	4.7
scissors	4.4
Scotch tape	2.2, 4.6, 6.3
seed-sorting dishes	4.2
seedheads (dried, mature)	4.1, 4.5, 4.6
soil	2.3
"sun mat"	6.3
teaspoon	4.6
toothpicks	2.2
tweezers	1.2
Velcro "wands"	3.3
water	2.3, 4.7
white cloth or sheet	6.2
wildflower seeds	2.2, 2.3
wildflower seeds (Mimosa or similar hard-coated seeds)	4.7
miscellaneous craft supplies including construction paper, glue, yarn, paints, crayons, scissors, etc.	5.4

NOTE: Sunshine mimosa seeds, which are large enough for students to work with, are generally available from the Florida Wildflower Growers Cooperative. Visit www.FloridaWildflowers.com or call 352-988-8117 to check availability.

The following reproducible student worksheets and reference pages are included:

Item	Activity/Unit
Parts of a Wildflower worksheet	1.1
Parts of a Wildflower Definition Match worksheet	1.1
Parts of a Simple Wildflower reference page	1.2
Compound Flower Investigation reference page	1.3
Parts of a Wildflower Crossword Puzzle worksheet	Unit 1 Vocabulary Activity
Wildflower Life Cycle worksheet	2.1
Parts of a Seed worksheet	2.2
Germination Lab Experiment worksheet	2.3
My Life Began as a Seed worksheet	2.4
Wildflower Life Cycle Crossword Puzzle worksheet	Unit 2 Vocabulary Activity
Pollination Specialties reference page	Unit 3
Pollinator Observations worksheet	3.5
Pollination Definition Match worksheet	Unit 3 Vocabulary Activity
Wildflower Seed Structures reference page	4.1
Wildflower Seed Investigation worksheet	4.1
Wildflower Seed Dispersal Adaptations worksheet	4.3
Wildflower Seed Dispersal Adaptation Cards worksheet	4.3
I'm a Traveling Wildflower Seed worksheet	4.3
Flung, Flown or Ferried worksheet	4.4
Herbarium Seed Chart worksheet	4.5
Make Your Own Seed Packet template worksheet	4.6
Seed Discovery Definition Match worksheed	Unit 4 Vocabulary Activity
Wildflower Adaptations reference page	Unit 5
Wildflower Adaptations workheet	5.1
Wildflower Adaptations Scoring Rubric teacher reference page	5.1
Wildflower Adaptations Clue Cards	5.2
Wildflower Adaptations Plant Cards	5.2
Adaptation Scavenger Hunt worksheets	5.3
Ecosystem Adaptations reference pages	5.5

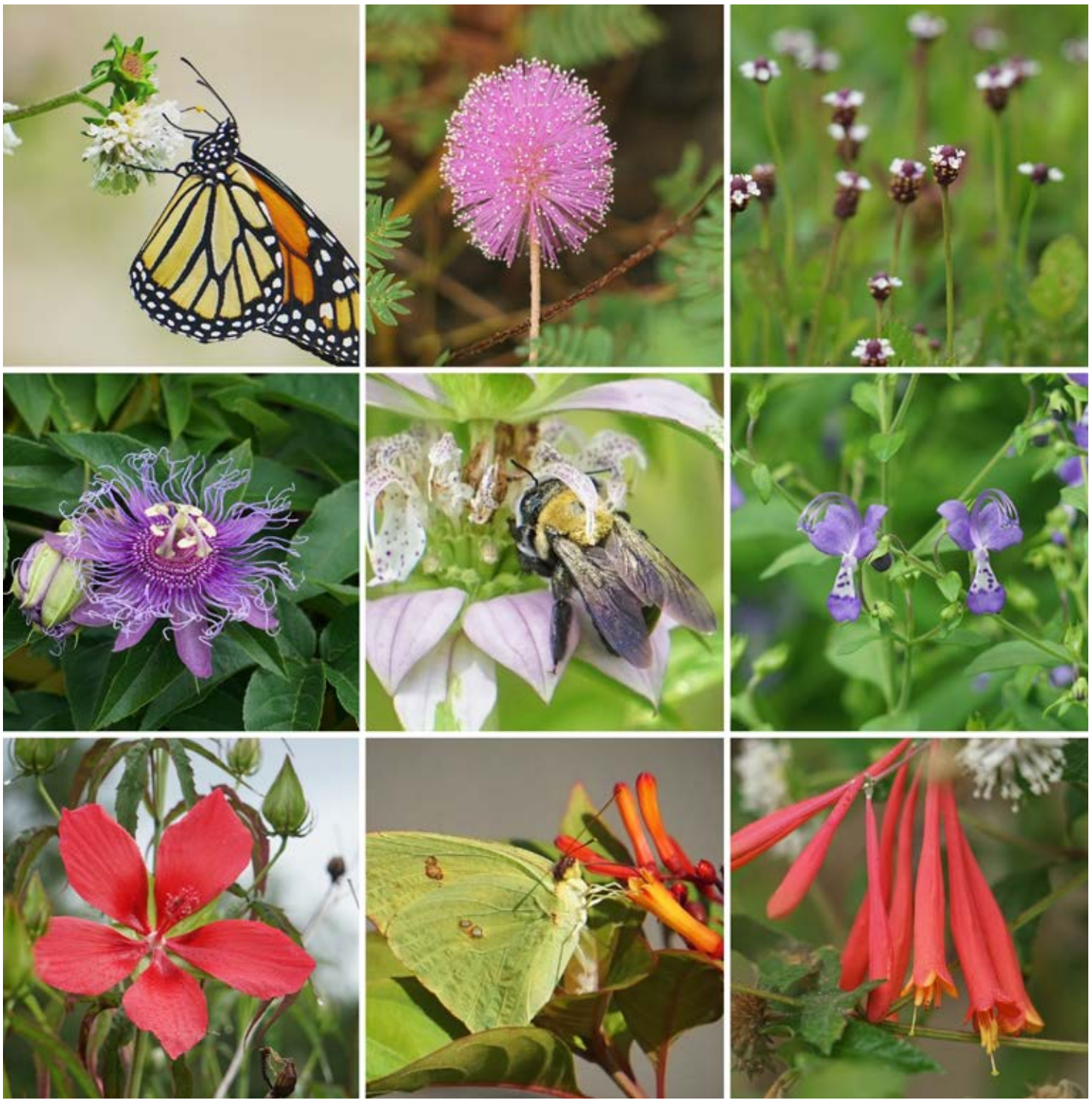
(Continued on the following page.)

Item (*continued*)	Activity/Unit
Wildflower Adaptations — Web Quest worksheet	5.6 Writing Extension
Adaptations worksheets	5.7 Web Quest
Wildflower Adaptations Crossword Puzzle worksheet	Unit 5 Vocabulary Activity
Cohort Combo Information Sheets worksheet	6.1
Cohort Combo Matching Cards	6.1
Insect Evidence Survey worksheet	6.2
Food Web Organisms picture cards	6.3
Plant and Animal Interactions Definition Match worksheet	Unit 6 Vocabulary Activity
The Importance of Wildflowers reference page	Unit 7
Pass the Wildflowers, Please! worksheet	7.1
Wildflower Menu Selection worksheet	7.1
Dr. Wildflower's Natural Remedies worksheet	7.2
Why Wildflowers are Important to Me worksheet	7.3
Wildflower Walkabout reference pages	7.5
Wildflower Walkabout Observation Sheet worksheets	7.5
The Importance of Wildflowers Crossword Puzzle worksheet	Unit 7 Vocabulary Activity
Wildflower Identification Resources reference page	Unit 8
Identifying Flower Shapes worksheet	8.1
Identifying Leaf Shapes worksheet	8.2
Which Yellow Flower Are You? picture cards	8.3
Which Yellow Flower Are You? worksheet	8.3
Wildflower Hunt worksheet	8.4
Wildflower and Leaf Forms reference page	8.4
Wildflower Identification Definition Match worksheet	Unit 8 Vocabulary Activity
What's In a Name? worksheet	9.1
Namesake Profile worksheet	9.3
Wildflower Namesakes teacher reference	9.3
Name Your Own Wildflower worksheet	9.4
Wildflower Names Definition Match worksheet	Unit 9 Vocabulary Activity
Wildflower Profile worksheet	Web Quest
Nature Scavenger Hunt worksheet	Outdoor Exploration

See specific activities for quantites and instructions.

The following visual presentations may be downloaded using the links provided:

Item	Activity	Link
Parts of a Wildflower	1.1	www.FlaWildflowers.org/wp-content/uploads/2026/03/1.1_PartsOfAWildflower.pdf
Wildflower Life Cycle	2.1	www.FlaWildflowers.org/wp-content/uploads/2026/03/2.1_WildflowerLifeCycle.pdf
Parts of a Seed	2.2	www.FlaWildflowers.org/wp-content/uploads/2026/03/2.2_PartsOfASeed.pdf
Which Yellow Flower Are You?	8.3	www.FlaWildflowers.org/wp-content/uploads/2026/03/8.3_WhichYellowFlowerAreYou.pdf



FLORIDA Wildflower FOUNDATION

Unit 1

Parts of a Wildflower

Overview

Flowers may look simple, but each part has an important job in helping the plant grow and reproduce. This unit introduces the four main parts of a flower — sepals, petals, pistils and stamens — and explains their roles in reproduction and pollination. This unit helps students identify floral structures, understand how flowers produce seeds, and explore the relationship between flower parts and pollinators. Understanding flower anatomy provides the foundation students need to explore life cycles, pollination and adaptations in later units.

Activities

1. Parts of a Wildflower
2. Operation Dissection
3. Compound Flower Investigation

Vocabulary

anther
calyx
carpel
complete flower
compound flower
corolla
disc floret
filament
floret
flower
incomplete flower
ovary
ovule
petal
pistil
pollen
pollination
pollinator
ray floret
reproduction
seed
sepal
stamen
stem
stigma
style

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.2

FLORIDA Wildflower FOUNDATION

Unit 1

Parts of a Wildflower

Introduction

Most ***flowers*** have four sets of parts, and each one play an important role in the plant's life:

- ***Sepals*** are the outermost parts of the flower. They are small, leaf-like structures that protect the developing flower bud, like a suit of armor. Together, the sepals form a whorl called a ***calyx***. When the flower blooms, the sepals usually remain green and are thicker than the petals.
- ***Petals*** help attract ***pollinators***. Their shape, size and color draw bees, butterflies, birds and other pollinators to the flower's ***nectar***. All of the petals together make up the *corolla*.
- The ***pistil*** is the female part of the flower and is located in the center. It is made up of one or more ***carpels***. Each carpel contains a ***stigma***, ***style*** and ***ovary***. The stigma is sticky and captures ***pollen***. The style is a long tube that connects the stigma to the ovary. The ovary holds the egg-bearing ***ovules***. ***Pollination*** occurs when the pollen lands on the stigma, travels down the style to the ovary and fertilizes the ovules. Once fertilized, the ovules develop into ***seeds***.
- ***Stamens*** are the male parts of the flower. Each stamen has an *anther*, where the pollen is produced, and a ***filament***, which holds up the anther. Stamens can stand alone or sometimes be fused together.

Most plants need both male and female parts in order for ***reproduction*** to occur. Many flowers have both male and female parts on the same plant. Others have separate male and female plants, so female plants may require ***cross-pollination*** from male plants.

FLORIDA Wildflower FOUNDATION

Unit 1 Activity 1

Parts of a Wildflower

Objective

Students will learn the different parts of a ***flower*** and be able to identify them by name and function.

Directions

1. Give each student a "Parts of a Wildfower — Diagram" and "Parts of a Wildflower — Definitions" worksheet.
2. Show "Parts of a Wildflower" visual presentation.
3. Define and discuss each part of the flower (as laid out in the slides) and have students label the flower on the "Diagram" worksheet accordingly.
4. Once the diagram has been completed, have students complete the "Definitions" worksheet, filling in the function of each flower part.

Materials

- "Parts of a Wildflower" worksheet (one per student)
- "Parts of a Wildflower Definition Match" worksheet (one per student)
- "Parts of a Wildflower" visual presentation (click to download)

Standards

Grade 3: SC.3.L.14.1

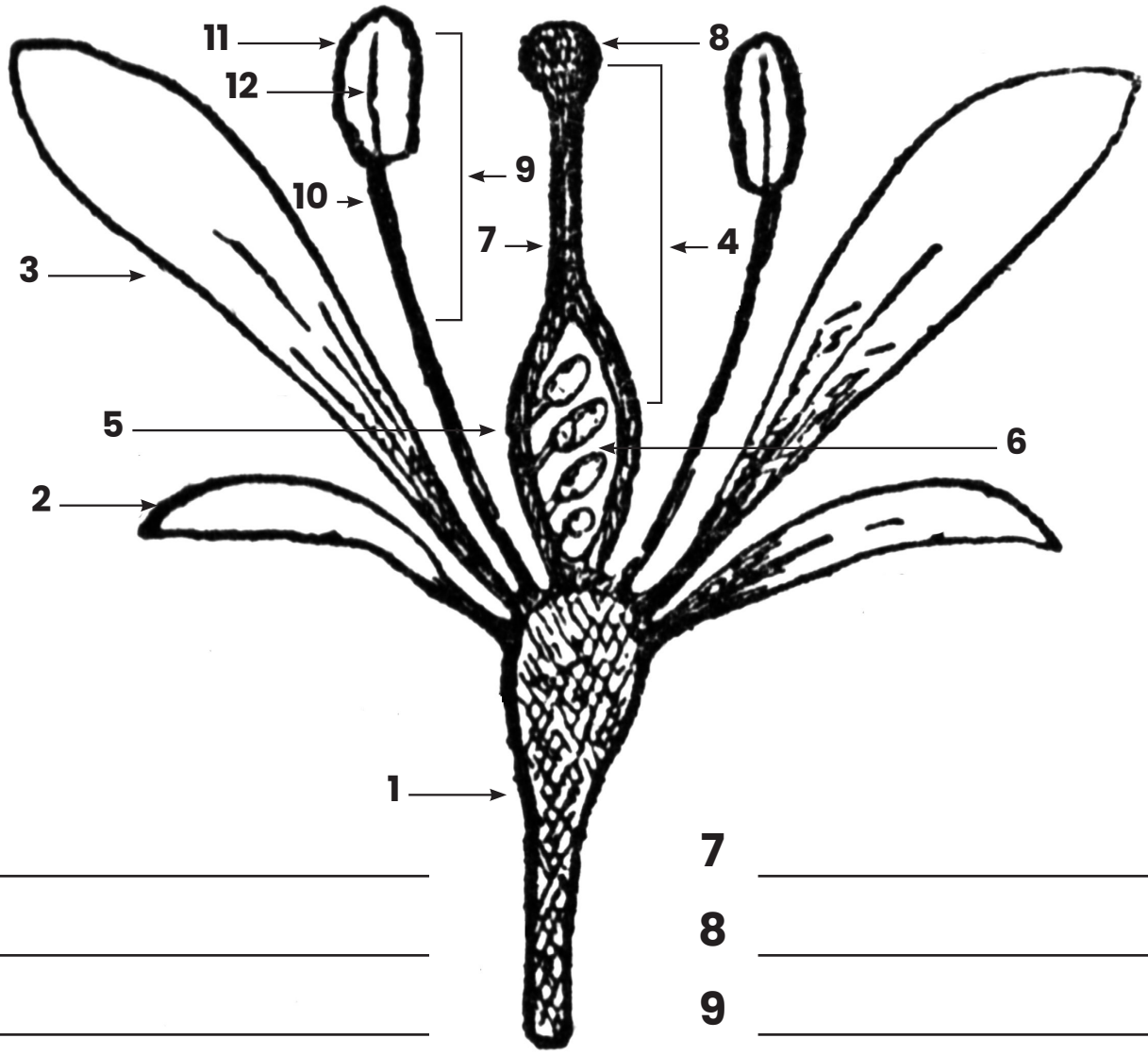
Grade 4: SC.4.L.16.1

Parts of a Wildflower

Use the words in the Word Bank to fill in the blanks with the appropriate plant part.

Word Bank

anther	ovule	pollen	stem
filament	petal/corolla	sepal/calyx	stigma
ovary	pistil/carpel	stamen	style



1 _____ **7** _____

2 _____ **8** _____

3 _____ **9** _____

4 _____ **10** _____

5 _____ **11** _____

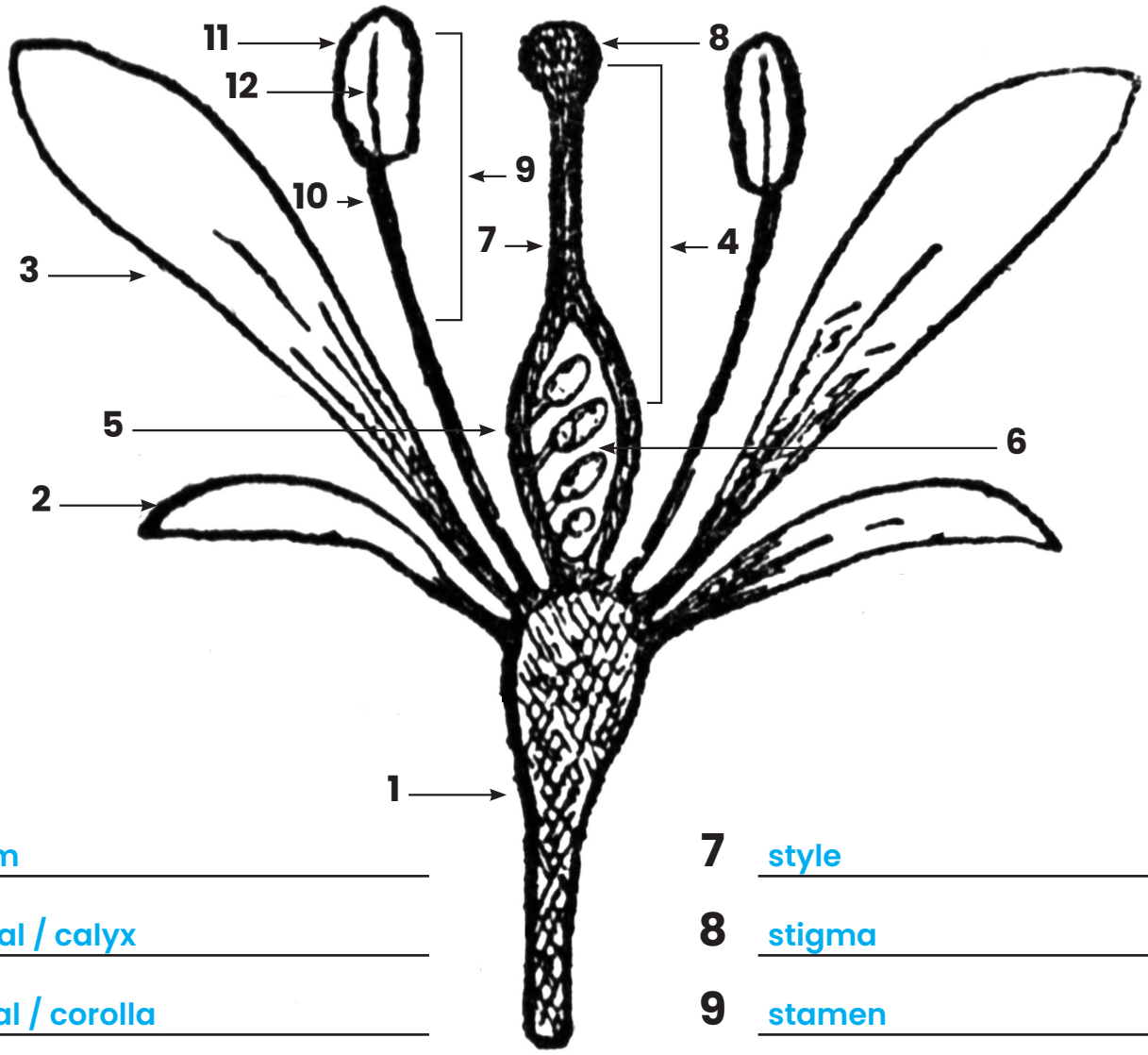
6 _____ **12** _____

Parts of a Wildflower

Use the words in the Word Bank to fill in the blanks with the appropriate plant part.

Word Bank

anther	ovule	pollen	stem
filament	petal/corolla	sepal/calyx	stigma
ovary	pistil/carpel	stamen	style



1 stem

2 sepal / calyx

3 petal / corolla

4 pistil / carpel

5 ovary

6 ovule

7 style

8 stigma

9 stamen

10 filament

11 anther

12 pollen

Parts of a Wildflower Definition Match

Match the flower part to its function.

Flower Part	Function
Anther	once fertilized, becomes the seeds
Filament	female part of flower consisting of stigma, style and ovary (also called carpel)
Ovary	sticky, captures pollen
Ovules	produces pollen
Petals	covers the anthers; necessary to fertilize ovules and make seeds
Pistil	supports anther
Pollen	connects stigma to ovary
Sepals	supports flower
Stamen	contains egg-bearing ovules
Stem	attract pollinators (also called corolla)
Stigma	protect flower bud (also called calyx)
Style	male part of flower consisting of anther and filament

Parts of a Wildflower Definition Match

Match the flower part to its function.

Flower Part	Function
Anther	produces pollen
Filament	supports anther
Ovary	contains egg-bearing ovules
Ovules	once fertilized, becomes the seeds
Petals	attract pollinators (also called corolla)
Pistil	female part of flower consisting of stigma, style and ovary (also called carpel)
Pollen	covers the anthers; necessary to fertilize ovules and make seeds
Sepals	protect flower bud (also called calyx)
Stamen	male part of flower consisting of anther and filament
Stem	supports flower
Stigma	sticky, captures pollen
Style	connects stigma to ovary

FLORIDA Wildflower FOUNDATION

Unit 1 Activity 2

Operation Dissection

Objective

Students will be able to identify the variety of ***flower*** parts among wildflower species.

Directions

Students should work in pairs.

1. Give each pair the following:
   - one pair of tweezers
   - one "Parts of a Simple Wildflower" handout (Students may use their completed worksheets from Activity 1 or you may provide them with a copy of the handout on the following page.)
   - one each of the same-variety flowers
   - contrasting-colored construction paper
2. Tell students the flower's common name and have them write it on the paper. (You may also tell them and have them write the scientific name, if known.)
3. Give student pairs the hand lens and tweezers and tell them to remove the ***sepals*** (outer petal-like structures) and tape them to the construction paper and label.
4. Have them do the same with the ***petals***, ***stamens*** and ***pistil***. Before taping the stamens, tell them to shake some of the ***pollen*** grains from the anthers onto the paper and tape them down.
5. Next, give student pairs one or two of the different-variety flowers.
6. Have them follow the same procedure for dissecting, taping and labeling each of the flowers.

Discussion

Have students compare the differences among the flower varieties.

- Do the parts have different shapes?
- Do they have different amounts of parts?
- Are all the flowers complete with sepals, petals, stamens and pistils?

Materials

- "Parts of a Simple Wildflower" handout (one per pair)
- construction paper (one sheet per student)
- hand lens (one per pair)
- Scotch tape
- tweezers (one per pair)
- a single variety of simple wildflowers
- a variety of simple wildflowers

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1

Tip

These flowers are good choices for this activity:

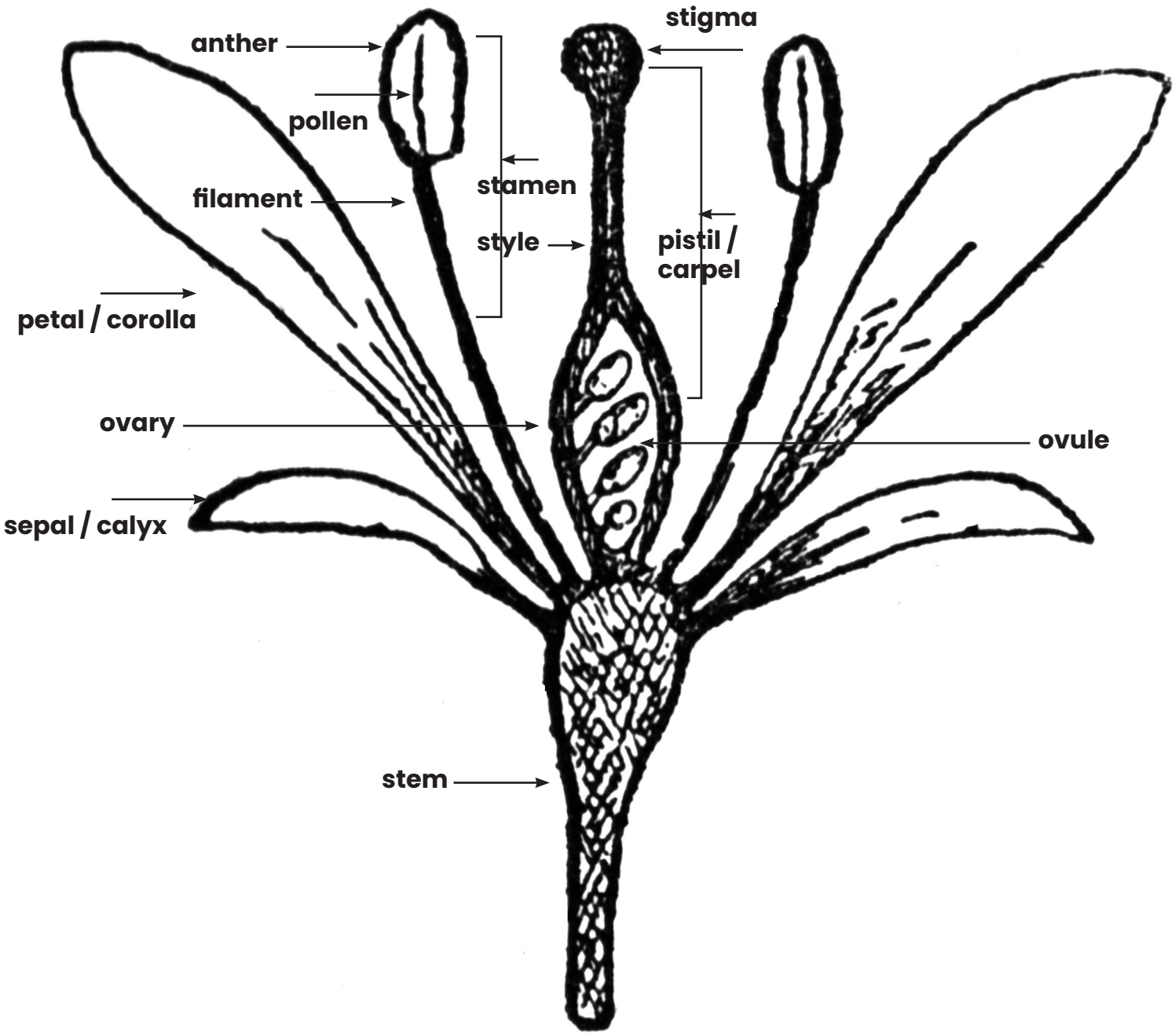
Wildflowers: Hibiscus, Partridgepea, Spiderwort

Store-bought flowers: any with large petals, such as Gladiolas or Lilies

Avoid very small flowers, compound flowers, or flowers with specialized parts.

Note: Teachers should instruct students not to pull apart wildflowers in the wild or at home as they are needed as food for pollinators. Explain that it is permitted here only as part of a guided learning experience.

Parts of a Simple Wildflower



Compound Flower Investigation

Objective

Students will be able to identify the male and female structures in a ***compound flower***.

Discussion

The oldest and simplest ***flowers*** have many ***petals*** of the same shape. As flowers changed during the last 100 million years, newer species eliminated parts or had parts that fused into more complex and specialized structures.

A ***compound*** (or ***composite***) ***flower*** is a flower that is actually made up of many small flowers, although it may look like a single bloom. When trying to identify the male and female structures in compound flowers, such as those in the Asteraceae or daisy family, may initially pose a challenge for both the teacher and students. Most members of the Asteraceae family have a daisy-like flower composed of two different types of flowers. For example, the "black eye" of the Black-eyed Susan is actually composed of many ***disc florets*** surrounded by the outer ***ray florets***.

Directions

Students should work in pairs or groups.

1. Give a copy of the "Compound Flower Investigation" worksheet and one flower to each student pair/group, along with a hand lens to each student.
2. Have them closely examine the flower to see if they can find the ***pistils*** and ***stigmas*** of the inner disc florets and the single petals of the outer ray florets.

Materials

- "Compound Flower Investigation" worksheet (one per pair/group)
- hand lens (one per pair/group)
- flowers with composite heads (one per pair/group)

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.2

Tip

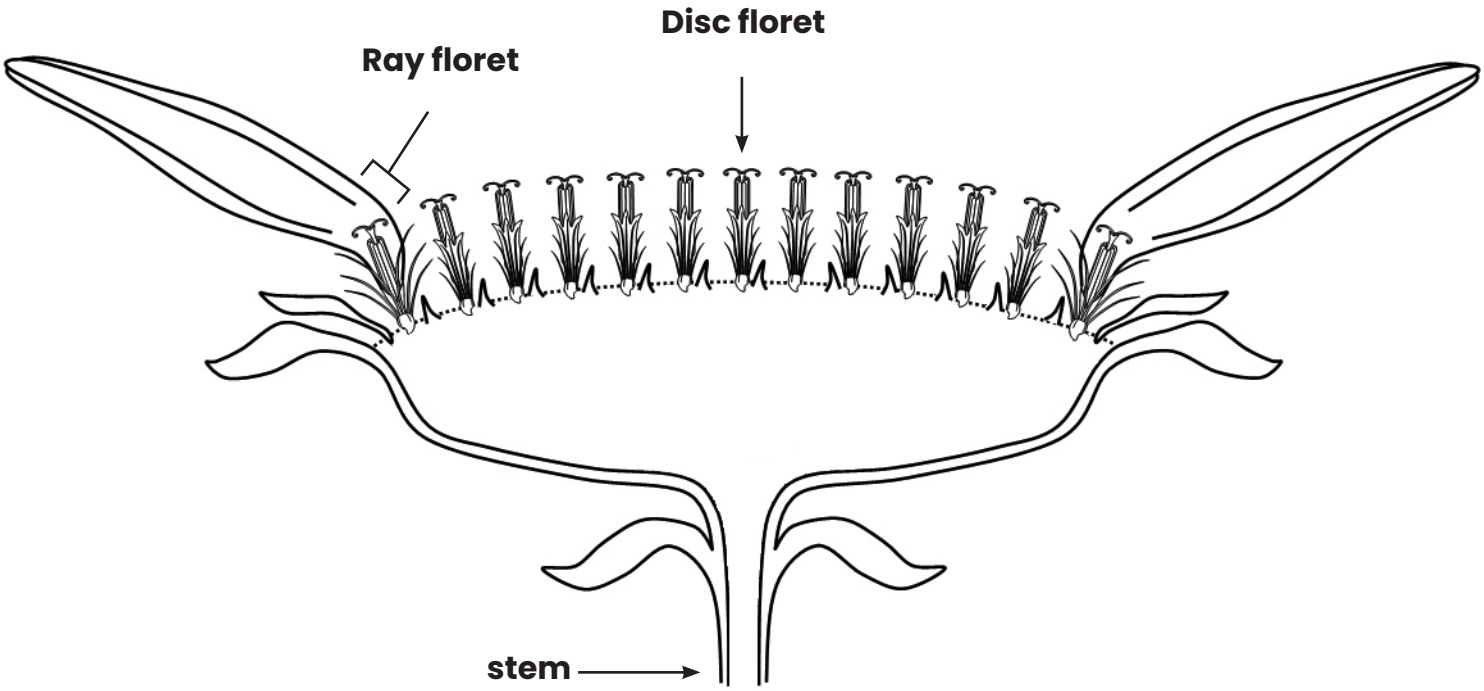
These flowers are good choices for this activity:

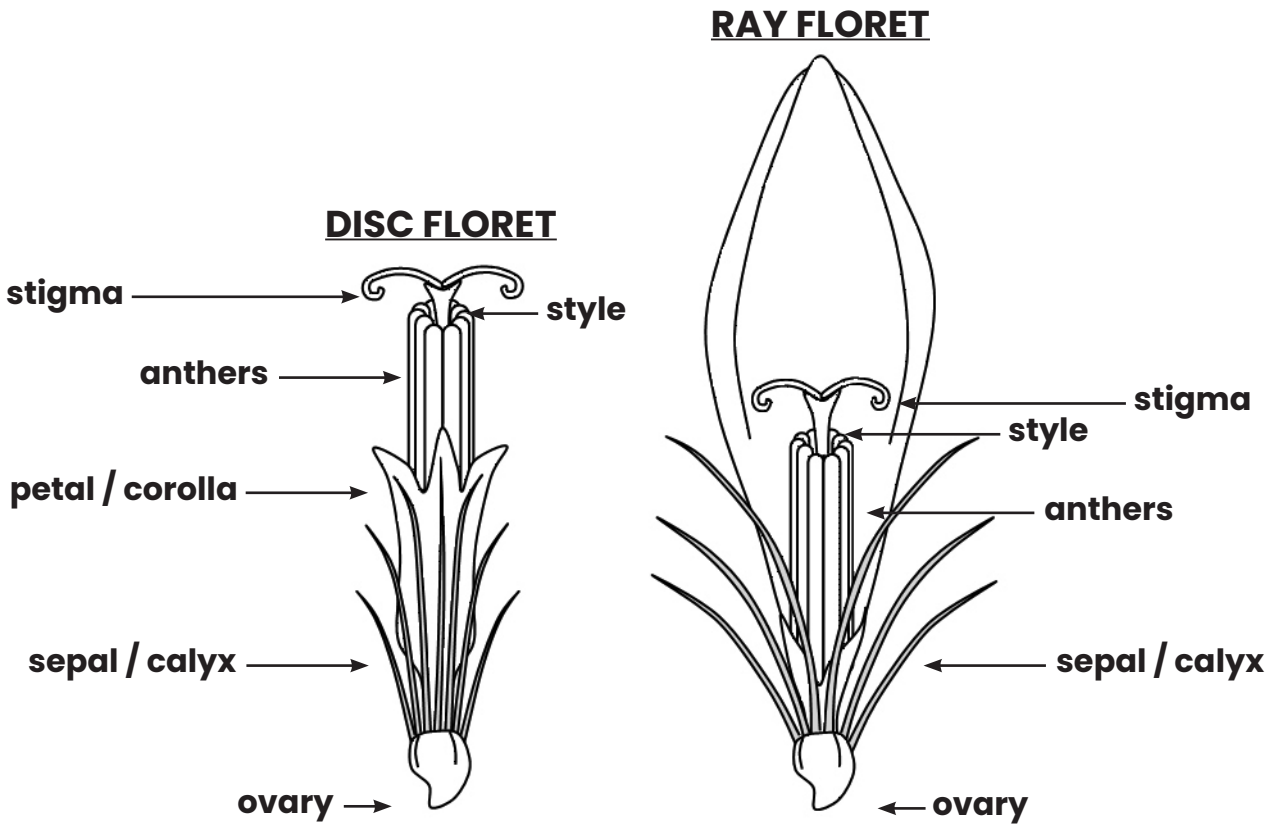
Wildflowers: Black-eyed Susan, Blanketflower, Dune sunflower

Store-bought flowers: Sunflower, Gerber daisy

Note: Some members of the Asteraceae family may be missing one of the flower types. Rayless sunflowers, for example, lack the outer ray florets.

Compound Flower Investigation





FLORIDA Wildflower FOUNDATION

Unit 1

Glossary

anther: yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair

calyx: collective term for the sepals of one flower

carpel: all the female parts of a plant together

complete flower: a flower that has all four main parts: sepals, petals, stamens and pistils

compound (composite) flower: a flower made up of smaller flowers such as those in the Aster family

corolla: collective term for the petals of one flower

disc floret: the small, tubular floret in a compound flower of the Aster family; a group of disc florets forms the disc or central part of the compound flower head and is often surrounded by ray florets

filament: fine hair-like stalk that supports the anther

floret: one of the small flowers making up a composite flower

flower: part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; part of a plant that ordinarily contains the reproductive organs

Note: Flowers can be male, female or bisexual. A male flower has only stamens. A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

incomplete flower: a flower that is missing one or more of the four main parts

ovary: part of the plant, usually at the base of the flower, that contains ovules and eventually becomes fruit

ovule: part of the ovary in a plant that, after fertilization, becomes the seed

petal: the colorful parts of the flower that often attract pollinators

pistil: organ of a flower that contains the ovule or ovules; female part of the flower made up of four parts — stigma, style, ovary and ovule

pollen: fine, powder-like material that covers the anthers within a flower

Note: This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

pollination: the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

Note: Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carry pollen between flowers, or when it is moved within flowers.

(Continued on following page.)

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

pollinator: an organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another

ray floret: the strap-shaped floret in a compound flower of the Aster family.

Note: A group of ray florets form the ray or outer part of a compound flower head. Ray florets are not always present.

reproduction: the act of generating new plants from parent plants

seed: small part of a flowering plant that is capable of growing a new plant

sepal: parts that look like little leaves or petals that cover the outside of a flower bud to protect the flower until it opens or blooms

stamen: stalk-like part of a flower that produces and bears pollen; male organ of a flower, bearing the anther and filament

stem: the main stalk of a plant that supports the leaves, branches and flowers

stigma: one of the female parts of the flower; the sticky bulb in the center of flowers where the pollen lands to start the fertilization process

style: another female part of the flower; the long stalk that supports the stigma

Parts of a Wildflower Crossword Puzzle

Use the clues and the Word Bank to fill in the puzzle on the next page.

Word Bank

anther	filament	petal	reproduction	stigma
calyx	floret	pistil	seed	style
carpel	flower	pollination	sepal	
corolla	ovary	pollinator	stamen	

Across

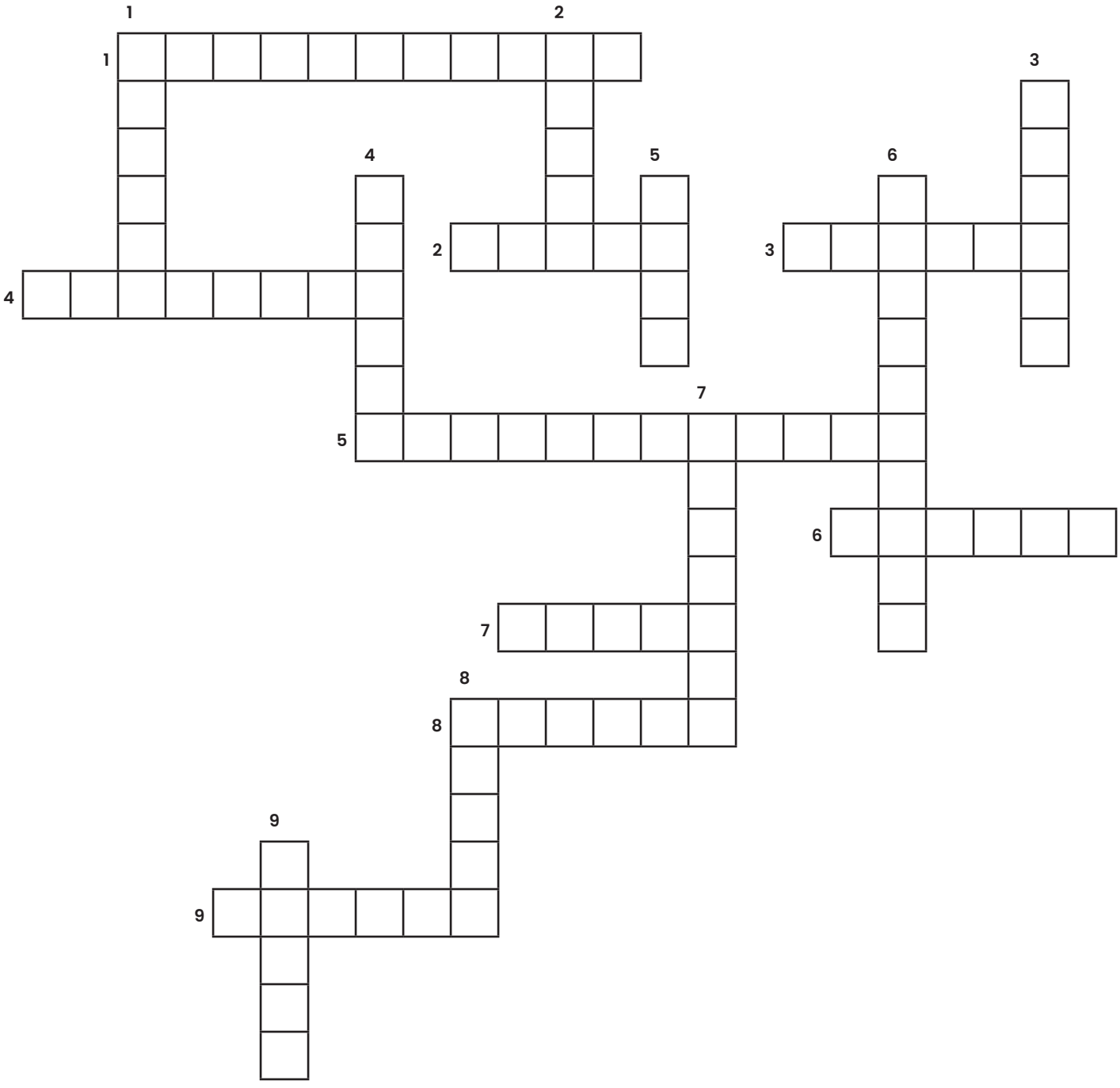
1. the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower
2. another female part of the flower; the long stalk that supports the stigma
3. part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; part of a plant that ordinarily contains the reproductive organs
4. fine hair-like stalk that supports the anther
5. the act of generating new plants from parent plants
6. stalk-like part of a flower that produces and bears pollen; male organ of a flower, bearing the anther and filament
7. the colorful parts of the flower that often attract pollinators
8. one of the female parts of the flower; the sticky bulb in the center of flowers where the pollen lands to start the fertilization process
9. all the female parts of a plant together

Down

1. organ of a flower that contains the ovule or ovules; female part of the flower made up of four parts — stigma, style, ovary and ovule
2. part of the plant, usually at the base of the flower, that contains ovules and eventually becomes fruit
3. one of the small flowers making up a composite flower
4. yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair
5. small part of a flowering plant that is capable of growing a new plant
6. an organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another
7. collective term for the petals of one flower
8. parts that look like little leaves or petals that cover the outside of a flower bud to protect the flower until it opens or blooms
9. collective term for the sepals of one flower

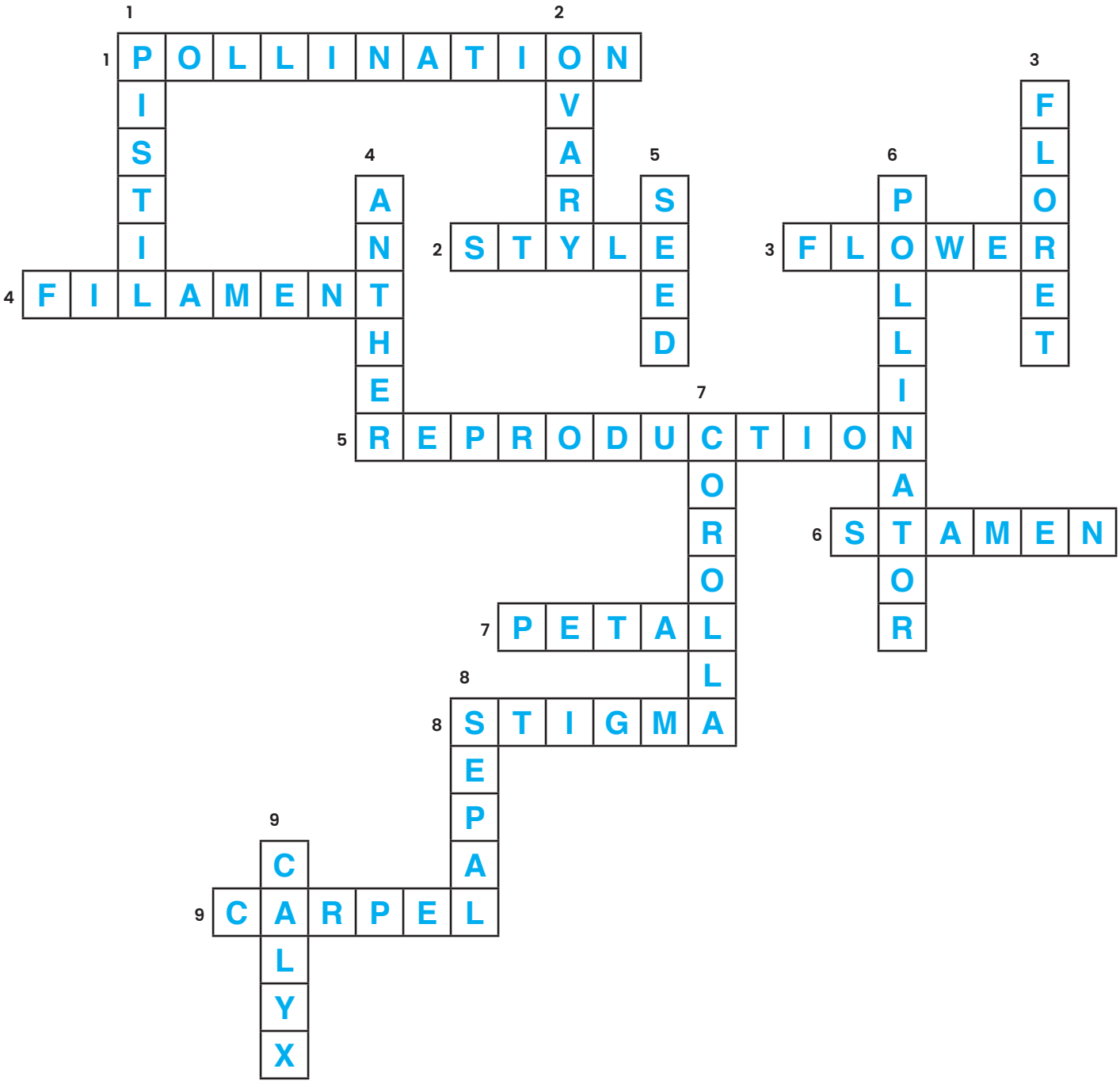
Parts of a Wildflower Crossword Puzzle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Parts of a Wildflower Crossword Puzzle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Resources

Literary connections

From Flower to Fruit by Anne Ophelia Downden

The Magic School Bus Plants Seeds: A Book About How Living Things Grow by Joanna Cole

The Nature And Science Of Flowers (Exploring the Science of Nature) by Kim Taylor and Jane Burton

The Secret Lives of Plants! (Adventures in Science) by Janet Slingerland

What Do Roots Do? by Kathleen V. Kudlinski

What's Inside a Flower by Rachel Ignotofsky

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Plant Life Cycles (Building Blocks of Science), World Book, Inc.

Websites and other web resources

Biology of Plants (Missouri Botanical Garden)
www.mbgnet.net/bioplants/main.html

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat)
www.Wildflower.org/plants-main

Plant Morphology (American Museum of Natural History)
www.amnh.org/explore/curriculum-collections/biodiversity-counts/plant-identification/plant-morphology

FLORIDA Wildflower FOUNDATION

Unit 2

Wildflower Life Cycle

Overview

This unit will use a simple life cycle graphic model, but will expand the cycle at appropriate points to include seed dispersal, germination, reproductive parts of a flower, and pollination. This unit will also focus on the seed phase. Students are probably most familiar with this phase.

Understanding the life cycle helps students see wildflowers as dynamic organisms that change over time, not just static blooms in a field. Each stage of the life cycle — from seed to seedling to mature plant — prepares students to understand how wildflowers reproduce and adapt to their environments.

Activities

1. Wildflower Life Cycle
2. Let's Do Surgery on a Seed
3. Germination Lab Experiment
4. My Life Began as a Seed

Vocabulary

cotyledon
- dicotyledon
- monocotyledon

cycle
dormancy
embryo
endosperm
epicotyl
flower
fruit
germination
life cycle
mature plant
pollination
radicle
reproduction
seed
seed coat
seed disperal
seedling
testa

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.2.1, MA.3.M.1.1, MA.3.M.1.2, MA.3.DP.1.1, MA.3.DP.1.2, SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: ELA.4.C.2.1, MA.4.DP.1.1, MA.4.DP.1.3, SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.4, SC.4.N.3.1

FLORIDA Wildflower FOUNDATION

Unit 2

Wildflower Life Cycle

Introduction

Have you ever planted a seed and watched it grow? The journey from tiny ***seed*** to flowering plant is called a ***life cycle*** — a series of changes that repeats over and over again.

A ***cycle*** is a series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order. The life of a wildflower can be seen as a cycle: It moves from seed to young plant (***seedling***) to a ***mature plant*** that then produces seeds.

In this unit, you'll discover what's inside a seed, watch seeds sprout and grow, and learn how wildflowers make new seeds to continue the cycle. You'll even get to be a plant scientist and conduct your own ***germination*** experiment!

What's Inside a Seed?

Seeds represent an evolutionary step forward for plants. A seed is a small package containing the ***embryo***, or baby plant. Within the embryo are all the cells needed to develop into a mature plant. The embryo has three main parts: the root, or ***radicle***; the shoot, or ***epicotyl***; and the seed leaves, or ***cotyledons***. The seed contains a "sack lunch" called the ***endosperm***, which provides the embryo with nutrients, usually in the form of starch and proteins. These nutrients allow the seed to remain viable while it waits to germinate. The embryo and endosperm are enclosed in the ***testa***, or ***seed coat***, which provides protection against changing environments. This is what you see and feel when you hold a seed.

Plants are classified based on the number of seed leaves (cotyledons) within the seed. Plants such as grasses (which can also be wildflowers) are ***monocotyledons*** (or monocots), containing one cotyledon. ***Dicotyledons*** (or dicots), such as sunflowers, are plants that have two cotyledons.

FLORIDA Wildflower FOUNDATION

Unit 2 Activity 1

Wildflower Life Cycle

Objective

Students will be able to identify and label the different phases of a wildflower's life cycle.

Discussion

A wildflower's ***life cycle*** begins with a ***seed***. The seed will sprout and produce a tiny, immature plant called a ***seedling***. The seedling will grow to adulthood and form a ***mature plant***. The mature plant will ***reproduce*** by forming new seeds, which will begin the next life cycle.

Directions

Students should work individually.

1. Give each student a "Wildflower Life Cycle" worksheet.
2. Show the "Wildflower Life Cycle" visual presentation. Define and discuss the different stages of the plant's life in order (as laid out in the slides) and have students label the diagram accordingly.

Extension

Students may work individually, in pairs or in teams.

1. Lead students into the schoolyard and show them a Beggarticks (*Bidens alba*) plant. This weedy wildflower is often found in neglected flowerbeds or untended lawns. It blooms spring through fall, and year-round in warmer climes. Try to find specimens in various phases of their life cycle.
2. Let students explore the schoolyard for other native plants. Using their "Wildflower Life Cycle" worksheets, have them look for other plants in the four main stages of their life cycles: seed, seedling, flowering and mature plant.

Materials

- "Wildflower Life Cycle" worksheet (one per student)
- "Wildflower Life Cycle" visual presentation (click to download)

Standards

Grade 3: SC.3.L.14.1

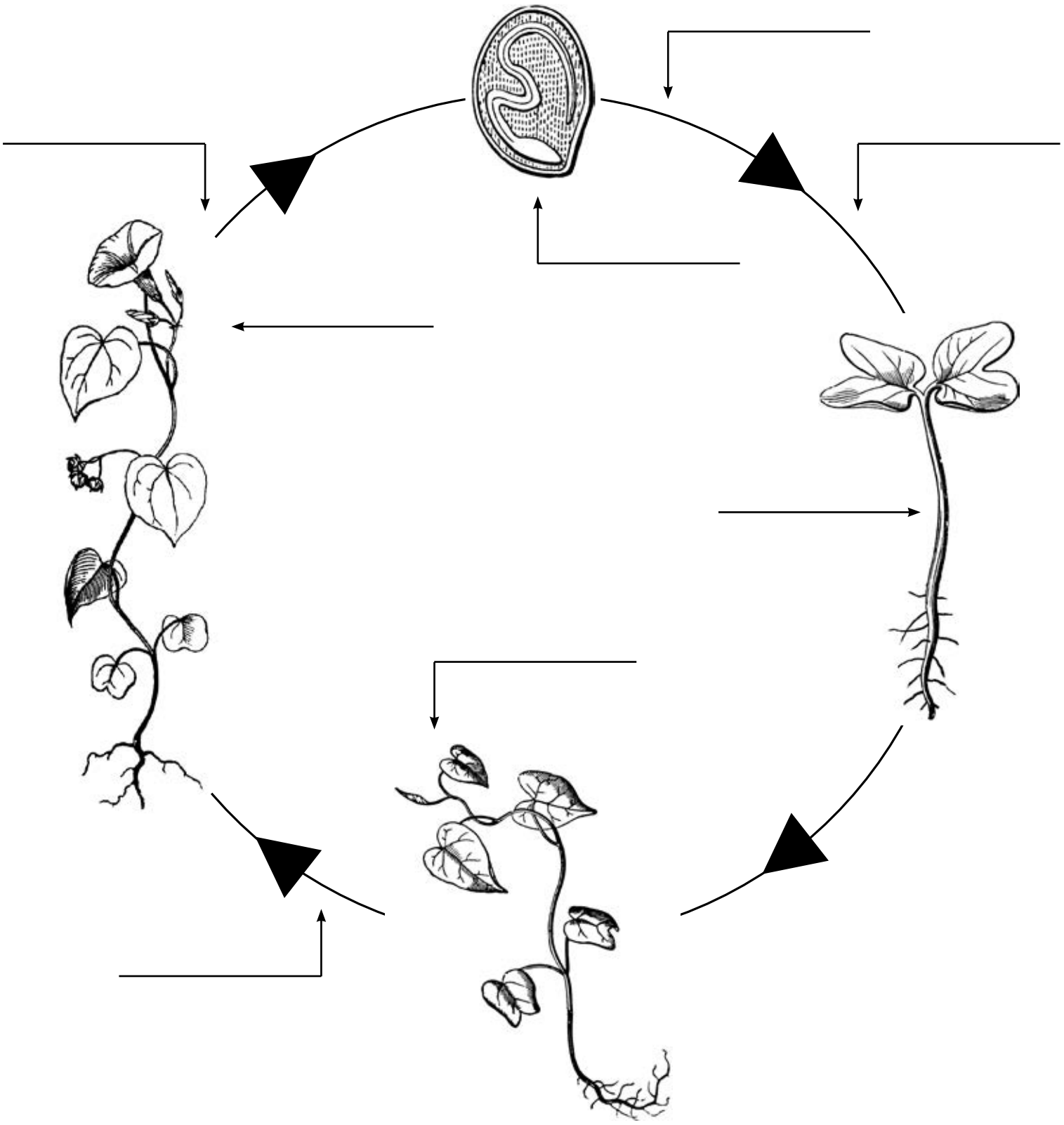
Grade 4: SC.4.L.16.1, SC.4.L.16.4

Note: To help you identify if Beggarticks (pictured below) is present in your schoolyard, visit florida.plantatlas.usf.edu/plant/species/3604. If Beggarticks is not present, consider using another "weedy" flowering plant that is common in your schoolyard.

Photo courtesy of Eleanor Dietrich

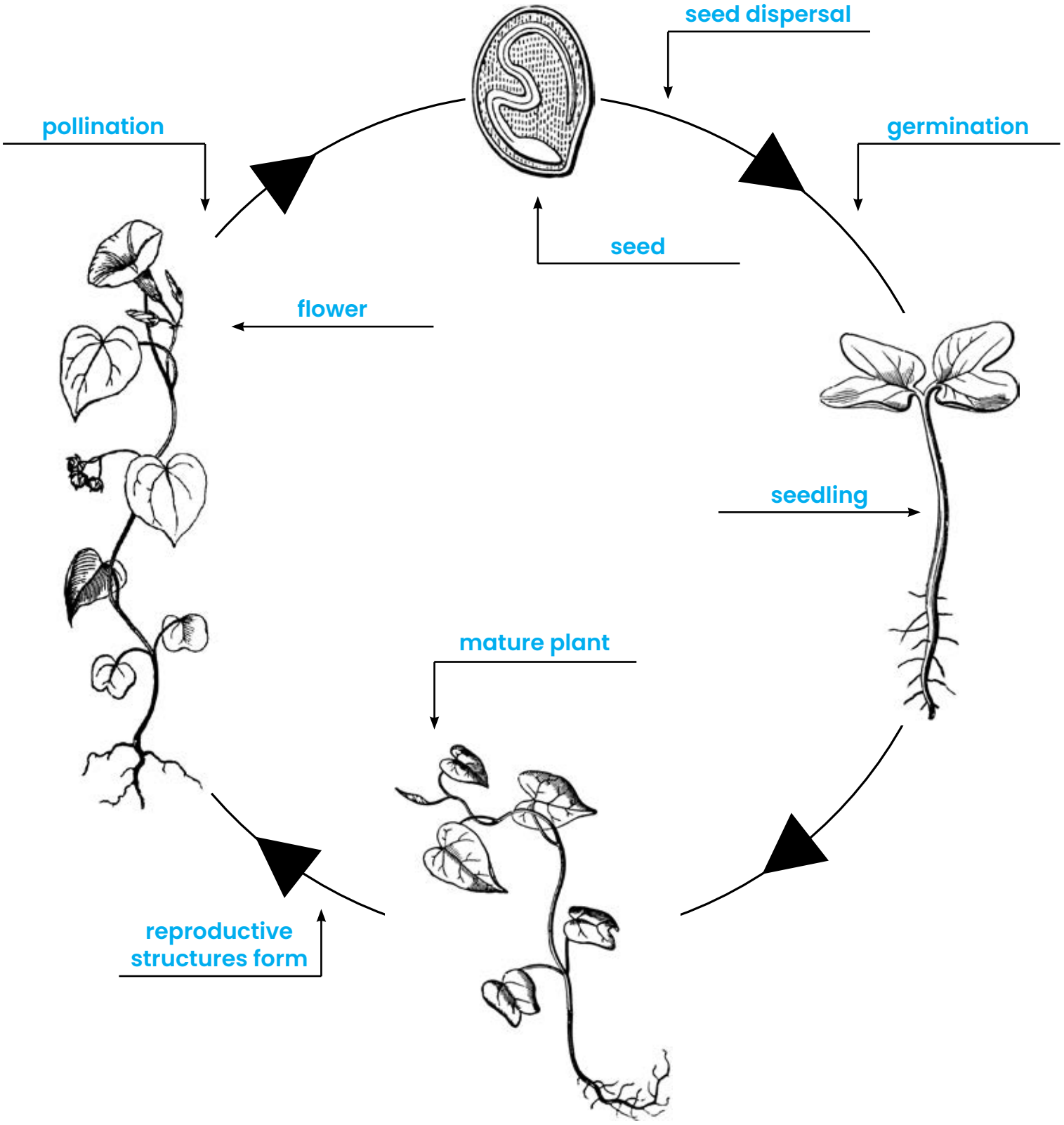
Wildflower Life Cycle

Label the stages of a wildflower's life cycle on the diagram below.



Wildflower Life Cycle

Label the stages of a wildflower's life cycle on the diagram below.



FLORIDA Wildflower FOUNDATION

Unit 2 Activity 2

Let's Do Surgery on a Seed

Objective

Students will dissect a seed and be able to identify and draw a diagram of its three major parts.

Discussion

Seeds come in different sizes, shapes and colors. Some can be eaten and some can't. Each seed has an important part to play in plant ***reproduction***. Within each seed is almost everything needed to make a new plant.

Directions

Students should work in pairs.

1. Give each pair a soaked wildflower seed, hand lens, plastic knife, toothpicks and paper towel.
2. Show the "Seed Diagram" visual presentation and advance each slide with appropriate step below.
3. Have students place the wildflower seed on a paper towel. Explain that the outer coating is a protective layer called the ***testa***, or ***seed coat***. Have students carefully remove the testa using the plastic knife and toothpicks.
4. Have them draw the seed outline and label with both names. You may also provide each pair with a "Seed Diagram" worksheet to complete..
5. Tell students that the part of the seed that is now visible is the ***endosperm***. Remind students that this is the food supply for the seed. Have students label the endosperm on their diagram.
6. Using the knife and toothpicks, tell students to very carefully open the seed like a book so that it splits into two parts. Make sure they do not cut the seed open! They should use the knife and toothpicks to pry it apart at the seam along the edge of the seed.
7. Have students use the hand lens to find the area that looks like a new, tiny plant. Remind them that this is called the ***embryo*** and contains everything necessary to make a new plant. Have them draw and label the embryo on their seed diagram.
8. If visible in the dissected seed, have students locate, draw and label the ***radicle***, ***epicotyl*** and ***cotyledons***.

(*Continued on following page.*)

Materials

- "Parts of a Seed" visual presentation (click to download)
- "Parts of a Seed" worksheets (optional; one per pair)
- wildflower seeds, soaked in water overnight (enough for each pair to have one seed, plus a few extras in case of mistakes)
- hand lens (one per pair)
- notebook or drawing paper (one sheet per student)
- paper towel (one per pair)
- plastic knife (one per pair)
- toothpicks (two per pair)

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.3.1

Tip

If wildflower seeds are not available, beans may be substituted. Explain to the students that these will serve as a model for wildflower seeds. Remember to soak them overnight.

Fun Fact

A great way to learn about the endosperm is to eat it! Foods like popcorn, shredded coconut and white rice are all endosperms. Two-thirds of all human calories come from endosperms.

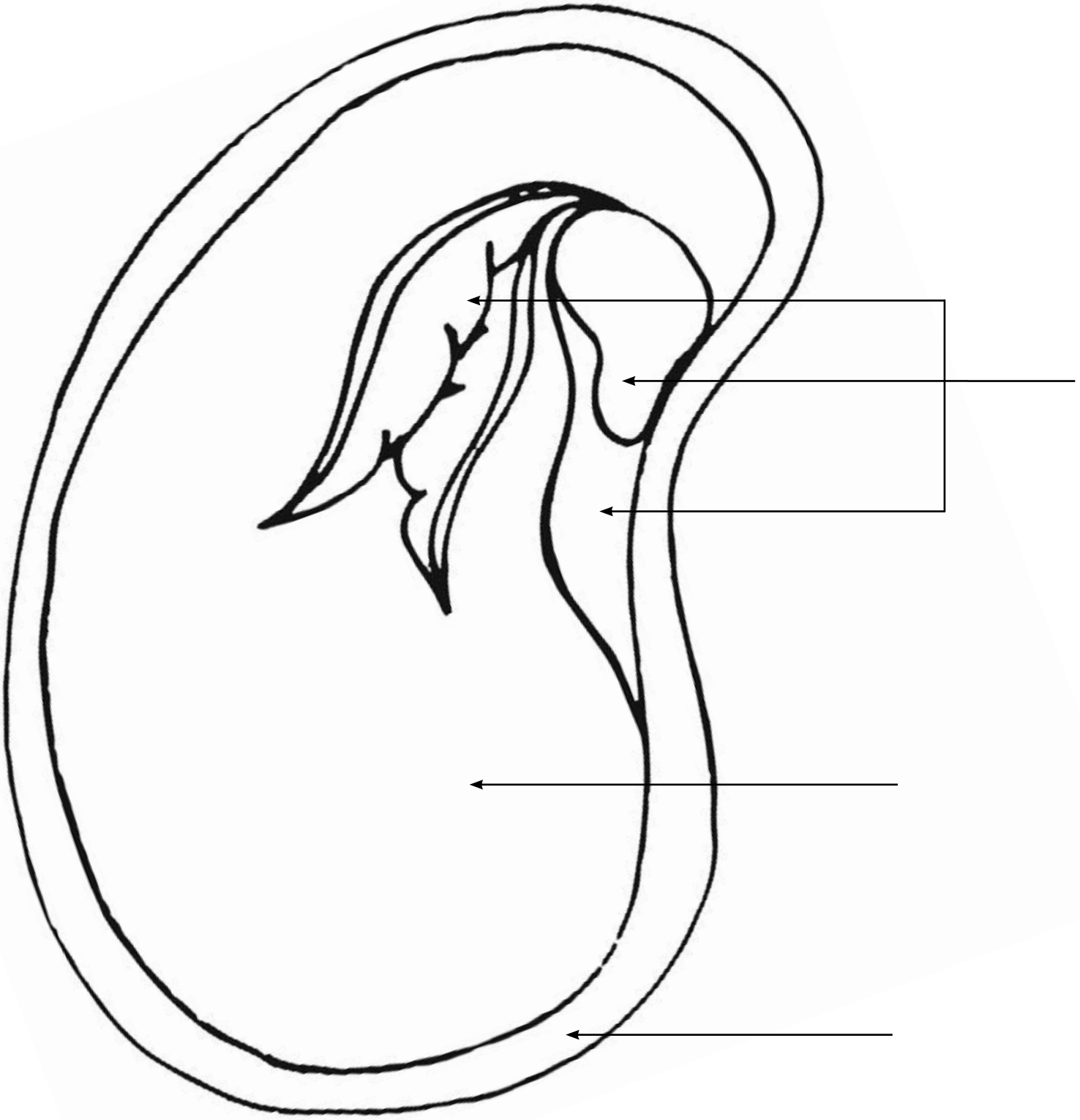
Discussion

Discuss the following questions as a group following the activity:

- The part that looks like a tiny plant is called _____ .
- What is the temporary food supply in a seed called?
- What part of the seed protects the embryo from injury and also from drying out?
- Let's work together to make a definition for seed.

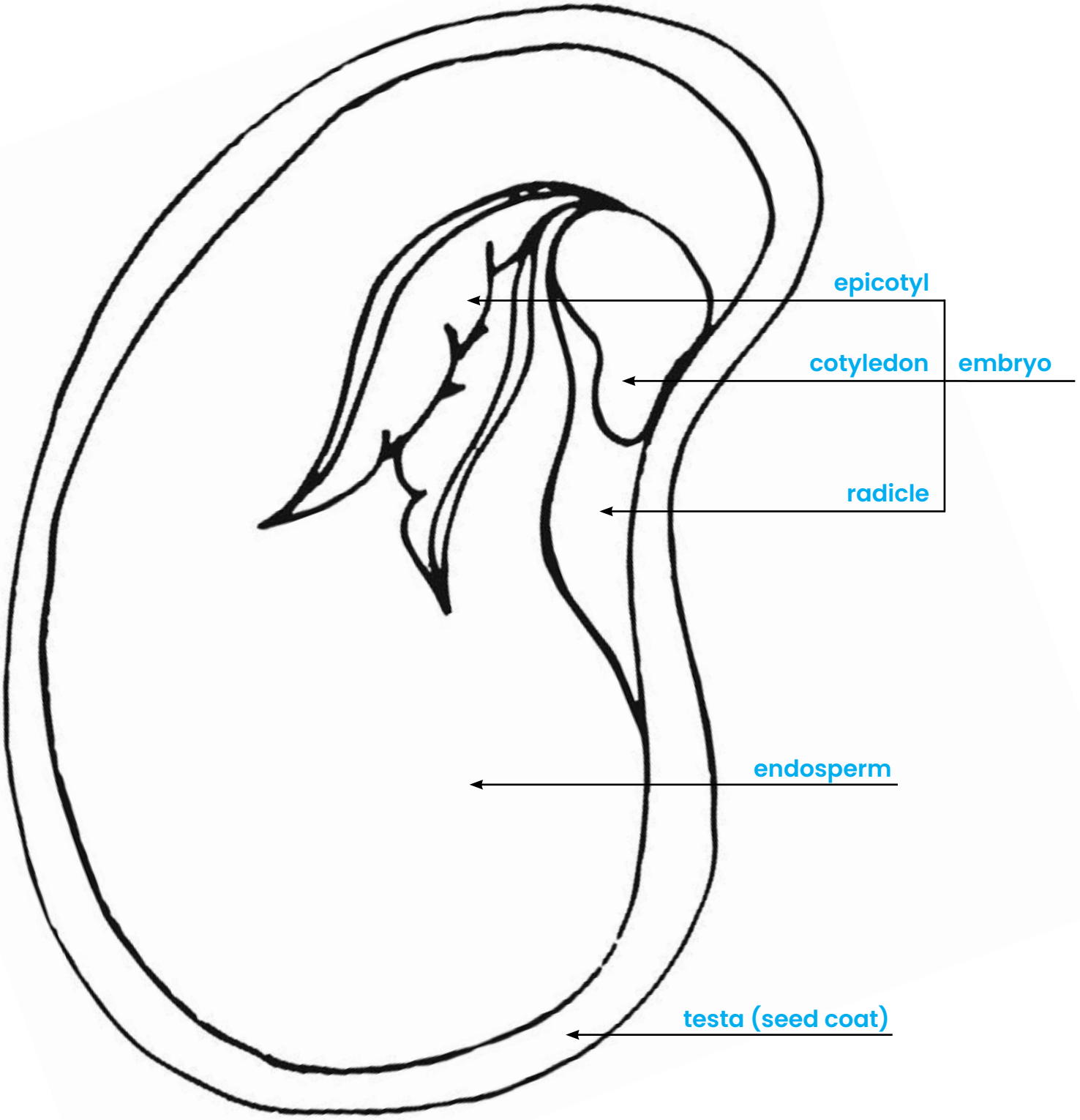
Parts of a Seed

Use the dissected seed to help you label the five parts on the diagram below.



Parts of a Seed

Use the dissected seed to help you label the five parts on the diagram below.



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Unit 2 Activity 3

Germination Lab Experiment

Objective

Students will be able to observe the germination of a seed and the growth of a baby plant over a four-week period. See alternative on next page if time and space are limited.

Discussion

Germination is the growth of an ***embryo*** contained within a ***seed***. It results in the formation of the ***seedling***. All seeds need water, oxygen, the proper temperature, and sometimes light or darkness in order to germinate.

Discuss the following questions with the students:

- What is a seed's job?
- What does a seed need in order to do its job?
- Think about the parts of a seed that you discovered when we did the seed 'surgery.' What were the three parts? What does each part do?

Directions

1. Provide each student with a copy of the "Germination Lab Experiment" worksheet.
2. Give each student a cup filled with soil, 4 seeds and newspaper.
3. Have each student follow the directions on the worksheet to plant the seeds in their cup of soil.
4. So students can observe the germination process over time, each week, have them remove one seed/plant to examine.
5. Have students measure, draw and label the progress on the worksheet. Have them use the back of the worksheet if additional room is needed.
6. At the end of the four-week experiment, have students graph their data:
   - Grade 3: Create a line plot showing the plant's size and increase in growth each week.
   - Grade 4: Create a line plot and calculate the overall amount of growth by subtracting the recorded sizes each week from the final week's size.

(*Continued on following page.*)

Materials

- "Germination Lab Experiment" worksheet (one per student)
- cup (one per student)
- newspaper
- soil
- water
- wildflower seeds (four per student)

Standards

Grade 3: MA.3.M.1.1, MA.3.M.1.2, MA.3.DP.1.1, MA.3.DP.1.2, MA.K12.MTR.7.1,† SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MA.4.DP.1.1, MA.4.DP.1.3, MA.K12.MTR.7.1,† SC.4.L.16.1, SC.4.L.16.4

Tip

Be sure to choose seeds that are large enough for students to work with, such as Sunshine mimosa (*Mimosa strigillosa*) seeds, which are generally available from the Florida Wildflower Growers Cooperative. Visit www.FloridaWildflowers.com or call 352-988-8117 to check availability.

If using Sunshine mimosa seeds, they must be "scarified" the night before the activity. To do this, place a piece of sandpaper on a flat surface and empty the packet of seeds onto it. Place a piece of sandpaper on top of the seeds (making a sandpaper sandwich) and rub the seeds back and forth across the sandpaper for up to 10 seconds.

If wildflower seeds are not available, beans may be substituted. Explain to the students that these will serve as a model for wildflower seeds.

† To complete this activity without the math component, skip step 6. You may also choose to modify the discussion questions. Students can simply observe, measure, draw and discuss the physical changes they see in their plants each week.

Discussion

After completing their graphs, ask the following questions:

- What trends do you notice in your graph?
- During which week did your plants grow the most? The least?
- What factors may have caused less growth during some weeks? More growth?
- How does your graph compare to your classmates' graphs? What similarities and differences do you notice?

Alternative Activity

If time and space are limited, consider this alternative version of the Germination Lab Experiment activity.

Students may work as individuals or in pairs.

1. Provide each student or pair of students a damp paper towel, a plastic sandwich bag, and 4 seeds.
2. Have students place beans/seeds on the paper towel and fold it in half.
3. Have them place the folded paper towel into the bag so it lays flat. Then tape to the bags to a window with the beans facing inside the room.
4. Have students keep a plant journal, recording observations daily and drawing pictures of changes the bean seeds go through as they grow.
5. Students can track growth measurements in their journals and create a graph showing daily or weekly growth patterns. Use the discussion questions above to analyze their graphs.

Materials

- seeds/beans (four per student/pair)
- paper towels
- plastic sandwich bag (one per student/pair)
- water

Standards

Grade 3: MA.3.M.1.1, MA.3.M.1.2, MA.3.DP.1.1, MA.3.DP.1.2,† SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MA.4.DP.1.1, MA.4.DP.1.3,† SC.4.L.16.1, SC.4.L.16.4

Tip

Be sure to choose seeds that will sprout quickly. Lima beans or other beans work best. Explain to students that the process they are about to observe with the beans will serve as a model for wildflower seeds.

† To complete this activity without the math component, skip step 6. You may also choose to modify the discussion questions. Students can simply observe, measure, draw and discuss the physical changes they see in their plants each week.

Germination Lab Experiment

Procedure 1

1. Gather materials.
2. Lay newspaper down on your desk.
3. Add soil to each cup.
4. Lay wildflower seeds on top of soil. (If using beans, poke 4 holes about ½-inch deep and place one seed in each hole.)
5. Gently press wildflower seeds into soil. (If using beans, gently cover each with soil so that the top of the soil is level.)
6. Do not smash the dirt down into the hole!
7. Add water to cup until soil is damp all the way to the bottom — not too dry or wet.

Procedure 2

8. Each week, check soil and make sure it is damp. Plants will not need to be watered each day!
9. At the end of each week, take one plant from the cup. Do this by gently digging for the seed with a pencil or other object.
10. Brush away loose soil and examine the plant for changes.
11. Measure the plant and record its length and width in that week's box.
12. Draw and label what you see. Try to draw the plant at its actual size if it will fit in the box.

Week 1

Week 2

Week 3

Week 4

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Unit 2 Activity 4

My Life Began as a Seed

Objective

Students will be able to demonstrate an understanding of the wildflower ***life cycle*** through collaborative story writing.

Materials

- "My Life Began as a Seed" worksheet (one per student)

Standards

Grade 3: ELA.3.C.2.1

Grade 4: ELA.4.C.2.1, SC.4.L.16.1, SC.4.L.16.4

Directions

1. Divide students into groups of four or eight and provide each student with a copy of the "My Life Began as a Wildflower Seed" worksheet.
2. Have the students develop a science story chain about the life cycle of the wildflower to include plant ***reproduction*** stages. The story chain should begin with the ***seed***, end with the wildflower dying after producing new seeds, and give information about the changes the wildflower is undergoing at each stage. Students should write the story from the point of view of the wildflower.
3. Each student will write the opening sentence of his/her wildflower life cycle story chain (beginning with the seed).
4. The students will then pass their papers to the student in their group sitting to their left, and that student will write the next sentence in the story, going on to the next stage.
5. The paper is again passed to the left and that student will write the third sentence. The paper should continue to be passed from student to student until a sentence has been written about each stage of the life cycle.
6. Have the students take turns reading their stories aloud to the group. All group members should be prepared to revise the story if the information is incorrect or not clearly stated.

Variation

1. Assign to each student a specific portion of the story (e.g. seed, ***seed dispersal***, ***germination***, etc.). Depending on the number of students, more than one student may have the same section.
2. Have students write as much as they know about their assigned section.
3. Once all students have completed their sections, have them line up in the classroom and divide them into life cycle groups (i.e. one section per group to form a complete life cycle; depending on the number of students, there may be multiple life cycle groups.)
4. Within each group, have students arrange themselves in the appropriate order based on their section of the story or life cycle.
5. Have students read their sections to the others in their group in sequential order. All group members should be prepared to revise their part of the story if the information is incorrect or not clearly stated.
6. Have each group present their story to the class.

My Life Began as a Seed

You have three lines on which to write your part of each story. When finished, pass your paper to the person on your left. Take the new story that is handed to you and write the next part of the story. Continue passing papers and writing until the story is finished with a new seed being formed.

Seed	
Seed dispersal	
Germination	
Seedling	
Mature plant	
Reproductive parts form and grow	
Flower	
Pollination	
Seed	

Exchange papers until you get your own paper back. Take turns in your writing group to read and correct the stories until you each have an accurate story written. No two stories should be exactly alike!

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Unit 2

Glossary

cotyledon: one of the three main parts of a plant embryo; also known as the seed leaf

cycle: a series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order

dicotyledon: a flowering plant whose embryo has two cotyledons

dormancy: a state of rest or inactivity; when a seed waits for the right conditions before it begins to grow

embryo: part of the seed that contains all the parts necessary to develop into a new plant

endosperm: part of the seed that contains the nutrients needed by the embryo to develop into a new plant

epicotyl: the part of the embryo that becomes the shoot or stem

flower: part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; part of a plant that ordinarily contains the reproductive organs

Note: Flowers can be male, female or bisexual. A male flower has only stamens. A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

fruit: an edible plant product that has seeds and flesh, such as an apple, berry or banana; the reproductive product of a plant; the seed of plants, or the part that contains the seeds.

germination: process by which a seed comes to life and produces a plant

life cycle: the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds

mature plant: a fully grown plant that is able to produce flowers and seeds

monocotyledon: a flowering plant whose embryo has one cotyledon

pollination: the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

Note: Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carries pollen in and between flowers, or when it is moved within flowers.

radicle: the part of the embryo that becomes the roots

reproduction: the act of generating offspring

seed: small part of a flowering plant that is capable of growing a new plant

seed coat: protective outer layer of a seed; also called a testa

seed dispersal: the scattering or distribution of seeds away from the parent plant to grow in new places

seedling: young plant that has grown from a seed

testa: protective outer seed coat

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Wildflower Life Cycle Crossword Puzzle

Use the clues and the Word Bank to fill in the puzzle on the next page.

Word Bank

cotyledon	endosperm	germination	radicle	seed dispersal
cycle	epicotyl	life cycle	reproduction	seedling
dicotyledon	flower	monocotyledon	seed	testa
embryo	fruit	pollination	seed coat	

Across

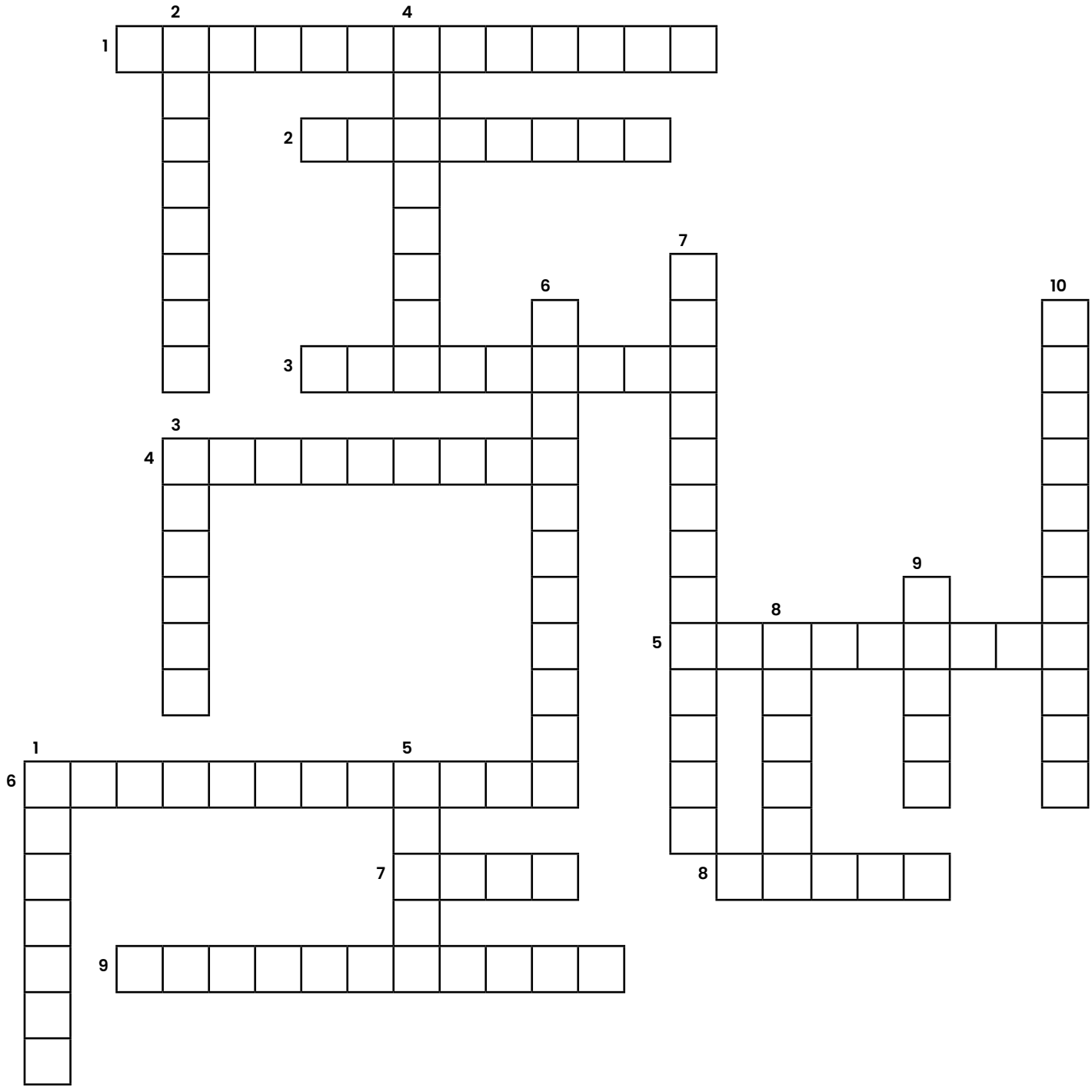
1. scattering or distribution of seeds
2. young plant that has grown from a seed
3. one of the three main parts of a plant embryo; also known as the seed leaf
4. part of the seed that contains the nutrients needed by the embryo to develop into a new plant
5. the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds
6. the act of generating offspring
7. small part of a flowering plant that is capable of growing a new plant
8. the reproductive product of a plant; the seed of plants, or the part that contains the seeds
9. the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

Down

1. the part of the embryo that becomes the roots
2. the part of the embryo that becomes the shoot or stem
3. part of the seed that contains all the parts necessary to develop into a new plant
4. protective outer layer of a seed; also called a testa
5. protective outer seed coat
6. process when a seed comes to life or produces a plant
7. a flowering plant whose embryo has one cotyledon
8. part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; blossom
9. a series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order
10. a flowering plant whose embryo has two cotyledons

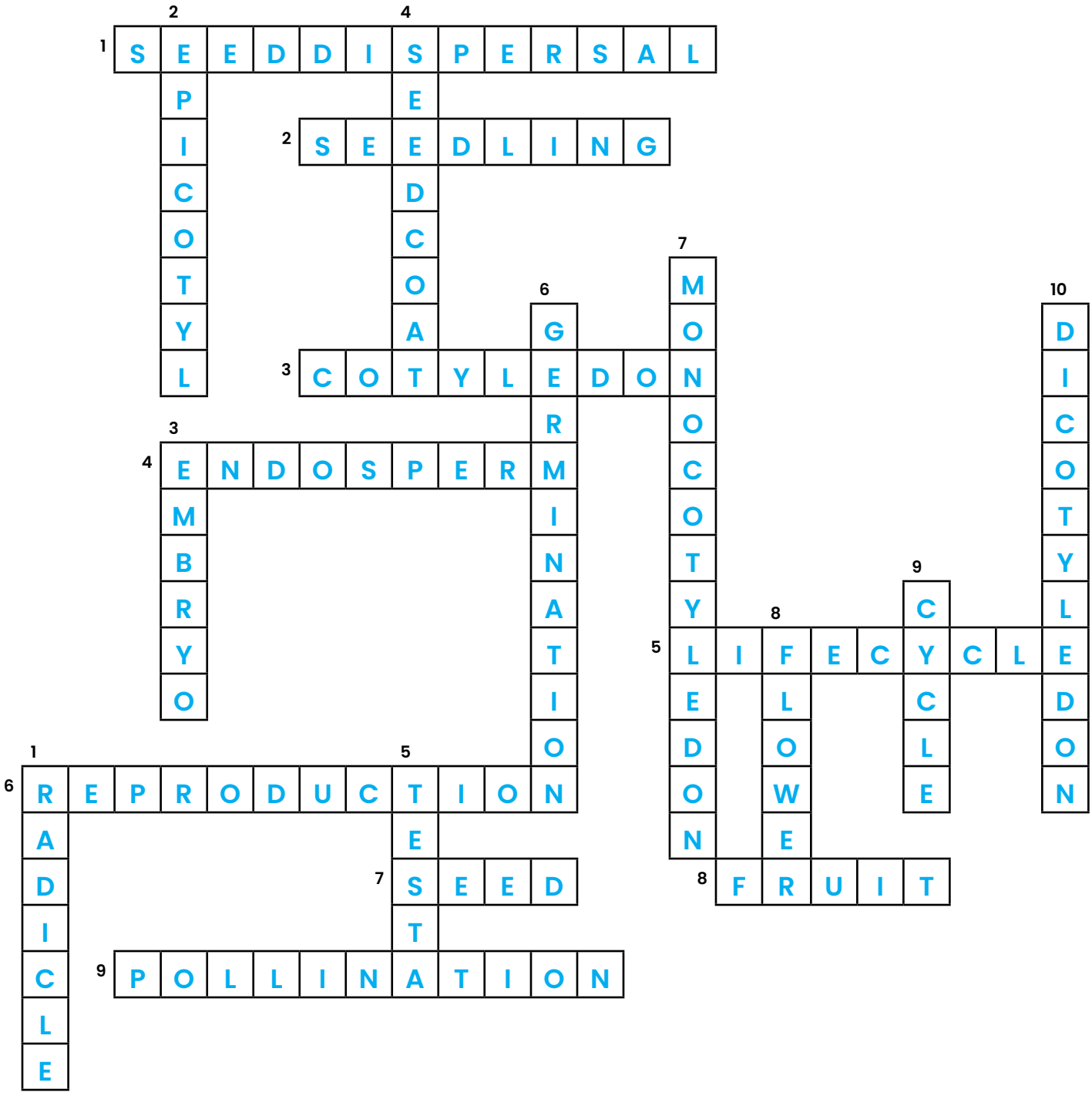
Crossword Puzzle: Wildflower Life Cycle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Crossword Puzzle: Wildflower Life Cycle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Resources

Literary connections

A Seed is Sleepy by Dianna Hutt Aston

Big Yellow Sunflower by Frances Barry

Flip, Float, Fly: Seeds on the Move by JoAnn Early Macken

From Flower to Fruit by Anne Ophelia Downden

From Seed to Plant by Gail Gibbons

The Garden Next Door by Collin Pine

How a Plant Grows by Bobbie Kalman

Insects and Flowers by Oda Hidetomo

The Life Cycle of a Flower by Molly Aloian

Lily's Pesky Plant by Kirsten Larsen

The Magic School Bus Plants Seeds: A Book About How Living Things Grow by Joanna Cole

Miss Maple's Seeds by Eliza Wheeler

Mother Earth and Her Children by Sybil Van Offers and S. Shoen-Smith

Mysteries & Marvels of Plant Life by Barbara Cork

The Nature And Science Of Flowers (Exploring the Science of Nature) by Kim Taylor and Jane Burton

Oh Say Can You Seed? Cat in the Hat Learning Library

On Meadowview Street by Henry Cole

The Secret Lives of Plants! (Adventures in Science) by Janet Slingerland

Seeds And Seedlings (Nature Close-Up) by Elaine Pascoe

The Tiny Seed by Eric Carle

We are the Gardeners by Joanna Gaines

What Do Roots Do? by Kathleen V. Kudlinski

What Does the Bunny See? by Linda Sue Park

What Is a Plant? (Science of Living Things) by Bobbie Kalman

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Plant Development (The Green World) by William G. Hopkins

Websites and other web resources

Biology of Plants (Missouri Botanical Garden)
www.mbgnet.net/bioplants/main.html

Florida Wildflower Foundation
(plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies
(Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

From Seed to Fruit (PBS LearningMedia)
(interactive resource that guides students through the stages of a plant's life cycle)
florida.pbslearningmedia.org/resource/evscps.sci.life.seed/from-seed-to-fruit/

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center
(national database; search by state, family or habitat)
www.Wildflower.org/plants-main

FLORIDA Wildflower FOUNDATION

Unit 3

Pollination

Overview

This unit introduces students to pollination and the vital role pollinators play in plant reproduction and ecosystem health. Students will learn that pollination is not a deliberate action by animals, but a result of their search for food such as nectar and pollen.

This section includes description pages that explain different types of pollinators and their specialties. Print and distribute these pages to students at the beginning of the unit. Allow time for students to read the descriptions and discuss them as a class before starting the activities. Students may keep the description pages as a reference as they work through the unit.

Emphasize that while insects such as bees and butterflies are common pollinators, some plants rely on wind, birds or bats. This helps students understand the diversity of pollination strategies and reinforces the idea that different species play different roles in natural systems.

Activities

1. Pollination Game
2. Flower Dust
3. Wandering Pollen
4. Why Wind?
5. The Perfect Fit

Vocabulary

anther
cross-pollination
fertilization
flower
nectar
nectar guide
petal
pollen
pollination
pollination syndrome
pollinator
proboscis
self-pollination
stigma

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

FLORIDA Wildflower FOUNDATION

Unit 3

Pollination

Introduction

Why do ***flowers*** make ***nectar***? Why are some flowers bright red while others are pale white? The answer is ***pollination***!

Pollination is the first step in a plant's reproductive cycle. It involves the transfer of ***pollen*** from one flower to another flower of the same species. Pollen is a fine, powder-like material that covers the ***anthers*** within a flower. It is often yellow, but can be white, black, orange, green or many other colors. Pollen is what bees and other ***pollinators*** collect and carry. Plants need pollen to make seeds.

Why Pollinators Matter

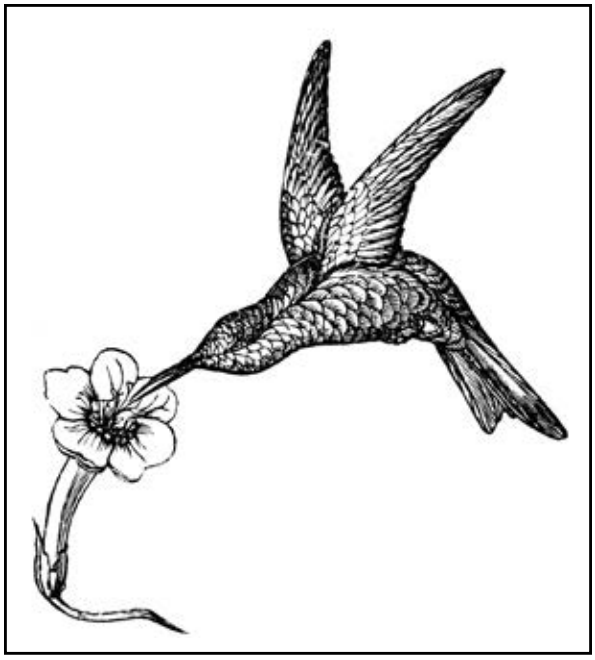
Many different insects and animals act as pollinators. These "work horses" of the natural world help ensure the continuation of plant species. But these pollinators do not get up in the morning and "go off and pollinate." Pollination is actually a lucky result of each pollinator's search for food. When a pollinator visits a wildflower in search of nectar (a sugary liquid made by the flowers), ***pollen*** or even other insects, it brushes up against the flower's anthers and ***stigmas***, picking up and depositing pollen with each visit. This process leads to ***fertilization*** and the production of seeds.

Pollination is important because most flowering plants cannot reproduce or produce seed without help from pollinators. Many fruit trees would also not produce fruit without them. Common pollinators include bees, butterflies and other insects. Some plants rely on wind, birds or bats instead. Insects are attracted to flowers by nectar, scent and colorful ***petals***.

In this unit, you will learn about different types of pollinators and the special roles they play. You'll play pollination games, become a pollinator yourself, explore how pollination works, and discover why it is essential for plants, wildlife and people.

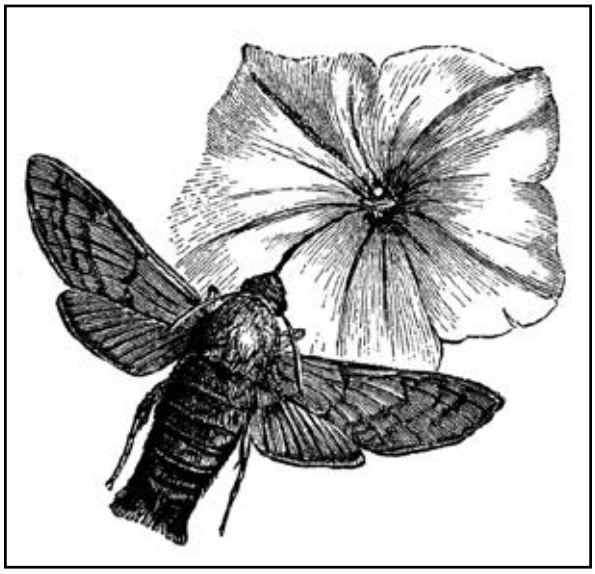
Pollination Specialties

Hummingbirds: Hummingbirds have keen eyesight and are attracted to tubular-shaped flowers that are red, orange or bright pink. The color red is not visible to most insects, but it is very visible to hummingbirds, so red flowers have evolved specifically to attract these tiny birds! ***Nectar*** is produced at the base of the deep flower tubes and is not accessible to most insect ***pollinators***. Hummingbirds hover in front of flowers and use their long, needle-like bills and even longer tongues to reach deep inside for nectar. While feeding, pollen sticks to their heads and throats, which they then carry to the next flower. Hummingbirds do not have a good sense of smell, so the flowers they visit tend to have little or no fragrance. Coral honeysuckle (*Lonicera sempervirens*), Crossvine (*Bignonia capreolata*) and Coralbean (*Erythrina herbacea*) are examples of hummingbird-pollinated flowers.



Hummingbird on Crossvine

Butterflies and moths: Butterflies are lazy pollinators and prefer flowers that provide a sturdy place where they can sit while they sip nectar. They feed on flower nectar for energy and lay their eggs on ***host plants*** where their caterpillars will later feed. Like bees, they are attracted to flowers that are sweetly scented and brightly colored. However, unlike bees, butterflies can see the color red, so they tend to visit red, blue, purple and yellow flowers. They also look for flowers with long, slender tubes that can fit their long tongues. Some flowers even have special markings called ***nectar guides*** — lines or patterns on the ***petals*** that direct the butterfly's tongue to the rich nectar at the flower base. Butterfly-pollinated flowers include Milkweeds (*Asclepias* spp.), Blazing star (*Liatris* spp.) and Firebush (*Hamelia patens*).



Hawkmoth on Moonflower

Moths, like their butterfly cousins, are also attracted to fragrant flowers, but because they forage at dusk and night, they prefer white or light-colored flowers that stand out against the darkness. Night-blooming flowers often produce very strong, sweet fragrances that guide moths from far away. Many moths have even longer tongues than butterflies, allowing them to reach nectar in extremely deep flower tubes. Moonflower (Ipomoea alba), is a perfect example of a moth-pollinated plant.

Pollination Specialties

Bees and wasps: Bees and wasps may nest in the ground, near clumps of native grass, or inside hollow plant stems. They visit ***flowers*** to feed on the ***nectar***, and also to collect ***pollen*** to feed their larvae. They eat the nectar with a tongue that extends out through a sucking tube. Body hairs on their legs and abdomens act as brushes that pick up the pollen, which they comb out and force into pollen baskets on their third pair of legs.

Furrow bee on Fleabane

Bees can see color, although in a different light spectrum (ultraviolet) than humans. Bee-***pollinated*** flowers are generally showy and brightly colored, usually in shades of blue or yellow (the color red appears black to them). Flowers tend to be sweet-smelling and often have special markings — called honey guides or nectar guides — that only bees can see. Nectar guides are designed to lead the bees straight to the nectar. They also are associated with landing platforms that provide a place for bees to sit. Bee-pollinated flowers include Spiderwort (*Tradescantia ohiensis*), Helmet skullcap (*Scutellaria integrifolia*), Toadflax (*Linaria canadensis*) and most members of the daisy family.

Some of the more unusual bee-pollinated flowers have spring-loaded traps or complex passageways that force the bee to follow a particular route. This ensures the bee will collect and deposit pollen in the proper locations. For example, the ***anthers*** of Beardtongue (*Penstemon* spp.) are arranged so they tap the bee's back as it moves into the flower in search of nectar.

Sap beetle on Magnolia

Beetles: Beetles prefer flowers that are large, greenish, white or dull in color, and give off a strong fruity, yeasty or spicy fragrance. Most beetle-pollinated flowers are flat or disc-shaped with pollen that is easy to access. Southern magnolia (*Magnolia grandiflora*) and Saw palmetto (*Serenoa repens*) are good examples of beetle-pollinated flowers.

Flies: Flies are attracted to rotting food on which to lay their eggs, so they tend to visit flowers with a similarly nasty smell. The plant provides the flies with no rewards, and so they typically leave quickly unless the plant has traps that delay or slow them down. Many orchids are fly-pollinated.

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Unit 3 Activity 1

Pollination Game

Objective

Students will be able to explain how wildflowers and insects interact in the process of ***pollination***.

Materials

- two antenna headbands for "bees" (optional)
- two boxes or tubs for "beehives"
- Post-it notes (minimum of four per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.7, SC.3.N.3.2, SC.N.3.3

Grade 4: SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

Discussion

- Ask students to name some ***pollinators*** (e.g., bees, hummingbirds, moths, bats, butterflies, beetles, flies). Write the different types of pollinators on the board and discuss the preferred characteristics of each (e.g. flower color, odor and shape, ***nectar*** content, ***pollen*** type, etc.).
- Discuss how the ***flower's*** job is to attract pollinators, while the pollinators are simply looking for food.
- Ask students if plants and animals want to help each other. (Answer: No, but it works out well that they do. Explore what happens.)

Directions

1. Place the two beehives at one end of the field or classroom.
2. Select two students to be bees and have them wear antenna headbands (if available).
3. Tell the rest of the students they will be wildflowers.
4. The teacher will be the "Queen Bee" to keep order and monitor the game.
5. Give four or more small Post-its (all the same color) to each wildflower and have wildflowers write their initials on each note before putting them on the front of their shirts.
6. Upon a signal from the Queen Bee, the bees run to a wildflower, pick up two Post-its and run back to the hive.
7. Have the bees leave one Post-it in their hive, and run with the other Post-it to another wildflower.
8. Bees will then leave the Post-it with the new wildflower and take two of that wildflower's Post-its.
9. Have the wildflower put the new Post-it on his/her shirt, while the bee runs back to the hive and again deposits one Post-it.
10. Have the bee take one Post-it back to a new wildflower, and repeat the process of giving one, taking two, depositing one until the Queen Bee calls time.
11. Have the wildflowers look at their Post-its:
    - If they have at least one Post-it with someone else's initials on it, they will survive. (The more Post-its with different initials each wildflower has, the greater chance for the wildflower to reproduce.)
    - Those who have no Post-its are not likely to survive because there was no pollen deposited to start the reproductive process.
    - Wildflowers with the same four Post-its they started with will not survive.
12. Draw the students into a summary about pollination and how it might work in nature by reflecting on the results of the game.
13. Have them hypothesize scenarios or actions that might increase or decrease the chances of pollination.

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Unit 3 Activity 2

Flower Dust

Objective

Students will be able to observe and compare the characteristics of different native plant pollens.

Directions

Students should work in pairs.

1. Give each student pair a blank piece of white paper. Have them tape it to a notebook, clipboard or other hard, portable surface. (Sheets of white foamcore or sturdy cardboard can also be used.)
2. Take students to an outdoor area where ***flowers*** are present and where pollen can easily be collected. (See note.)
3. Tell students they will be collecting and studying ***pollen***. Explain that flowers and pollen have a job to do, so students must not pick any flowers; instead, they will simply collect some pollen. Demonstrate by gently bending a blossom over and shaking the pollen free onto a piece of paper.
4. Tell students not to disturb any insect or bird ***pollinators*** that are visiting a flower; instead, they should go to flowers that do not have visitors.
5. Give students 15-20 minutes to collect pollen from several different species. Be sure to point out flowers and flowering grasses with pollen.
6. Have students gather together to examine their pollen samples with hand lenses. Some of the pollen will be larger, some stickier, and some might even be different colors.

Discussion

- Ask students if there was a difference in size of the pollen grains in different flowers.
- Why might some flowers have larger pollen grains than others?
- Do all of the flowers have available pollen, or is it only present on some?
- Are there special areas or structures that hold the pollen?
- Discuss why plants need pollination to survive.

Materials

- hand lens (one per student pair)
- white paper (one per student pair)
- hard surface such as notebook, clipboard, cardboard or foamcore

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Note: Prior to doing this activity, locate an area in the schoolyard where pollen can easily be collected from flowering plants.

FLORIDA Wildflower FOUNDATION

Unit 3 Activity 3

Wandering Pollen

Objective

Students will be able to identify and demonstrate different methods for how pollen is transported.

Directions

Students should work in groups of four.

1. Give each group a cup, six marbles, 12 pom-poms and a Velcro wand.
2. Explain that the cups represent ***flowers***; the marbles and pom-poms represent different types of ***pollen***; and the Velcro wand represents ***pollinators*** (bees, beetles, butterflies, flies, bats, hummingbirds and other birds) that visit the flowers to feed on their ***nectar***.
3. Instruct the group to place the marbles in the cup, and to place the cup on the tabletop.
4. Explain that pollen can be sticky or non-sticky.
5. Ask:
   - Why might some pollen be sticky and some not?
   - How would pollen that is not sticky be carried away?
6. Explain that pollen that is not sticky depends on wind to be carried away.
7. Have one student in each group simulate a pollinator visiting a flower by stirring the wand in the cup and pulling it out.
8. Now have another student in each group simulate the blowing wind by gently tipping the flower cup and allowing the marbles to flow out and travel away.
9. Ask:
   - Which method was more effective in carrying away the non-sticky pollen? Why?
   - What about sticky pollen? What do you think will be the best method for carrying away pollen that is sticky?
10. Explain how plants with sticky pollen depend on pollinators such as insects and other animals to carry away their pollen.
11. Have students replace the marbles in the flower cup with pom-poms.
12. Again, instruct one student to simulate the blowing wind by gently tipping the cup.

(*Continued on following page*)

Materials

- cups (one per group)
- marbles (six per group)
- 5mm pom-poms* (15± per group)
- Velcro "wands" (one per group) (see note)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.2, SC.4.N.1.7, SC.4.N.3.1

Note: Velcro "wands" can be made by adhering 2 pieces of velcro (hook side) to the ends of a large craft stick. Self-adhesive velcro hook dots are available at most office or home supply stores.

If 5mm pom-poms are not available, felt dots may be substituted.

13. Point out that the pom-poms (i.e. sticky pollen) stay inside or very near the cup, illustrating that the wind cannot carry away sticky pollen.
14. Ask:
    - Which method was more effective in carrying away the sticky pollen?
    - Why would one method be more effective?
15. Explain to students how the pom-poms grip the wand in the same way that sticky pollen grips visiting insects and other animals, and is then carried to the next flower.
16. Point out that some of the pollen falls off, and ask students to consider how that might be a good thing. (This illustrates how pollen is transferred from one flower to the next.)

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Unit 3 Activity 4

Why Wind?

Objective

Students will be able to explain why wind-pollinated plants produce large amounts of pollen and evaluate how distance and density affect pollination.

Directions

1. Have students sit in a semi-circle on the floor and place their hands on the floor in front of them.
2. Fill a cup with marbles. (Depending on how many students you have, you may want to fill two or three cups.) Explain that the cup will represent a ***flower*** and the marbles will represent its ***pollen***.
3. Explain that wind-dependent wildflowers must produce huge amounts of pollen for the species to survive.
4. Sit in front of the students and tell them that each student will represent a flower that needs to be pollinated.
5. Tip the flower cup(s) full of pollen marbles onto the floor. Tell students that they are to "collect" any pollen that comes in contact with them. Remind students that flowers can't move quickly or with a purpose, so to be fair, they should close their eyes.

Discussion

- How many of the pollen marbles actually reached another flower?
- What would happen if students sat farther apart?
- What if they sat closer together?
- Can they think of other things that might change the odds of the pollen reaching the other flowers?

Materials

- cup(s)
- marbles

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.2, SC.4.N.1.7, SC.4.N.3.1

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Unit 3 Activity 5

The Perfect Fit

Objective

Students will observe pollinators at work and be able to compare and contrast the characteristics of the flowers that various pollinators visit.

Directions

Students should work in pairs.

1. Give each pair (or each student) a "Pollinator Observations" worksheet.
2. Take students outside to an area where wildflowers and other flowering plants are in bloom.
3. Have student pairs spend about 10 minutes observing pollinators and the types and characteristics they see at work. Remind students not to disturb the pollinators they see.
4. Have students record their observations on the worksheet.
5. Have students regroup for discussion.

Discussion

- What types of pollinators were observed?
- Were individual flowers visited by two or more kinds of pollinators?
- What do the different pollinators hang on to when collecting their food?
- How many kinds of flowers were pollinated by butterflies?
- Do the butterfly-pollinated flowers have any special characteristics, such as scent, color or shape?
- How many kinds of flowers were being pollinated by bees?
- Do the bee-pollinated flowers have any special characteristics, such as scent, color or shape?

Materials

- "Pollinator Observations" worksheet (one per student pair)

Standards

Grade 3:SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.7

Note: This activity requires access to wildflowers or plants in bloom.

Pollinator Observations

Spend about 10 minutes observing pollinators and the types and characteristics you see at work. Record your observations below. **Do not disturb the pollinators you see; just observe them.**

1. What types of pollinators were observed? Indicate how many of each type below.

_____ Butterflies _____ Bees _____ Wasps

_____ Flies _____ Beetles _____ Birds

_____ Other insects (list them) _____

_____ Other animals (list them) _____

2. Were individual flowers visited by two or more kinds of pollinators? If yes, explain.

3. What do the different types of pollinators hang on to when collecting food?

4. How many kinds of flowers were pollinated by butterflies?

5. Do the butterfly-pollinated flowers have any special characteristics such as scent, color or shape?

6. How many kinds of flowers were pollinated by bees?

7. Do the bee-pollinated flowers have any special characteristics such as scent, color or shape?

Glossary

anther: yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair

cross-pollination: when pollen from one flower is transferred to the stigma of a different flower

fertilization (in plants): joining of pollen with an ovule to form a seed

flower: part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; part of a plant that ordinarily contains the reproductive organs

Note: Flowers can be male, female or bisexual. A male flower has only stamens. A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

host: in a symbiotic relationship, an organism that supplies nutrients, support or additional resources to another organism

nectar: a sweet liquid made by flowers to attract pollinators; provides food energy for insects, birds and bats

nectar guide: a pattern, line or spot on a flower petal that shows pollinators where to find nectar, like a runway guiding a plane to land

petal: the colorful parts of the flower that often attract pollinators

pollen: fine, powder-like material that covers the anthers within a flower

Note: This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

pollination: the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

Note: Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carry pollen between flowers, or when it is moved within flowers.

pollination syndrome: a set of flower traits (color, shape, scent, nectar) that attract specific types of pollinator

pollinator: an organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another

proboscis: a long, tube-like mouthpart that butterflies, moths, and some other insects use to drink nectar from flowers

self-pollination: when pollen from a flower fertilizes the stigma of the same flower or another flower on the same plant

stigma: one of the female parts of the flower; the sticky bulb in the center of flowers where the pollen lands to start the fertilization process

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Pollination Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

anther	flower	pollen	pollinator
cross-pollination	nectar	pollination	self-pollination
fertilization	nectar guide	pollination syndrome	stigma

_____ the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

_____ joining of pollen with an ovule to form a seed

_____ a sweet liquid made by flowers to attract pollinators; provides food energy for insects, birds and bats

_____ when pollen from a flower fertilizes the stigma of the same flower or another flower on the same plant

_____ a pattern, line or spot on a flower petal that shows pollinators where to find nectar

_____ fine, powder-like material that covers the anthers within a flower

_____ a set of flower traits (color, shape, scent, nectar) that attract specific types of pollinator

_____ part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated

_____ when pollen from one flower is transferred to the stigma of a different flower

_____ one of the female parts of the flower; the sticky bulb in the center of flowers where the pollen lands to start the fertilization process

_____ an organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another

_____ yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair

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flower	part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated
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stigma	one of the female parts of the flower; the sticky bulb in the center of flowers where the pollen lands to start the fertilization process
pollinator	an organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another
anther	yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair

Resources

Literary connections

Bugs in the Garden by Beatrice Alemagna

The Flowers are Calling by Rita Gray

From Flower to Flower: Animals and Pollination by Patricia Lauber

From Flower to Fruit by Anne Ophelia Downden

From Seed to Plant by Gail Gibbons

The Garden Next Door by Collin Pine

The Great Pollinator Count by Susan Edwards Richmond

Insects and Flowers by Oda Hidetomo

The Life Cycle of a Flower by Molly Aloian

Max and the Milkweed by Auggie Grand

The Milkweed and Its World of Animals by Ada and Frank Graham

Mysteries & Marvels of Plant Life by Barbara Cork

The Nature And Science Of Flowers (Exploring the Science of Nature) by Kim Taylor and Jane Burton

On One Flower: Butterflies, Ticks and a Few More by Anthony Fredericks

Pollination by Mary King Hoff

Seeds, Bees, Butterflies, and More! Poems for Two Voices by Carole Gerber

What Is a Plant? (Science of Living Things) by Bobbie Kalman

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Websites and other web resources

The Beauty of Pollination video by Louie Schwatrzberg
www.youtube.com/watch?v=MQiszdkOwuU

Biology of Plants (Missouri Botanical Garden)
www.mbgnet.net/bioplants/main.html

Florida Wildflower Foundation
(plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies
(Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center
(national database; search by state, family or habitat)
www.Wildflower.org/plants-main

Selecting Plants for Pollinators
(Pollinator Partnership)
Pollinator.org/PDFs/Guides/OuterCoastalrx7FINAL.pdf

FLORIDA Wildflower FOUNDATION

Unit 4

Seed Discovery

Overview

Seeds are remarkable packages of life, each containing everything needed to grow a new plant. They come in an astounding variety of shapes, sizes, and dispersal mechanisms—from dandelion seeds that float on the wind to beggarticks seeds that hitch rides on animal fur. In this unit, students will investigate seed structure and diversity, explore how seeds travel from parent plants to new locations, and discover the strategies plants use to ensure their seeds land in favorable growing conditions.

This unit builds directly on Unit 2's exploration of seed anatomy and germination, taking a deeper dive into seed diversity and dispersal. Students will apply their knowledge of adaptations to understand how seed structures help wildflowers reproduce successfully.

Activities

1. Wildflower Seed Investigation
2. Seed Sort
3. I'm a Traveling Wildflower Seed
4. Flung, Flown or Ferried
5. Make an Herbarium Seed Chart
6. Start a School Seed Library
7. Wake Up, Seeds!
8. Seed Germination Poem

Vocabulary

adaptation
germination
herbarium
observation
plant diversity
seed
seed bank
seed coat
seed dispersal
seed diversity
seed library
seedling
scarification
stratification

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.1.4, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.R.3.3, ELA.3.V.1.1, MA.3.M.1.1, MA.K12.MTR.1.1, MA.3.DP.1.1, MA.3.DP.1.2 SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.V.1.1, MA.K12.MTR.1.1, MA.4.DP.1.1, SC.4.E.6.5, SC.4.L.16.1, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

FLORIDA Wildflower FOUNDATION

Unit 4

Seed Discovery

Introduction

Seeds allow wildflowers and other plants to grow and spread. It's fun to find the seeds on a wildflower! When a flower finishes blooming, ***seeds*** will form in its place. When ready, some drop to the ground or are catapulted away from the plant. Other seeds have special wings that carry them on the wind to new homes, while some have tiny spines that attach to animals that walk by. These are all methods of ***seed dispersal***. For successful ***germination***, seeds need open soil, sunlight and rain to grow into new plants.

Discovering Wildflower Seeds and Their Adaptations

Florida is home to hundreds of wildflower species, each with its own unique seeds. Seeds are often stored in a special case where they develop, enlarge and wait for dispersal. This ***adaptation*** protects them from predators and changing weather until they are mature. Temperature, rain, wind and sunlight all affect whether a seed will grow. Seeds must also land on open ground without grass, leaves or weeds so they can germinate and send roots into the soil. Some seeds sprout within a few weeks, while others stay dormant through cold weather until conditions are just right for growth.

Different Kinds of Wildflower Seeds

Seeds come in many shapes, each helping plants survive and spread. Some grow in dry cones, like Black-eyed Susans, while others form inside pods, like Milkweed. Some seeds are hidden in berries, which animals eat and carry away, and others, like Aster seeds, have tiny bristles that hitch a ride on animals. Some seeds develop in a capsule, like Violets, which opens to release them into the world.

Saving Seeds to Grow New Wildflowers

When is a seed ripe? It is fun to collect seeds to start new plants in your garden, but seeds should only be collected when they are fully mature. In nature, the seed structure usually turns brown and begins to disintegrate, releasing the seeds. Observing plants carefully helps determine the perfect time for collection before seeds are naturally dispersed. Summer and fall are ideal times to harvest seeds from your garden.

Safety note: Only collect seeds from plants you know are safe to handle.

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Unit 4 Activity 1

Wildflower Seed Investigation

Objective

Students will be able to compare wildflower seed ***adaptations*** and relate those adaptations to reproduction and survival.

Directions

Students can work in pairs.

1. To each pair, provide one "Wildflower and Seed Structure" handout, one "Wildflower Seed Investigation" worksheet and several different mature seedheads.
2. Review the handout with students. Explain that mature seedheads are ready for collection when they are dry and seed structures are brown.
3. Have students pull apart seedheads to release the seeds onto paper. A pencil may be used to pry small seeds out of a flower cone or disc so students can see the different seed shapes.
4. Have students observe the different seed structures carefully using a hand lens. Seeds vary in size and appearance, even from the same plant family. For each seed type, record:
    - color, size and shape
    - how tightly the seed is held in the seedhead or cone
    - any special features, such as wings, bristles or hooks

Discussion

- Based on the seed shapes, how do you think each seed is dispersed?
- How easy or difficult was it to release the seeds from the seedheads? What might this tell you about what needs to happen before each seed can grow?
- How do the color, size, shape and other features of the seed give clues about the environment it needs to thrive? Where would this seed grow best, and what might the plant look like once it matures?

Materials

- "Wildflower Seed Structures" handouts (one per pair)
- "Wildflower Seed Investigation" worksheet (one per pair)
- dried, mature seedheads of various wildflower (3–5 species per pair)
- hand lens (1 per pair)
- white paper

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.6

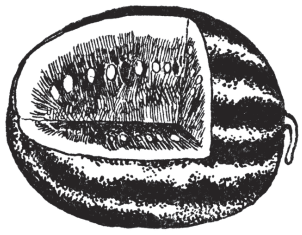
Grade 4: SC.4.L.16.1, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2

Tips

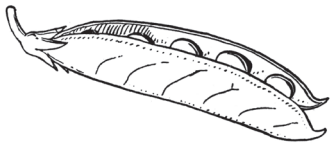
Mature seedheads are best for this activity. Look for seedheads that are dry with brown seed structures — these indicate the seeds are fully mature and ready for dispersal. Late summer to fall is the ideal time to collect wildflower seeds in Florida.

Wildflower Seed Structures

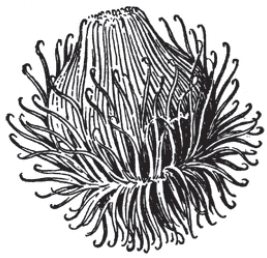
Some seeds are surrounded by colorful, juicy fruit that animals eat, carrying the seeds inside them to new places where they come out in droppings.



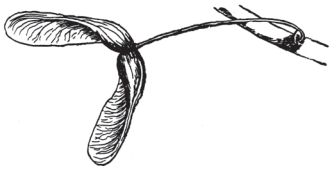
Some seeds grow inside a protective case that splits open or pops to scatter the seeds when they're ready.



Some seeds are covered in stiff burrs that stick to animal fur and people's clothing for a ride to new locations.



Some seeds have thin, flat wings that spin like helicopter blades as they fall from trees.



Some seeds have feather-like fluff that catches the wind and floats through the air to new places.

Some seeds are round and heavy, so they drop straight down or are carried away and buried by animals like squirrels.

Wildflower Seed Investigation

Observe each seedhead carefully. Remove the seeds and record what you notice.

Seedhead number	Color	Size (S/M/L)	Special features (wings, hooks, etc.)

Sketch your favorite seed below and label its parts:

Based on what you observed, how do you think your favorite seed travels away from the parent plant?

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Unit 4 Activity 2

Seed Sort

Objective

Students will be able to collect, identify and sort seeds by size, shape, design and dispersal method.

Materials

- masking tape (one 12-inch piece per student)
- seed-sorting dish (one per team)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.1, SC.4.L.17.4, SC 4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Directions

Students should work in pairs or teams.

1. Tell students they will be collecting and studying seeds to see how they are dispersed. Tell them they will be using two collection methods: their hands and a "seed collector."
2. Give each student a 12-inch long strip of masking tape. Tell students to wrap the tape, sticky side out, around their shoe or sock. These are the "seed collectors."
3. Take students to an area on campus where they may find wildflowers, grasses, and/or flowering vines, shrubs and trees that are producing seed. Explain that seeds have an important job to do, so they should only collect by hand one seed from each plant type.
4. Take students to a weedy patch, meadow or untended part of the school campus in order to collect seeds on their "seed collectors."

   Alternative: Have each student collect seeds by hand at home and bring them to class.
5. After the students bring their seeds back to the classroom, have the pairs/teams place them in the shallow dish where they can examine them to discuss possible dispersal methods.
6. Have the pairs/teams work to sort the seeds into the following categories:

   - seeds with stickers
   - seeds with wings
   - big seeds
   - small seeds
   - round, flat seeds
   - ball-shaped seeds
   - seeds from inside a fruit
   - seeds we eat
   - seeds from a pod
   - seeds from an underground root

Discussion

- Ask students if they had any seeds that they were unable to categorize. What categories, if any, are missing from the list?
- Have students identify any seeds that fall into more than one category, or did not fit into any of the categories.
- Have them hypothesize how the size, shape or design would affect how the seed is dispersed.

Extension

To extend this activity, have the students remove and plant the seeds that were collected on the masking tape — either in a window garden or in a designated and protected spot on campus — and discover what plant species they collected!

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Unit 4 Activity 3

I'm a Traveling Wildflower Seed

Objective

Students will be able to understand why and how seeds are adapted for dispersal.

Discussion

Wildflower seeds have a better chance for survival if they are scattered away from the parent plant where there is less competition for nutrients, sunlight, water and space. Wildflowers have ***adapted*** to use one or more method to ***disperse*** their seeds.

Seeds travel! They can't just get up and walk to a new location, but structures on the seed may allow it to move to a new location. Some of the moving forces might be wind, water or animals, while some seeds are propelled from an exploding seed pod. Other seeds may simply fall to the ground by way of gravity.

As a class, discuss and chart how a seed might be structured based on the following method of travel:

- wind
- exploding or bursting
- water
- animal

Materials

- "Wildflower Seed Dispersal Adaptations" worksheets (one set per pair)
- "Wildflower Seed Dispersal Adaptation Cards" (one card per pair)
- "I'm a Traveling Wildflower Seed" worksheet (one per pair)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5

Grade 4: SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Directions

Students should work in pairs.

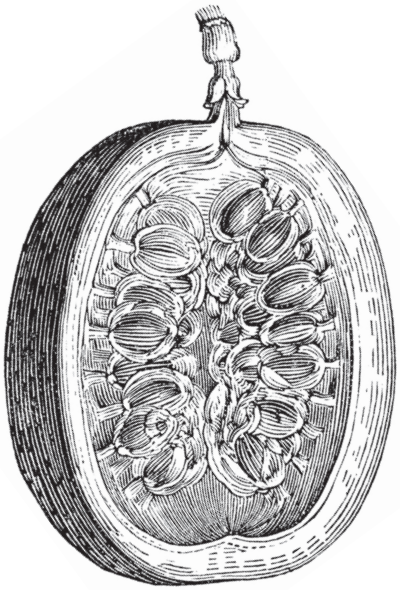
1. Give each pair one set of "Wildflower Seed Dispersal Adaptations" worksheets.
2. Have them guess by which method each seed is dispersed based on the clue and drawing. Students should write their guesses in the box next to each seed type.
3. Discuss the correct answers with the class. Give each pair of students at least one opportunity to discuss why they chose the method they did.
4. Now give each pair one "Wildflower Seed Dispersal Adaptation Card" and one "I'm a Traveling Wildflower Seed" worksheet.
5. Have them design and draw a seed that could travel by wind, water, gravity, bursting, or animal (eaten or carried), depending on the description found on the card they are given. Encourage the students to be creative.
6. Have students trade cards so they can design multiple seeds.
7. Once each pair of students has drawn at least two seeds (more if time permits), have them present their seeds to the class.

Wildflower Seed Dispersal Adaptations

Milkweed

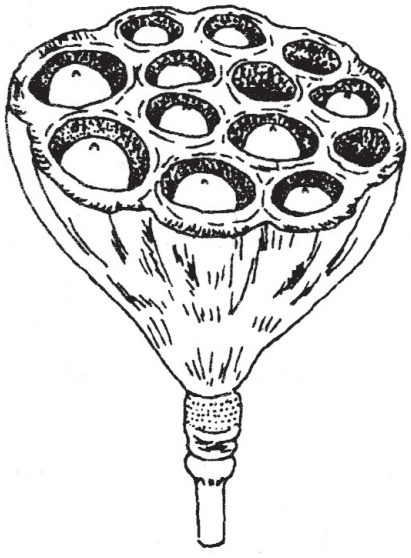
Milkweed seeds
have fluffy hairs.

Passionfruit



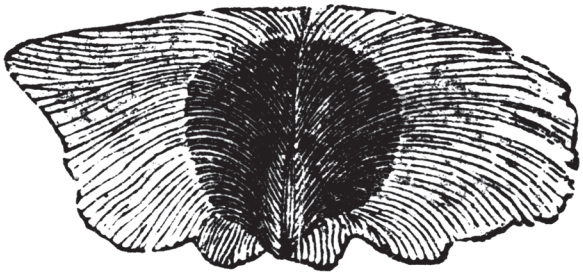
Passionfruit seeds are enclosed
in a tasty, juicy pulp.

American lotus



American lotus grows
along river and pond edges.

Trumpet creeper



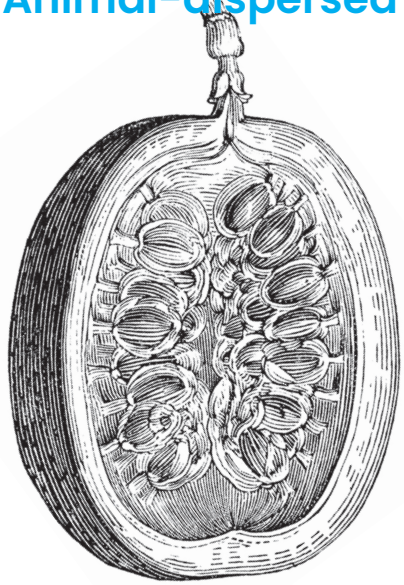
Trumpet creeper vine seeds
have papery "wings."

Wildflower Seed Dispersal Adaptations

Milkweed
Air-dispersed

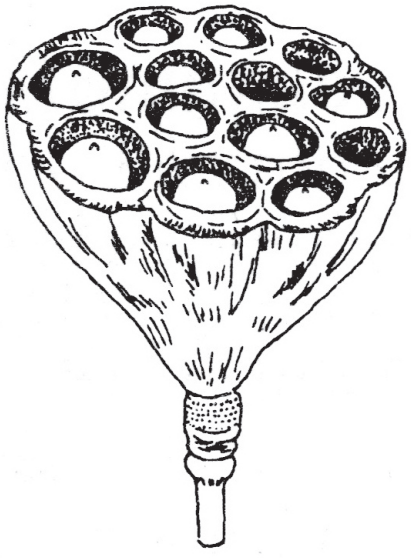
Milkweed seeds
have fluffy hairs.

Passionfruit
Animal-dispersed



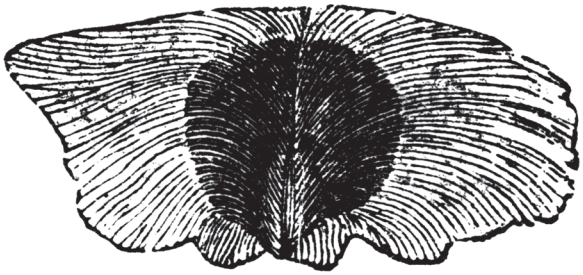
Passionfruit seeds are enclosed
in a tasty, juicy pulp.

American lotus
Water-dispersed



American lotus grows
along river and pond edges.

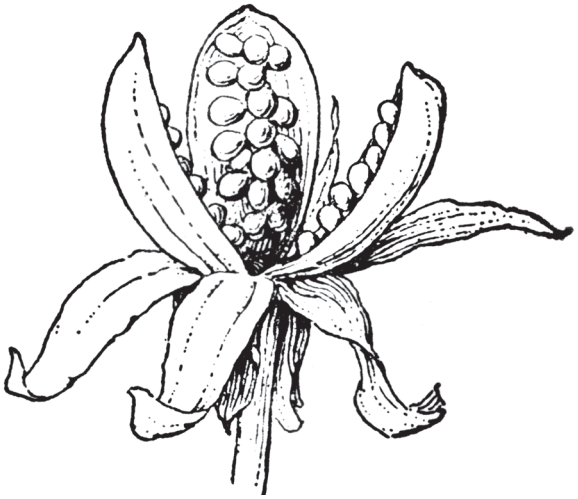
Trumpet creeper
WInd-dispersed



Trumpet creeper vine seeds
have papery “wings.”

Wildflower Seed Dispersal Adaptations

Violet

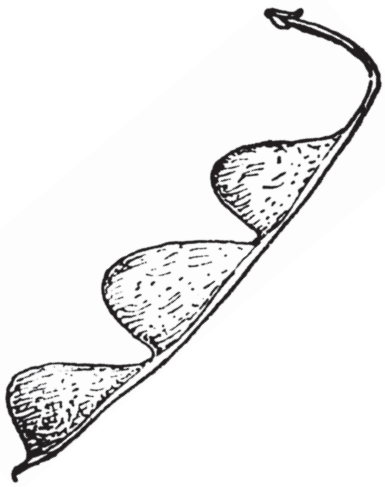


Violet seed pods
burst open when ripe.

Maple

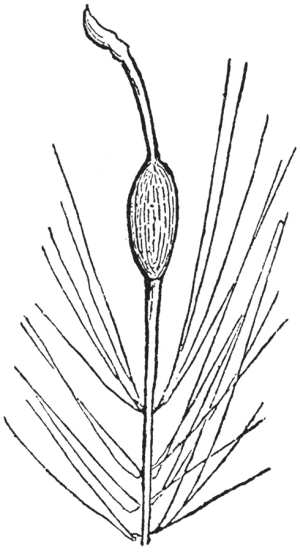
Maple seeds are winged
and twirl like a helicopter.

Ticktrefoil



Ticktrefoil seeds are covered
in tiny sticky hairs.

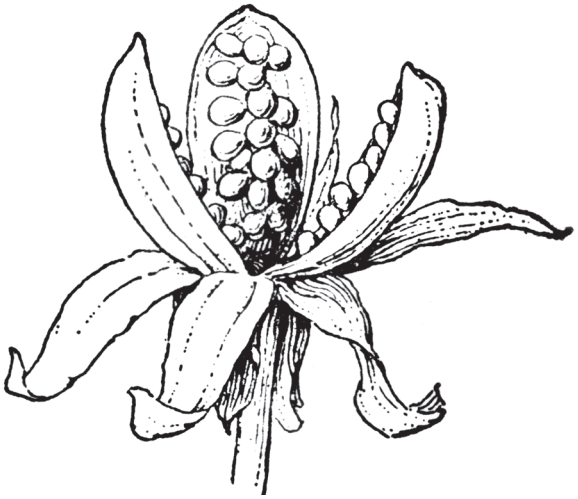
Cattail



Cattail seeds
have fine hairs.

Wildflower Seed Dispersal Adaptations

Violet
Burst-dispersed

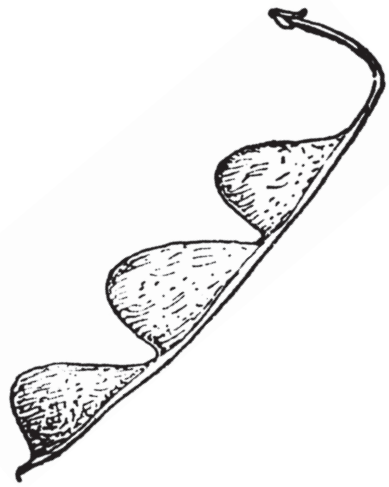


Violet seed pods
pop open when ripe.

Maple
Wind-dispersed

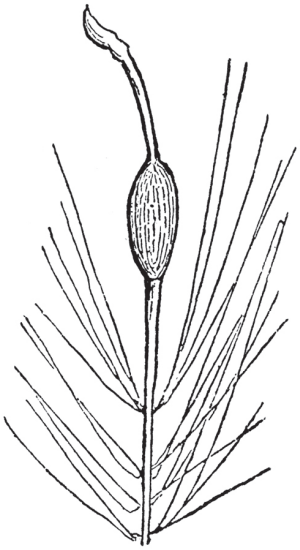
Maple seeds are winged
and twirl like a helicopter.

Ticktrefoil
Animal-dispersed



Ticktrefoil seeds are covered
in tiny sticky hairs.

Cattail
WInd- and Water-dispersed



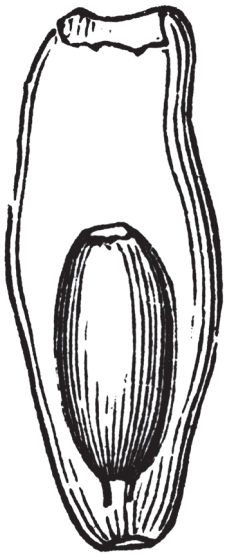
Cattail seeds
have fine hairs.

Wildflower Seed Dispersal Adaptations

Beggarticks

Beggarticks seeds
have tiny barbed hooks.

Water lily

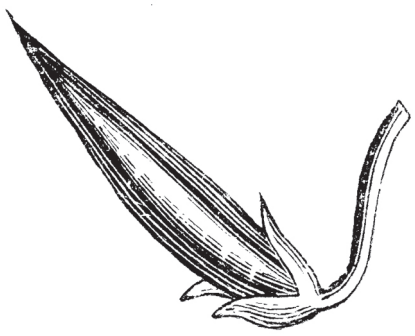


Water lily seeds
are filled with air.

Dandelion

Dandelion seeds
have feather-like bristles.

Woodsorrel



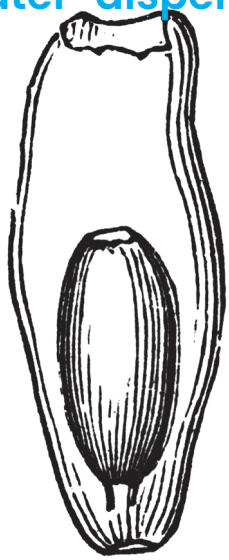
Woodsorrel seed pods
explode when touched.

Wildflower Seed Dispersal Adaptations

Beggarticks
Animal-dispersed

Beggarticks seeds
have tiny barbed hooks.

Water lily
Water-dispersed

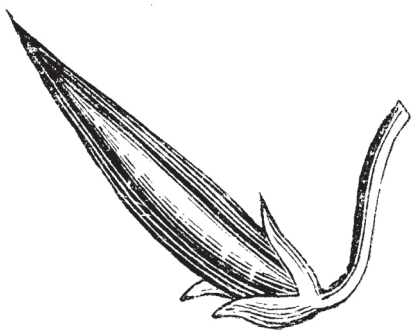


Water lily seeds
have are filled with air.

Dandelion
Animal-dispersed

Dandelion seeds
have feather-like bristles.

Woodsorrel
Burst-dispersed



Woodsorrel seed pods
explode when touched.

Seed Dispersal Adaptation Cards

Cut into separate cards. Print enough for each pair to have a card.

Adapt your wildflower seed so that it can shoot into the air at least two feet.	Adapt your wildflower seed so that it can stick on an animal or person.
Adapt your wildflower seed to be eaten by a bird or other animal.	Adapt your wildflower seed so that wind can carry it at least two feet.
Adapt your wildflower seed so that it can fall and roll to a place two feet away from the parent wildflower.	Adapt your wildflower seed to float on water to a new location.

I'm a Traveling Wildflower Seed

Read the description on the Adaptation Card. In the space below, draw and describe your seed and its adaptation.

Draw	Describe

FLORIDA Wildflower FOUNDATION

Unit 4 Activity 4

Flung, Flown or Ferried

Objective

Students will be able to compare and measure how far seeds travel using different dispersal methods.

Discussion

Explain to students that just as different kinds of plants use different methods to disperse their pollen, they also use different methods to disperse their seeds. Some have built-in catapults to propel their seeds; others use the wind, water, birds or other animals to carry their seeds away.

Directions

Students should work in pairs or groups.

1. Provide student pairs or groups with one set of "Flung, Flown or Ferried" worksheets and appropriate supplies.
2. Have students use the instructions that follow to create a "catapult," a "whirligig" (or helicopter) and an airplane to simulate different seed dispersal methods. (Teachers may need to demonstrate each process.) Tell students the catapult will represent seeds that are dispersed by exploding or bursting seed pods; the whirligig will represent winged seeds; and the plane will represent seeds that are blown by the wind.
3. Have students measure how far the "flung" and "flown" seeds can travel and record the distances on the worksheet.
4. Next, have students use the Internet or other reference and resource materials to research the distances that animals can travel. Specifically, have them take note of how far birds such as mockingbirds, blue jays and cardinals, and mammals such as opposums, raccoons and deer travel.
5. Students can now compare the distances seeds can travel depending upon whether they are dispersed by catapult, wind, bird or other animal.
6. Have students graph the differences using various types of graphs (e.g. bar graph, line graph, pie chart).

Materials

- "Flung, Flown or Ferried" worksheets (one set per pair/group)
- 1/2" pom-poms (several per pair/group)
- craft sticks (eight per pair/group)
- graph or plain paper (one sheet per student)
- 1/2 or 1/4 sheet of paper (one per pair/group)
- measuring tape (one per pair/group)
- plastic spoon (one per pair/group)
- plasti-bands (several per pair/group)
- scissors (one pair per pair/group)
- paper clips (one per pair/group)

Standards

Grade 3: MA.3.M.1.1, MA.3.DP.1.1,† MA.K12.MTR.1.1, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: MA.4.DP.1.1, MA.K12.MTR.1.1, SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

Discussion

- Which method of dispersal is more effective and why?
- When might one method be better than another?
- What conditions are necessary for each to be successful?
- What might happen when an animal such as a bird carries a seed to a very different habitat?

† For MA.3.M.1.1, MA.3.DP.1.1 and MA.K12.MTR.1.1, have students graph the differences on a line plot.

Flung, Flown or Ferried

Record and compare the distances that seeds travel when catapulted, air-lifted and wind-blown.

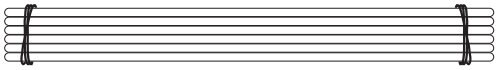
Distance for catapulted "seed"	Distance for air-lifted "seed"	Distance for wind-blown "seed"

When seeds travel in the fur or guts of moving animals, how much farther can they go?

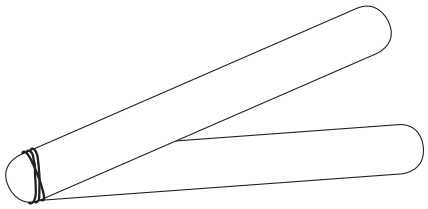
Animal	Distance traveled	Seed dispersal method

Flung, Flown or Ferried — Catapult

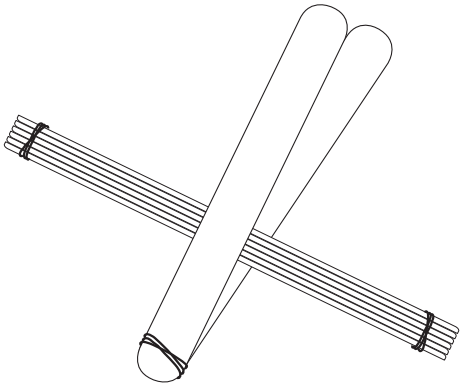
1. Bind 6 craft sticks by wrapping a plasti-band around each end.



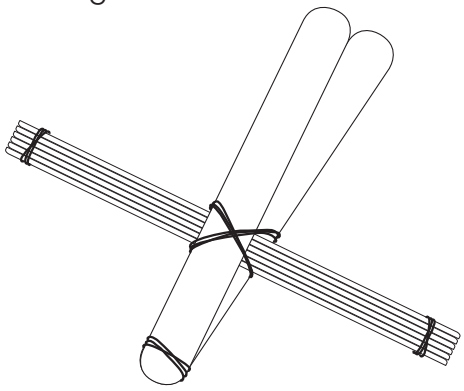
2. Bind the remaining 2 craft sticks at one end by wrapping a plasti-band around one end.



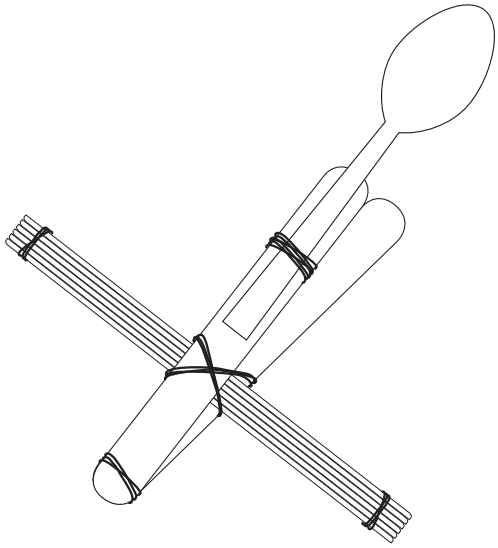
3. Carefully insert the 6-stick bundle in between the 2-stick bundle.



4. Join the two bundles together by wrapping 1–2 plasti-bands around where they intersect. The closer the 6-stick bundle is to the base of the 2-stick bundle, the more leverage you will get.



5. Attach the plastic spoon to the upper craft stick with one or more plasti-bands.



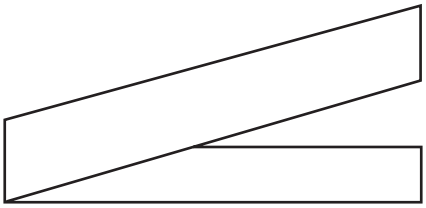
6. Place a pom-pom on the spoon.

7. Hold the catapult with one hand, and use the other hand to pull the spoon down.

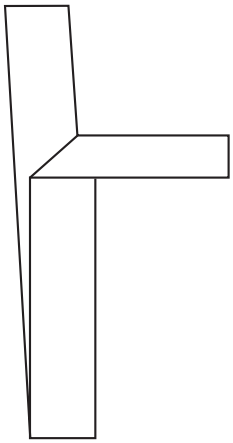
8. Release the spoon to launch your pom pom!

Flung, Flown or Ferried — Whirligig

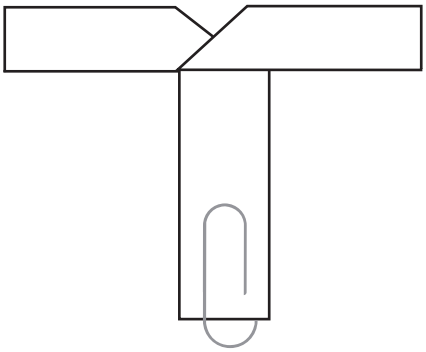
1. Cut out the large strip of paper.
2. Fold the strip of paper in half.



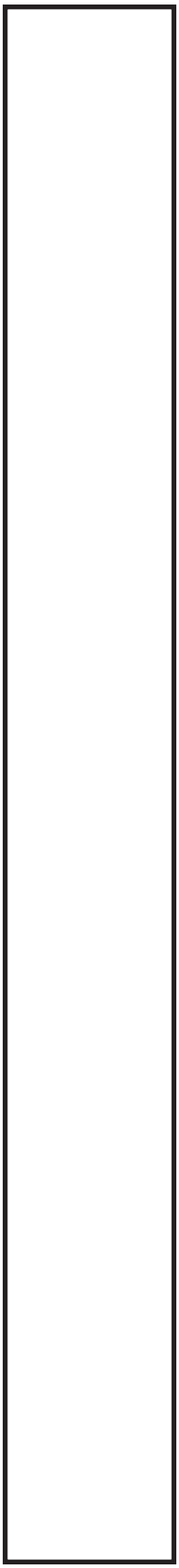
3. Fold one side to the right half way. Then fold the other side to the left half way.



4. Attach a paper clip to the bottom where the paper was first folded.

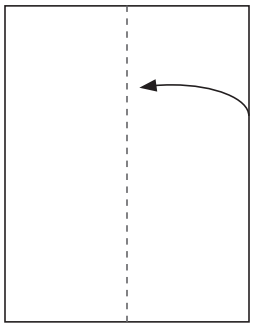


5. Throw it in the air and see how far it flies. Record your distance on the worksheet.
6. Repeat steps 1–5 with the small strip of paper. Compare and record the difference.

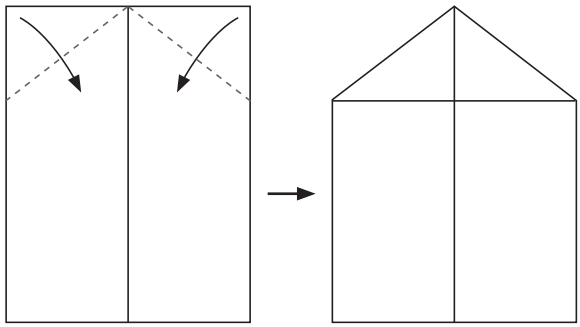


Flung, Flown or Ferried — Airplane

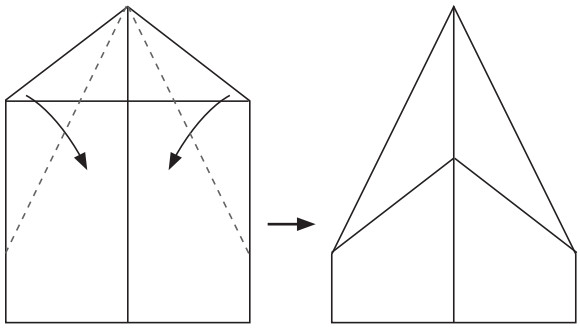
1. Fold the paper in half lengthwise.



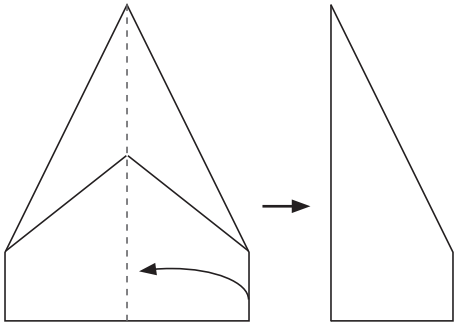
2. Open the paper, then fold the top two corners in toward the center crease. The edges should meet in the middle and form a triangle at the top.



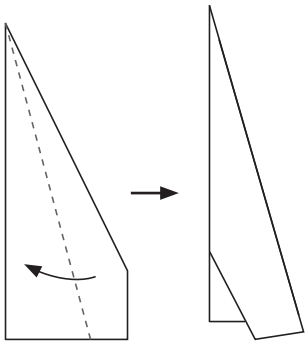
3. Take the top corners and fold them toward the middle. Just like in step 2, the edges should meet in the middle. The top should be pointed.



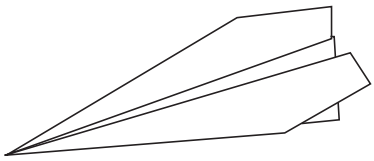
4. Fold the paper in half lengthwise again.



5. Starting from the tip, fold the sides ("wings") down so the edges meet the bottom edge of the airplane.



6. To launch, open the wings, hold the airplane by its bottom edge and throw straight ahead.



FLORIDA Wildflower FOUNDATION

Unit 4 Activity 5

Make an Herbarium Seed Chart

Objective

Students will be able to define and create an herbarium.

Discussion

Explain to students that an herbarium is like a plant library made from dried plant specimens. Scientists and students use herbaria to help identify and classify plants. Today, students will make their own "seed ***herbarium***."

Materials

- Dried seedheads from 3-5 labeled wildflower species
- "Herbarium Seed Chart" worksheet (3-5 per student or pair)
- drayons, colored pencils or markers
- Scoth tape
- paper envelopes or small paper bags for storing extra seeds (optional)

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.3

Grade 4: SC.4.N.1.6

Directions

Students should work individually or in pairs.

1. Provide each student or pair with labeled wildflower seedheads (3–5 species). Be sure each seedhead is clearly identified with the wildflower's common name (and scientific name, if known).
2. Have students carefully remove 2-3 seeds from the seedhead and place them on an Herbarium worksheet. Use Scotch tape to attach the seeds securely.
3. On the worksheet, students should record:
   - the name of the wildflower
   - today's date (when collected)
   - where the seeds came from (schoolyard, garden, etc.)
   - a description of the seed (size, color, special features)
   - how they think the seed disperses (wind, animal, water, etc.)
4. Have students draw a picture of what the flower looks like when blooming. (Provide reference photos if students haven't seen the flowers.)
5. Have students label the parts of the seed and flower that they can see.
6. Keep these pages in a folder or binder to build a class seed herbarium. Students can add more species throughout the year as different wildflowers go to seed.

Discussion

As a class, compare the different seeds and flowers. Ask:

- What similarities and differences are noticed?
- How does ***seed diversity*** help wildflowers survive and spread to new places?
- Why might scientists want to keep collections of seeds from different plants and different places?
- What can seeds tell us about the plants they came from?

Herbarium Seed Chart

Collector's name _____ Date _____

Wildflower name: _____

Collection location: _____

_____

Seed description:

Size: ☐ Tiny ☐ Small ☐ Medium ☐ Large

Color: _____

Special features (wings, hooks, fluff, etc.):

_____

_____

How I think this seed disperses:

☐ Wind ☐ Water

☐ Eaten by animals ☐ Animal fur

☐ Exploding pod ☐ Falls to ground

Seed specimen:

Wildflower drawing:

Label the parts you know.

One interesting thing I learned about this wildflower: _____

_____

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Unit 4 Activity 6

Start a School Seed Library

Objective

Students will be able to collect, save and share wildflower seeds for future planting. Students will also be able to define what a ***seed library*** (or ***seed bank***) is and how it helps conserve ***plant diversity***.

Discussion

Explain to students that a seed library is like a collection of living "books" made from seeds. People save seeds, label them, and share them so others can "check them out" to grow in their own gardens. This way, plants can keep growing year after year. Scientists also use seed banks (large-scale collections, sometimes frozen in vaults) to make sure rare or important plants aren't lost forever.

Today, students will start their own school seed library by collecting, saving, and labeling wildflower seeds.

Directions

Students may work individually or in pairs or groups.

- Provide each pair or group with 3–5 dried seedheads and each student with 3–5 Seed Packet templates.
- Have students gently remove the seeds from the seedheads onto large sheets of paper. Use a spoon or pencil if needed to loosen them.
- Place the seeds into small envelopes labeled with the plant's name and the date collected. Wash hands after handling, and compost or discard leftover seedhead debris.
- Create artistic seed packets using the "Seed Packet" templates.
- Once the packets are ready, measure ½–1 teaspoon of seeds into each. Fold the flaps toward the center and seal with tape or stickers.
- Store the packets together in a box or binder to begin your class seed library. Add more seeds each season, and consider sharing with other classes or school gardens.
- Encourage students to "check out" seed packets in spring to plant at home or in the school garden, then return new seeds in the fall.

Materials

- dried seedheads of various wildflower (3–5 per pair/group)
- paper (large sheets if possible)
- paper envelopes or small bags
- "Make Your Own Seed Packet" printed on paper or light card stock (3–5 per student)
- crayons, colored pencils or markers
- Scotch tape or stickers
- teaspoon (one per pair/group)

Standards

Grade 3: SC.3.N.1.3

Grade 4: SC.4.N.1.6

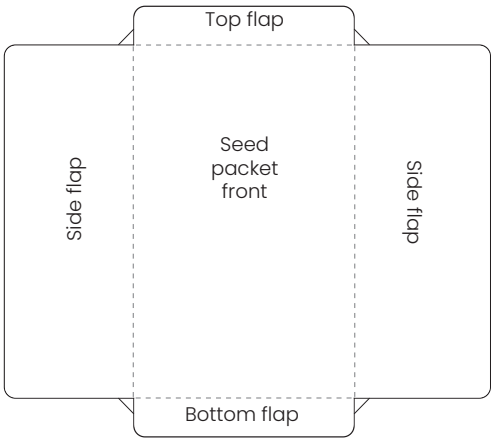
Tips

If seedheads are collected fresh, allow them to dry in paper bags for at least a week before the activity.

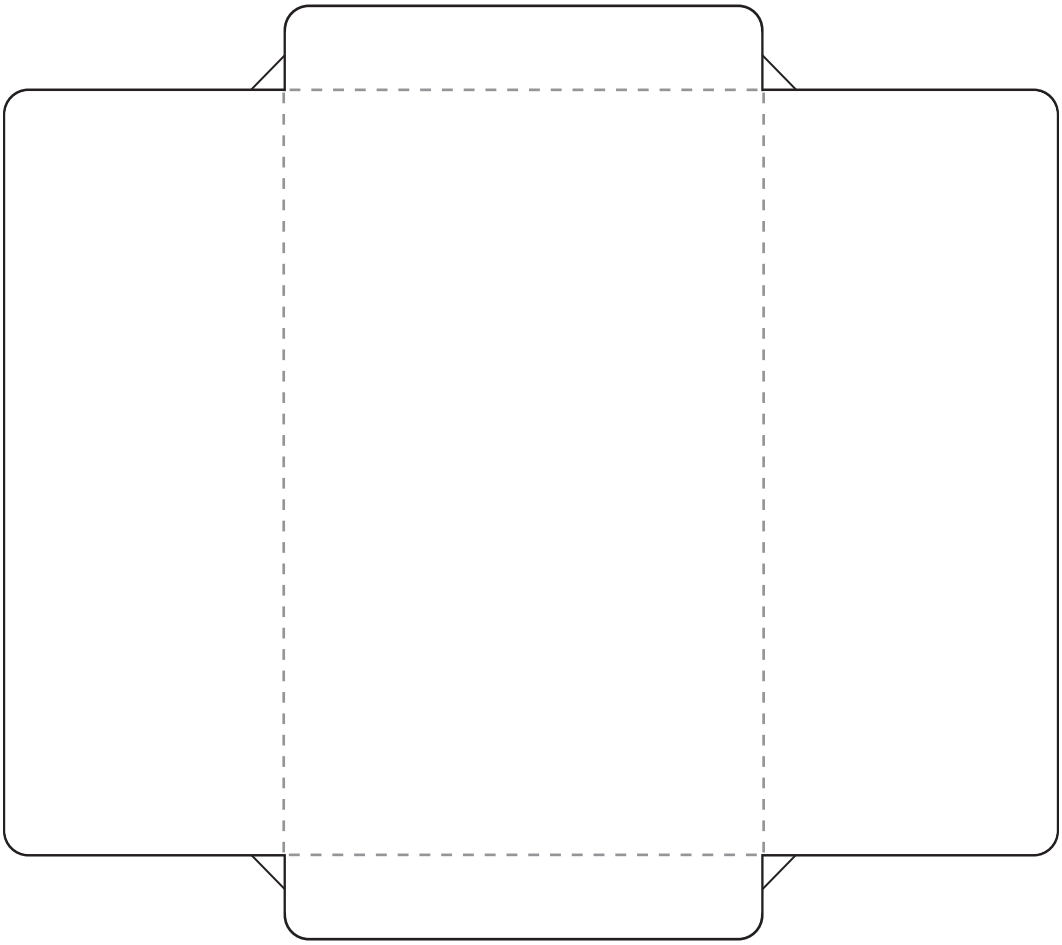
Choose species that are safe and easy for students to handle (e.g., *Coreopsis*, Blanketflower, Black-eyed Susan).

Partner with a local native nursery, wildflower group or garden club if you need seedheads.

Make Your Own Seed Packet



1. On the seed packet front, write the name of the wildflower your seeds will grow into. Draw and color a picture of the wildflower. Be creative!
2. Cut the template out along the solid lines. Do not cut the dotted lines.
3. Fold the small corner flaps inward first — these reinforce the corners and prevent seeds from escaping.
4. Fold in the side flaps — they should overlap — and tape one over the other. This will become the back of your seed packet.
5. Fold up the bottom flap and tape it so it closes the bottom of the packet.
6. On the seed packet back, write the color and full-grown height of the wildflower, when it blooms, where to plant the seed (sun or shade), and the date the seeds were collected.
7. Place seeds in the packet.
8. Fold down the top flap and seal with tape or a decorative sticker.



FLORIDA Wildflower FOUNDATION

Unit 4 Activity 7

Wake Up, Seeds!

Objective

Students will be able to explain that some seeds need special treatments, such as ***scarification*** and ***stratification***, in order to ***germinate***.

Materials

- Mimosa (Powderpuff) or similar hard-coated seeds
- sandpaper
- small container of water
- photos (or teacher-provided examples) of seeds that require stratification (e.g., Milkweed, Violet)

Standards

Grade 3: SC.3.N.1.3

Grade 4: SC.4.N.1.6

Discussion

Explain that gardeners and scientists often use scarification and stratification to "wake up" seeds. These ***adaptations*** help wildflowers survive and thrive in nature.

Directions

1. Show students two Mimosa seeds. Lightly rub one seed on sandpaper or nick it with a nail file. Leave the other seed untreated.
2. Place both seeds in water. Observe which seed sinks faster (the scarified seed absorbs water more easily).
3. Explain that this process is called scarification — it scratches or thins the ***seed coat*** so water can get in.
4. Show photos or describe how some seeds (like violets) must spend winter in the soil before they sprout. Explain that this process is called stratification — it's like seeds waiting out the cold until the right season arrives.

Discussion

- Why do you think some seeds might "wait" to sprout? How might these strategies help them survive in nature?
- How does scratching or chilling a seed help it "wake up"?
- If you were a seed, would you rather sprout right away or wait? Why?

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Unit 4 Activity 8

Seed Germination Poem

Objective

Students will be able to use knowledge of plant needs and seed germination to write a poem using key terms.

Materials

- chart paper or whiteboard
- blank paper

Standards

Grade 3: ELA.3.C.1.4, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.R.3.3, ELA.3.V.1.1, SC.3.L.14.1, SC.3.N.1.3

Grade 4: ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.V.1.1, SC.4.L.16.1, SC.4.L.17.4, SC.4.N.1.6

Directions

1. Have students work together to make a list of everything a plant needs to grow from a seed (e.g., soil, water, sunlight, warm temperature). Include key vocabulary terms such as ***germination***, ***scarification***, ***stratification***, etc.
2. Have students write a poem about planting a seed using words from the list.
3. Allow students to share poems in whole or small groups. Have them discuss the similarities and differences between their poems and the variety of ways seed germination can occur.

Discussion

- How did you decide which words to include in your poem?
- What feelings or images came up as you thought about seeds growing?
- Why do you think seeds have different needs before they can grow?

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Glossary

adaptation: a change or feature that helps a plant live and grow better in its environment ; anything that helps an organism survive and successfully reproduce in an ecosystem

germination: process by which a seed comes to life and produces a plant

herbarium: a collection of dried plants and seeds that people use to study and identify plants

observation: the act of looking at something carefully to learn more about it

plant diversity: the wide variety of plants that occur on Earth

seed: small part of a flowering plant that is capable of growing a new plant

seed bank: a collection of seeds stored for future planting; can refer to a natural collection of seeds in soil or a human-created seed library

seed coat: protective outer layer of a seed; also called a testa

seed dispersal: the scattering or movement of seeds away from the parent plant to grow in new places

seed diversity: the many different kinds of seeds, with different sizes, shapes and ways of growing

seed library: a place where people save and share seeds so plants can grow again

seedling: a young plant that has grown from a seed

scarification: when a seed's hard coat has to be scratched or broken so the seed can grow

stratification: when a seed needs to spend time in the cold before it can start to grow

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Seed Discovery Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

adaptation	plant diversity	seed dispersal	scarification
germination	seed	seed diversity	stratification
herbarium	seed bank	seed library	
observation	seed coat	seedling	

_____ when a seed's hard coat has to be scratched or broken so the seed can grow

_____ the wide variety of plants that occur on Earthr

_____ a young plant that has grown from a seed

_____ a change or feature that helps a plant live and grow better in its environment; anything that helps an organism survive and successfully reproduce in an ecosystem

_____ the act of looking at something carefully to learn more about it

_____ protective outer layer of a seed; also called a testa

_____ the many different kinds of seeds, with different sizes, shapes and ways of growing

_____ process by which a seed comes to life and produces a plant

_____ when a seed needs to spend time in the cold before it can start to grow

_____ a collection of dried plants and seeds that people use to study and identify plants

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Seed Discovery Definition Match

Match the vocabulary words in the Word Bank to their definitions.

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adaptation	plant diversity	seed dispersal	scarification
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observation	seed coat	seedling	

scarification	when a seed's hard coat has to be scratched or broken so the seed can grow
plant diversity	the wide variety of plants that occur on Earthr
seedling	a young plant that has grown from a seed
adaptation	a change or feature that helps a plant live and grow better in its environment
observation	the act of looking at something carefully to learn more about it
seed coat	protective outer layer of a seed; also called a testa
seed diversity	the many different kinds of seeds, with different sizes, shapes and ways of growing
germination	process by which a seed comes to life and produces a plant
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herbarium	a collection of dried plants and seeds that people use to study and identify plants
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Resources

Literary connections

A Seed is Sleepy by Dianna Hutt Aston

Big Yellow Sunflower by Frances Barry

Claire Goes Foraging by Margaret Aycock

The Curious Garden by Peter Brown

Flip, Float, Fly: Seeds on the Move by JoAnn Early Macken

From Flower to Fruit by Anne Ophelia Downden

From Seed to Plant by Gail Gibbons

The Garden Next Door by Collin Pine

How Seeds Travel (A Lerner Natural Science Book) by Cynthia Overbeck

Jack's Garden by Henry Cole

Lily's Pesky Plant by Kirsten Larsen

The Life Cycle of a Flower by Molly Aloian

The Magic School Bus Plants Seeds: A Book About How Living Things Grow by Joanna Cole

Miss Maple's Seeds by Eliza Wheeler

Mother Earth and Her Children by Sybil Van Offers and S. Shoen-Smith

Oh Say Can You Seed? Cat in the Hat Learning Library

On Meadowview Street by Henry Cole

Once Around the Sun by Bobbi Katz and LeUyen Pham

Seed Surprises by Andrew Willett

Seeds And Seedlings (Nature Close-Up) by Elaine Pascoe

Seeds, Bees, Butterflies, and More! Poems for Two Voices by Carole Gerber

Seeds Pop-Stick-Glide by Patricia Lauber

The Tiny Seed by Eric Carle

We are the Gardeners by Joanna Gaines

What Does the Bunny See? by Linda Sue Park

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Plant Life Cycles (Building Blocks of Science), World Book, Inc.

Websites and other web resources

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

From Seed to Fruit (PBS LearningMedia) (interactive resource that guides students through the stages of a plant's life cycle)
florida.pbslearningmedia.org/resource/evscps.sci.life.seed/from-seed-to-fruit/

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat)
www.Wildflower.org/plants-main

Seed Dispersal (Science Learning Hub) (activities and resources to teach students about how seeds are dispersed in nature)
www.sciencelearn.org.nz/resources/103-seed-dispersal

FLORIDA Wildflower FOUNDATION

Unit 5

Wildflower Adaptations

Overview

Now that students understand flower parts and life cycles, they're ready to explore how wildflowers have evolved special features to thrive in challenging environments. This unit builds on previous knowledge by showing how flower structures and life cycle stages are shaped by environmental pressures.

In this unit, students explore how wildflowers survive and thrive through physical adaptations. Unlike animals, plants cannot move, so their adaptations are structural rather than behavioral and develop over generations. Students will examine functional, defensive, and reproductive adaptations, as well as how wildflowers are specially adapted to Florida's ecosystems, such as aquatic, fire-dependent and coastal habitats. Through observation and discussion, students will discover how these adaptations help plants survive and reproduce in their unique environments.

Activities

1. Wildflower Adaptations
2. Wildflower Adaptation Game
3. Adaptation Scavenger Hunt
4. Plant Warriors
5. Ecosystem Adaptations
6. Wildflower Adaptations Web Quest
7. Adaptations Writing Extension

Vocabulary

adaptation
alkaloid
aquatic
cross-pollination
defensive adaptation
drought
ecosystem
epiphyte
evaporation
fire-dependent
functional adaptation
habitat
mimicry
physical adaptation
photosynthesis
pollen
pollinator
predator
reproductive adaptation
succulent
transpiration
waxy

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.2.1, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.C.5.2, SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2

Grade 4: ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.E.6.5, SC.4.L.16.2, SC.4.L.17.4, SC 4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

FLORIDA Wildflower FOUNDATION

Unit 5

Wildflower Adaptations

Introduction

Imagine living in the Florida heat without air conditioning, or surviving on a beach where salty wind blows constantly. Wildflowers face these challenges every day! Since they can't move to find shade or water, wildflowers have developed amazing adaptations — special features that help them survive in tough conditions.

An ***adaptation*** is any trait that helps a living thing survive and successfully reproduce in its environment. Wildflowers only have ***physical adaptations*** (changes to their body structures) because they cannot move on their own or change their behavior like animals can. These adaptations develop over many, many generations: if a trait helps a plant survive and make seeds, it gets passed on to the baby plants; if it doesn't help, the plant doesn't survive, and the trait disappears.

Adaptations can be divided into three types:

- ***Functional***: help the plant survive, like the deep roots of Tickseed that reach water during dry spells
- ***Defensive***: help protect the plant from predators, like the spiny leaves of Pricklypear cactus
- ***Reproductive***: help the plant produce seeds successfully, like the bright flowers of Butterfly milkweed that attract pollinators

In this unit, you'll become an adaptation detective, discovering how wildflowers protect themselves, attract pollinators and thrive in Florida's unique habitats.

Wildflower Adaptations — Reproductive

It is important for wildflowers to reproduce. Flowering plants have co-evolved with their pollinating partners over millions of years, producing a fascinating and interesting diversity of ***reproductive adaptations***. The variety in color, form and scent we see in flowers is a direct result of the need for flowers to be pollinated.

Wildflowers that depend on ***pollinators*** with high-energy diets, such as hummingbirds, produce huge amounts of nectar that have a much higher concentration of sugar and other nutrients as compared with flowers pollinated by other insects. Examples include Trumpet creeper (*Campsis radicans*) and Coral honeysuckle (*Lonicera sempervirens*).

Some plants use a form of ***mimicry*** to help with pollination. For example, Cardinalflower (*Lobelia cardinalis*) (pictured) attracts hummingbirds with its bright red, tubular flowers; however, the flowers have no nectar.

Bats and moths that are active at night are attracted to flowers that are white or very pale. These night-blooming flowers have a strong fragrance and a lot of nectar to attract pollinators that are active at night.

Beetle-pollinated flowers tend to be larger and more open to provide an easy landing pad since beetles cannot get around as easily as other flying insects. Landing pads provide a place where beetles can rest or feed while making contact with the flower's pollen.

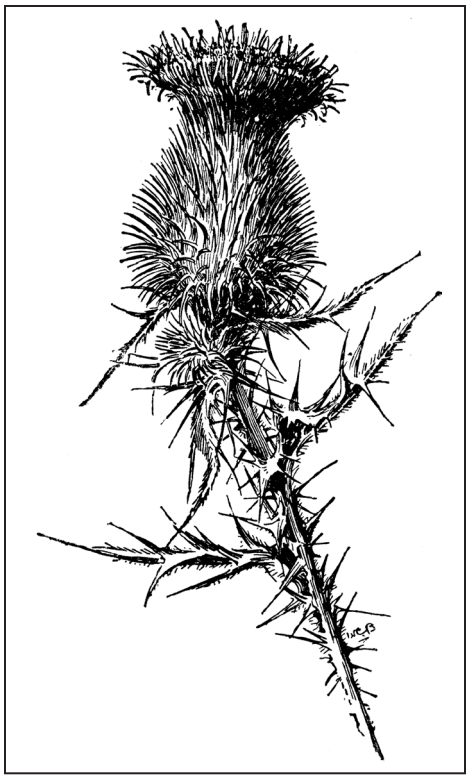
Pollen is high in protein, and many bees and beetles eat it. Flowers that depend on insects that eat pollen produce large amounts of pollen to ensure successful pollination.

Plants may use a combination of other strategies, such as visual cues (for example, bright colors or patterns, showy petals or sepals), scent, food or mimicry to lure a pollinator. Some orchid flowers, for example, look very similar to the insects that pollinate them in order to attract them. Many bee-pollinated flowers reflect a low ultraviolet pattern near the center of each petal. The ultraviolet patterns are invisible to humans, as our vision does not see ultraviolet light; however, bees do.

Wildflowers have evolved to bloom at differing times throughout the seasons, from the first hints of warmth in late winter through spring and summer, until last call in autumn. This decreases competition and provides pollinators with a constant supply of food.

Wildflowers that use wind for ***cross-pollination*** generally have flowers that appear early in the spring, before or as the plant's leaves are emerging. This prevents the leaves from interfering with the dispersal of pollen from the anthers and allows the stigmas to receive pollen. Pollen from wind-pollinated wildflowers is lightweight, smooth and small. Wildflowers that are wind-pollinated, such as most grasses, generally occur as large populations so female flowers have a better chance of receiving pollen.

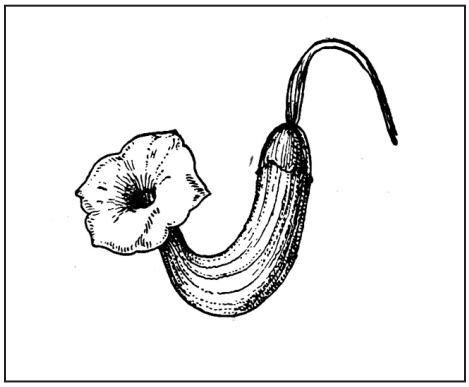
Wildflower Adaptations — Defensive



Defensive adaptations (defenses) are adaptations that help the plant defend or protect itself. The Sensitive brier (*Mimosa quadrivalvis*) reacts to being touched by folding up its leaves. Some plants, such as Coralbean (*Erythrina herbacea*) and some Thistles (*Cirsium* spp.) (pictured, top) are armored with thorns, spines or sharp hairs.

Chemical defenses, such as the "milk" in Milkweed (*Asclepias* spp.) help plants deter predation. The "milk" is actually an ***alkaloid*** that contains a toxic, latex-like chemical. (The Monarch butterfly, however, is adapted to tolerate the "milk." The butterflies eat the milkweed and store the alkaloids in their bodies, which make them taste bad to birds and other ***predators***.) Other plants produce a bitter taste, discouraging animals that might want to eat them.

Some plants have highly aromatic foliage that discourages insects, as well as herbivores such as deer, from eating them. The leaves of plants such as Richweed (*Collinsonia canadensis*), St. John's mint (*Clinopodium brownei*) and others in the mint family produce a strong mint-like scent when crushed. Any sort of strong smell, even if it is a nice smell, is likely a chemical defense.



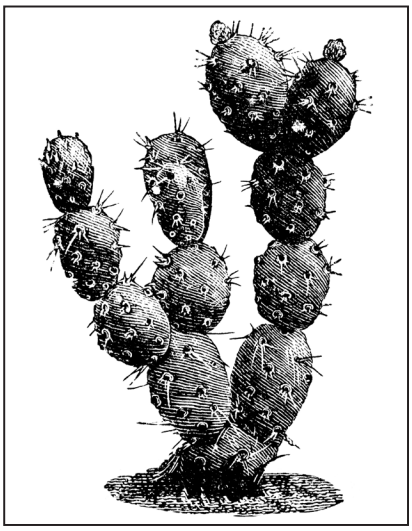
Some plants use scent to attract "defenders." Research has shown that certain plant species, when being eaten by insects, will emit a scent that attracts the predators of those insects (usually another species of insect). These predators eat the insects that are eating the plant, and thus, the plant is "saved."

Plants can also use ***mimicry*** as a defense. For example, Passionflower vines (*Passiflora* spp.) produce small, yellowish bumps at the base of their leaves. These bumps are the same size, shape and color as butterfly eggs. They fool butterflies into thinking another butterfly has already laid eggs on the plant. The butterfly will then look for another vine on which to deposit its eggs. Virginia snakeroot (*Aristolochia serpentaria*) (pictured, bottom) produces dark red flowers that smell like rotting meat. This attracts flies that are hoping to lay their eggs on the meat. In the process of moving around the flower in search of the meat, the flies pollinate the flowers.

Wildflower Adaptations — Functional

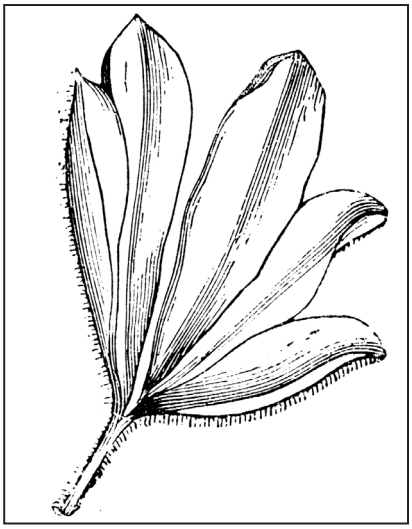
Functional adaptations help plants carry out major life functions such as ***photosynthesis***, growth, and water and nutrient storage and transport. Wildflowers living in extreme weather conditions have to develop appropriate adaptations in order to survive. The Florida environment can be extreme with hot temperatures and light freezes, ***drought*** and excessive rain, salty and poor soils, and even more. One of the many benefits of native plants is that they have had millions of years to become adapted to the extremes of the regions in which they live.

Wildflowers living in a water-limited environment — such as on Florida's sand dunes and in sandhills or scrub ***habitats*** — must develop ways to capture and store water. Plants in these areas typically have thick or ***succulent*** leaves where water can be stored. Many of these leaves have a thick, ***waxy*** covering on their surface that keeps the wildflowers cooler and reduces water loss due to evaporation. Examples are Seapurslane (*Sesuvium portulacastrum*) and Railroad vine (*Ipomoea pes-caprae*).



Small, needle-like leaves, such as those of Florida rosemary (*Ceratiola ericoides*) (pictured, top), have less surface area, which means less area that is exposed to the air and sunlight that causes ***evaporation*** and ***transpiration***. Similarly, Hairy dawnflower (*Stylisma villosa*) holds its leaves upright at 90° angles to reduce the amount of surface area exposed.

Some wildflowers can store water in their stems, trunks, or in underground structures like the Pricklypear cactus (*Opuntia* spp.) (pictured, middle) or Triangle cactus (*Acanthocereus tetragonus*). Cacti have round stems that store a lot of water. Their spines are actually leaves that help reduce the amount of water lost through transpiration.



Small hairs are also found on some wildflowers' leaves, such as Skyblue lupine (*Lupinus diffusus*) (pictured, bottom) and Softhair coneflower (*Rudbeckia mollis*). These small hairs can absorb water from the atmosphere, reflect sunlight and lower the leaves' temperature.

Bromeliads can survive both extremely wet and dry conditions. Some live on the bark of other trees and do not have access to wet soils, so they need ways to capture and store water when it rains. Their long, curved leaves overlap at the base, forming a little bowl. The rain runs down the leaves and is stored in the bowl. An example is the Strap airplant (*Catopsis* spp.).

FLORIDA Wildflower FOUNDATION

Unit 5 Activity 1

Wildflower Adaptations

Objective

Students will be able to identify and understand how plants are adapted for survival.

Materials

- "Wildflower Adaptations" worksheet (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.3.2

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.8, SC.4.N.3.1

Directions

This is a two-part activity. Students can work individually, in pairs or in groups.

1. As a class, brainstorm a list of types of adaptations that could be used by Florida wildflowers.
2. Provide each student with a "Wildflower Adaptations" worksheet.
3. Assign each student/pair/group a wildflower to research using the Internet or other reference and resource materials. Have them fill in Part One of the worksheet as it relates to their assigned wildflower.
4. For Part Two, have students/pairs/groups design and draw an imaginary wildflower that would have at least three adaptations. Encourage students to use adaptations from the class list, but to also be creative and think of their own adaptations that may not be on the list.
5. The wildflower drawing should include a sketch showing the adaptations, labels with reasons for each adaptation, and appropriate grammar, conventions, and neatness.

A scoring rubric is provided to help assess student work.

Alternative

Provide students with craft materials and allow them to design a 3-dimensional model of an imaginary wildflower with at least three adaptations. Have them list and define the adaptations that are included in the model.

Wildflower Adaptations

Part one

Wildflower name: _____

Adaptations	How does this adaptation help your wildflower survive? Why did it develop the adaptation?
1.	
2.	
3.	

Part two

Sketch of plant and adaptations

Wildflower Adaptation Scoring Rubric (for teachers)

4	3	2	1
The sketch or model relates to topic, is large enough to see, and has labels.	The sketch or model relates to the topic but is small or unclear; most labels are present.	The sketch or model is somewhat neat; not all labels are included and/ or the sketch isn't large enough.	The sketch or model is neither clear nor neatly displayed; the visual isn't large enough, or is lacking labels.
Each adaptation is identified with fully developed reasons given for the adaptation.	Each adaptation is identified with reasons given for the adaptation, but the reasons are only briefly stated.	One adaptation is missing, poorly done, or does not relate to the topic; reasons for the adaptations are not well-described or not complete.	One or more adaptations are missing, poorly done, or does not relate to the topic; reasons for the adaptations are missing or not appropriate.
Project is well-written: • Focused and on-topic; • Good grammar, spelling and punctuation; • Neatly done.	Project is adequately written: • Focused and on-topic; • Good grammar, spelling and punctuation; • Could be more visually appealing.	Parts of project are difficult to understand: • Writing is not completely focused on topic; • Some adaptations or reasoning are confusing; • Somewhat messy appearance.	Project is poorly written and difficult to understand: • Writing is unfocused, off topic, and confusing to the reader; • Contains many punctuation, grammar and spelling errors; • Messy appearance.

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Unit 5 Activity 2

Wildflower Adaptation Game

Objective

Students will discuss challenges to plant survival in Florida's environments, and be able to identify ways wildflowers and other plants have adapted to these challenges.

Materials

- "Wildflower Adaptations Clue Cards" (one set)
- "Wildflower Adaptations Plant Cards" (two sets)

Standards

Grade 3: SC.3.N.1.1

Grade 4: SC.4.L.16.2, SC.4.N.1.1

Tip

Prior to starting this activity, print and laminate one set of "Wildflower Adaptations Clue Cards" and two sets of "Wildflower Adaptations Plant Cards." Use different colored paper to easily differentiate Clue Cards from Plant Name Cards.

Directions

1. Have students list what plants and wildflowers need to survive. Be sure that they include water, soil, and sunlight.
2. Discuss characteristics of Florida that make it difficult for wildflowers to grow. For example, it is hot with periods of heavy rainfall and drought; soils are well drained; fungi and algae attack some wildflowers; and animals and insects eat some wildflowers.
3. Discuss with students some of the specific adaptations that are found in the plants featured in the game.
4. Take the students outside and divide them into two groups or teams. Designate a starting line for them to form two lines behind.
5. Place "Wildflower Adaptations — Plant Name Cards" together in two sets about 50 feet away.
6. Give students the following instructions:
    - The teacher will read a clue from the "Wildflower Adaptations — Clue Cards." Listen carefully to the clues being read.
    - As a team, discuss the clue and determine which plant it refers to or which wildflower is being described.
    - When time is called (about 15 seconds) and a signal given, one person from each team will run to their team's wildflower cards and select the name of the wildflower that matched the clue given, then run back to the team.
    - The first student back scores a point for their team if the correct card was picked.
    - If the correct card was not picked, the other team gets a point if their runner picked up the correct card. There may be more than one right answer to some clues.
    - The team with the highest score wins after all clue cards have been given.

Extension

Have students use the Internet or other reference and resource materials to research wildflowers found in Florida and develop adaptation clue cards of their own to use with this game.

Wildflower Adaptation Clue Cards

American white waterlily

This floating aquatic plant has pale white and pink flowers and broad, circular and spongy leaves that are rooted below the water's surface. A massive floating canopy of leaves is produced over weak stems that easily break and allow the plant to spread. The upper leaf surface, where most photosynthesis occurs, is covered with thick wax that repels water.

Ghost orchid

This epiphyte consists of large masses of photosynthetic roots with one to 10 fragrant flowers that open one at a time. The flowers emit a fruity fragrance during early morning that attracts the Giant sphinx moth, an insect with a very long proboscis. The lower petals produce two long lobes that resemble the back legs of a jumping frog. It is found in moist, swampy forests in southwestern Florida.

Coral honeysuckle

This woody vine has bright, reddish-orange, tubular flowers. It attracts butterflies and hummingbirds and blooms in the spring and summer.

Daisy fleabane

Primarily small bees and flies visit the flowers for nectar or pollen. The flowers have a mild fragrance. It can set fertile seed without cross-pollination. The seeds have small bristles or white hairs that promote distribution of the seeds by wind. The root system consists of a taproot. This plant spreads by re-seeding itself.

Yellow-eyed grass

This very tall native wildflower is common in flatwoods, savannas, bogs and lake margins nearly throughout Florida. It grows in full sun in wet sites where soil remains moist year-round. Its small yellow flowers open one at a time in a densely crowned cone-like head that resembles a tiny pine cone. This flower survives best in habitat that requires frequent fire to eliminate competition.

Gulf Coast lupine

This small, endangered wildflower is endemic to the Panhandle region of Florida. It is adapted to tolerate extreme conditions found on coastal dunes. Leaves are pubescent or covered with fine hairs. Flowers are purplish-blue, with a deep purple central spot.

Pitcherplant

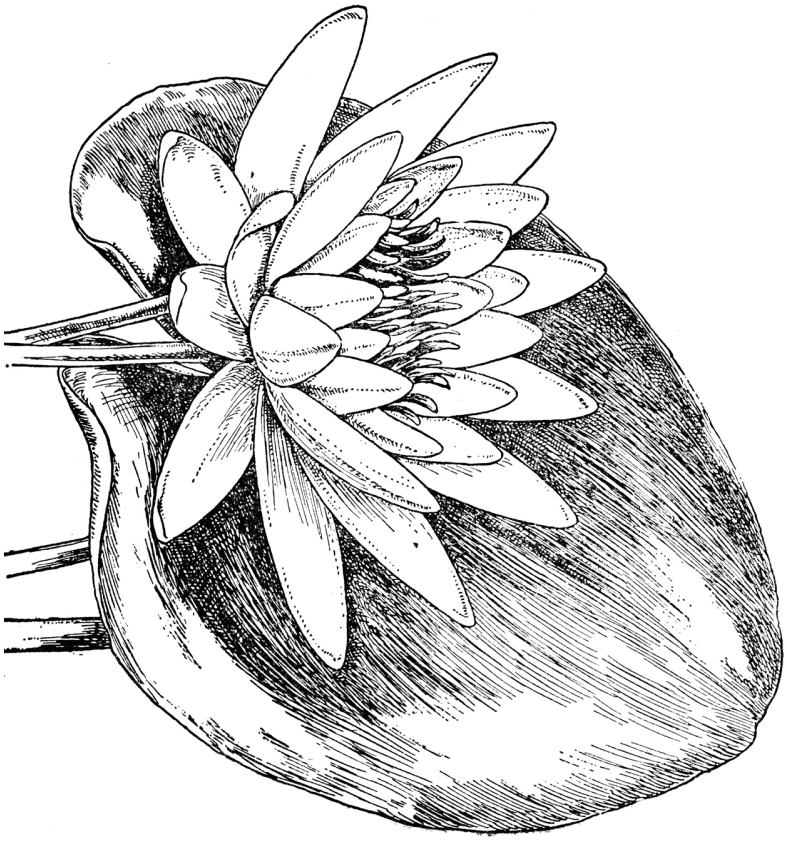
Leaves of this carnivorous plant have a deep fluid-filled cavity into which insects fall, drown, and are digested. The nutrients are absorbed by the plant.

Pricklypear cactus

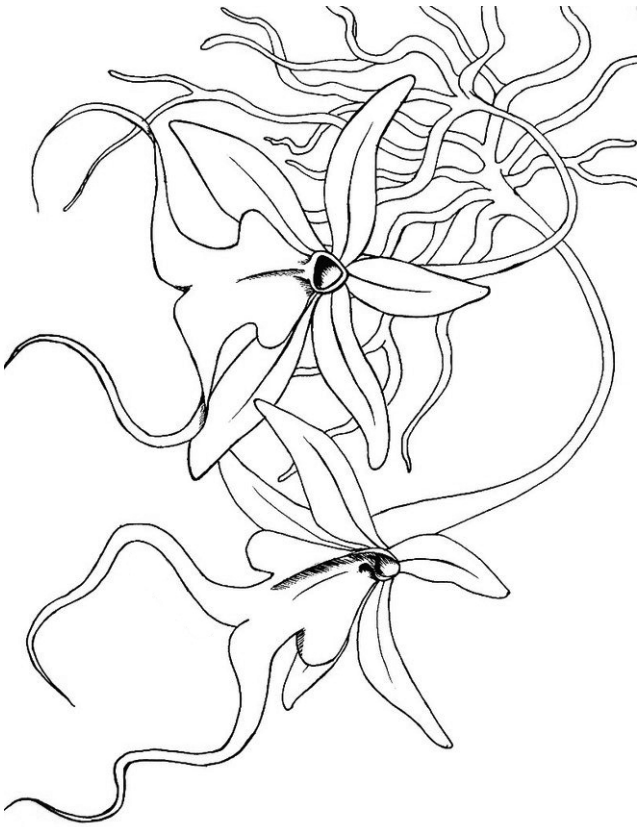
This prickly plant has yellow flowers that invite bees to enter. The spines found on its thick pads act like sponges to absorb and hold water.

Wildflower Adaptation Plant Cards

American white waterlily



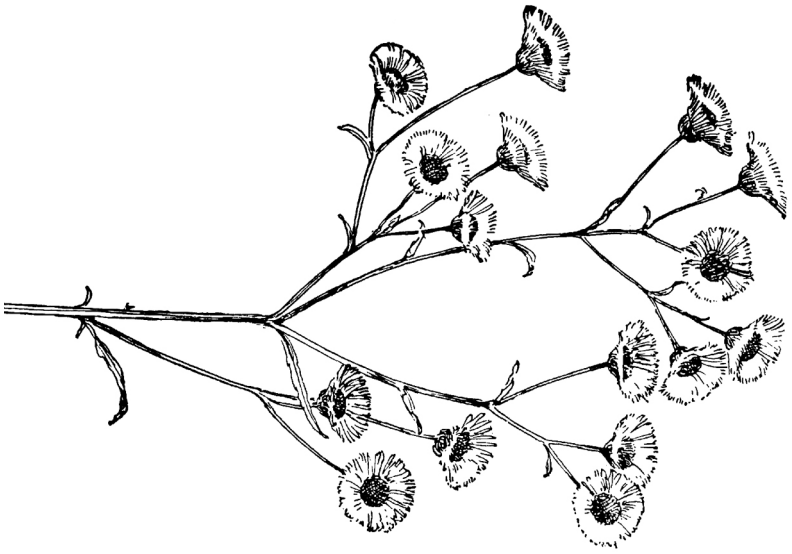
Ghost orchid



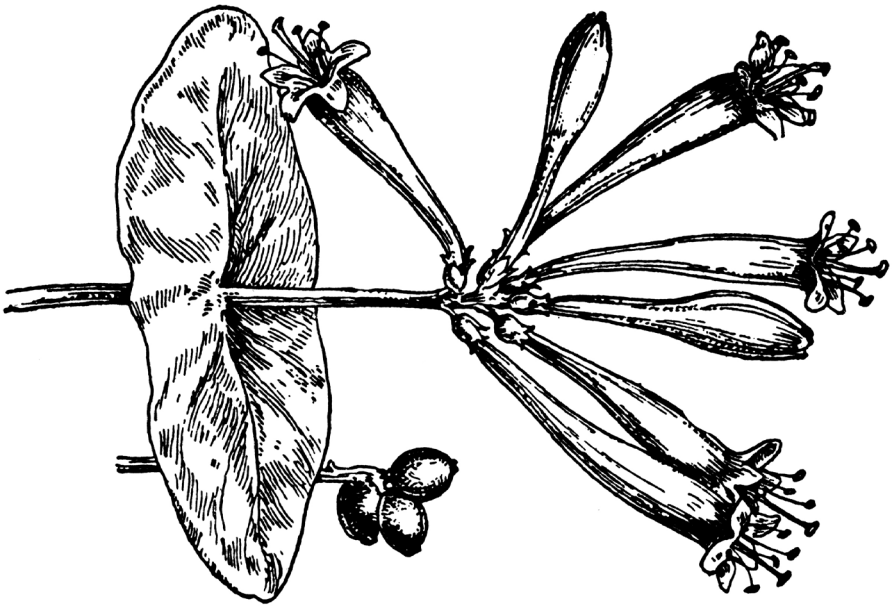
American white waterlily courtesy FCIT (etc.usf.edu/clipart)
Ghost orchid courtesy of Christina Lakish (christinacoleart.tumblr.com)

Wildflower Adaptation Plant Cards

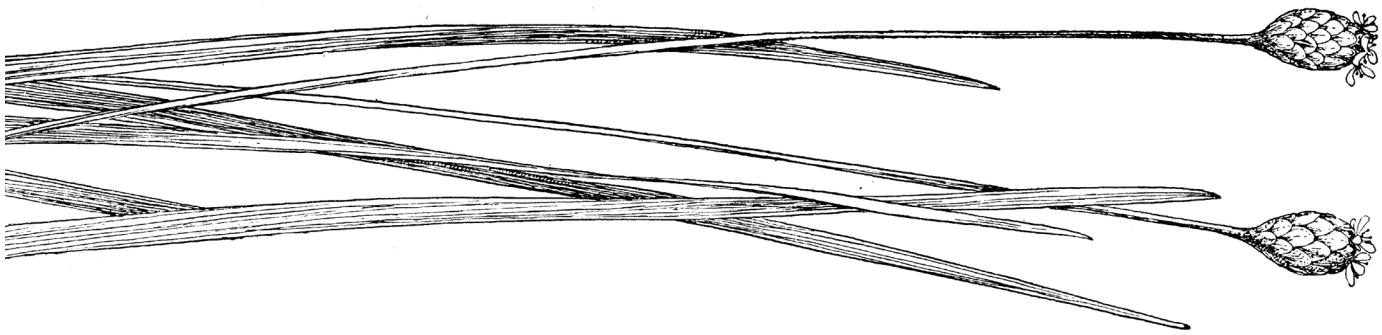
Daisy fleabane



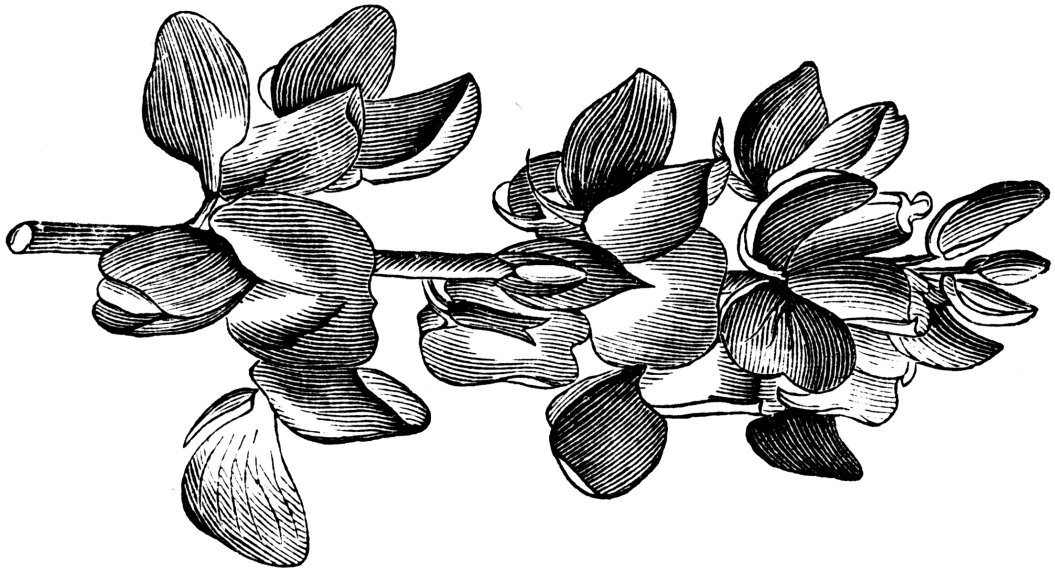
Coral honeysuckle



Wildflower Adaptation Plant Cards



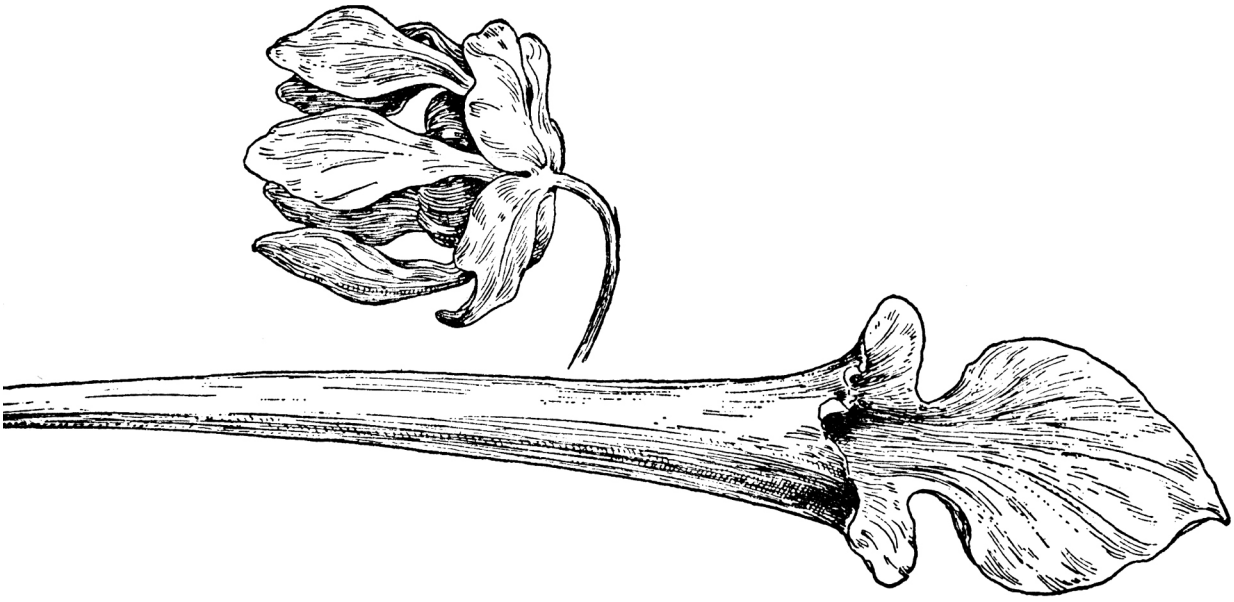
Yellow-eyed grass



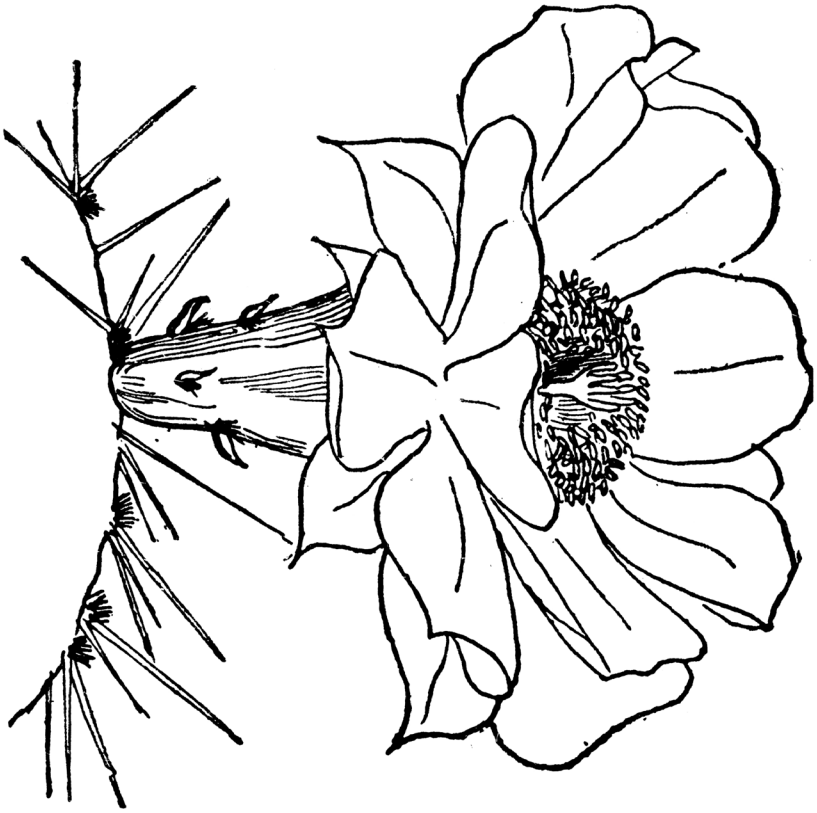
Gulf Coast lupine

Wildflower Adaptation Plant Cards

Pitcherplant



Prickly pear cactus



FLORIDA Wildflower FOUNDATION

Unit 5 Activity 3

Adaptation Scavenger Hunt

Objective

Students will be able to identify and categorize adaptations found in wildflowers.

Directions

1. Provide each student with a set of the "Adaptation Scavenger Hunt" worksheets to complete as a homework or class assignment.
2. Students are to look for something in the leaves, stems, flowers, fruits, or other plant parts that appear to be an adaptation to the plant's environment.
3. Students must determine which category the adaptation belongs in — functional, defensive or reproductive — and offer an explanation for their reasoning.
4. Students will write a short description of the plant, its flower, and its adaptation; they will also sketch the wildflower and label its adaptation.
5. Students should try to find one example of each type of adaptation.
6. Have students share and compare their findings.

Variation

Have students use the Internet or other reference and resource materials to research Florida native wildflower adaptations and select three examples with which to complete the "Adaptation Scavenger Hunt" worksheet.

Materials

- "Adaptation Scavenger Hunt" worksheets (one set per student)
- hand lens (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.E.6.5, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7

Tip

This scavenger hunt requires access to wildflowers in bloom. Check to see if your campus has a wildflower garden or growing boxes, or look in an unmowed area, near a fence line, or in a drainage ditch.

Some of the wildflowers found on school grounds are very small, so students will have to look closely.

Note: If completing as a homework assignment, you may choose to suggest adaptations that do not require a hand lens.

Adaptation Scavenger Hunt

Adaptation descriptions

Functional: Helps the plant carry out major life functions such as photosynthesis, water and nutrient storage and transport, and growth. It could include anything that seems to help the plant stay upright, climb, transport nutrients, capture water, store water, drain water from its leaves, or anchor itself.

Reproductive: Increases plant pollination or seed production. Look at the flowers and see how pollinators are attracted to the plant. Look at the seed-containing fruits and think about how they are dispersed and what kind of animal may help spread the seeds.

Defensive: Helps a plant defend itself from being eaten. Defensive adaptations can be physical (for example, leaves or stems with thorns, spines or sharp hairs), chemical (such as a toxic "milk" within the stems or leaves, or a strong odor), or mechanical (leaves that fold up when you touch them, for example).

Directions

1. Find three examples of flowering plants at home, in your neighborhood, or at school. Look at each plant and find an adaptation in its leaves, roots, stems, flowers or fruits that appears to be an adaptation to its environment.
2. Determine which category the adaptation you identified belongs in — functional, defensive or reproductive. Circle the adaptation type that applies on the worksheet.
3. Write a short description of the plant and describe its adaptations.
4. Sketch a picture of the plant that shows its adaptations.
5. Try to find one example of each type of adaptation.

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

Adaptation Scavenger Hunt

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

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Unit 5 Activity 4

Plant Warriors

Objective

Students will be able to design and demonstrate an understanding of plant defense mechanisms through creative modeling.

Directions

1. Invite students to create a plant that uses at least one of the defense methods they have learned about. Remind them that a successful plant design increases the plant's chances of producing good seeds. Their designs should focus on protecting the plant itself or on protecting the plant's seeds.
2. Students may use the Internet or other reference and resource materials to help identify additional plant defense mechanisms.
3. Have students present their creations to the class and demonstrate the plant's defense mechanisms.
4. Set up a "Hall of Warriors" for students to display their inventions. Each plant should have a card that identifies its name, location and potential enemies, as well as the defense that helps protect the plant.

Materials

- miscellaneous craft supplies including construction paper, glue, yarn, paints, crayons, scissors, etc.

Standards

Grade 3: SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5, SC.3.N.3.2

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.3.1

Note: Remind students that plants do not have the freedom to move, so no karate-chopping vines!

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Unit 5 Activity 5

Ecosystem Adaptations

Objective

Students will be able to understand the characteristics of Florida's four major ecosystems and identify the ways in which plants must adapt to survive in each ecosystem.

Directions

Students can do the research and presentation part of this activity individually, in pairs or in groups

1. Give each student, pair or group a copy of one of the four "Ecosystem Adaptations" handouts.
2. Direct students to read the information they've been presented and then, using the Internet or other reference and resource materials, research additional information such as Florida wildflowers endemic to the ecosystem or animal-plant interactions in the ecosystem. Have them keep track of the sources they use.
3. Have each student write about their ecosystem and the wildflowers found within it. Instruct them to describe the adaptations of each wildflower and how they help or allow the wildflowers to survive within that ecosystem.
4. Have each group design a presentation of their ecosystem information to share with the whole class. Presentations can be done on the computer or as poster sessions.

Materials

- "Ecosystem Adaptations" handouts (one sheet per group)

Standards

Grade 3: ELA.3.C.2.1, ELA.3.C.5.2, SC.3.N.1.1, SC.3.N.1.7

Grade 4: ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Ecosystem Adaptations — Coastal Dunes and Scrub

Although it rains quite a bit in Florida, our coastal dunes and scrub regions are very dry and hot, closely resembling a desert. One reason is that their soil is composed of deep, dry sands that allow water to quickly drain through it. Another reason is that there is a lot of sunlight shining directly on the plants and reflecting off the light-colored soils.

In coastal areas, winds are often strong, salty and blow constantly, drying plants out. In the scrub, plants receive little water, constant sun, and may be subject to high-intensity fires.

Florida plants are exposed to extreme temperatures and drought conditions. To survive, plants must avoid losing too much water and at the same time, stay cool. Plant adaptations to cope with these conditions include:

- Thick ***succulent*** leaves and/or stems where water can be stored.
- Few or no leaves, which helps reduce water loss during ***photosynthesis***. Leafless plants conduct photosynthesis in their green stems.
- Long root systems that spread out wide or go deep into the ground to absorb water.
- Leaves with hair or spines that help shade the plant, reducing water loss. These hairs and spines can also provide protection from animals that would consume the plant.
- Leaves that turn throughout the day to reduce the amount of leaf surface that is exposed to the sun and heat. This reduces water loss and helps keep the plant cooler.
- ***Waxy*** coating on stems and leaves to help reduce water loss.
- Slower growth rates, which requires less energy. The plants don't have to make as much food and therefore do not lose as much water.

Ecosystem Adaptations — Aquatic and Wet Areas

Florida has a wide variety of ***aquatic habitats***, including rivers, streams, springs, wetlands and marshes. Wetland areas are often a mixture of forests and understory plants. Special ***adaptations*** to help plants thrive in a watery habitat include:

- Underwater leaves and stems are flexible to move with water currents.
- Some plants have air pockets in their stems, hollow stems or air-filled bladders to help them stand up or float in the water.
- Submerged plants lack strong water transport systems in their stems. Instead, water, nutrients and dissolved gases are absorbed directly from the water.
- Roots and root hairs are reduced or absent because the roots are only needed for anchorage, not for absorption of nutrients and water.
- Leaves that float on top of the water to expose themselves to sunlight.
- Seeds that can float.
- Drip tips and ***waxy*** surfaces that allow water to run off, discouraging the growth of bacteria and fungi.
- Buttresses and prop and stilt roots that help hold up plants in the shallow soil.

Ecosystem Adaptations — Flatwoods and Dry Prairies

Florida's flatwoods and dry prairies feature hot summers, cold winters and frequent fires. Flatwoods are dominated by an open canopy of pine species, and an understory of Saw palmetto (*Serenoa repens*), Gallberry (*Ilex glabra*) and other flammable evergreen shrubs, while dry prairies have little to no canopy. Both ecosystems typically contain many grasses and wildflowers. ***Adaptations*** developed for this type of area include:

- Deep root systems help the plants survive when fires consume their above-ground portions. The deep roots quickly sprout new growth. They also help some grasses obtain water from sandy soils. Many species in these ecosystems are ***fire-dependent***, meaning they require fire in order to germinate, reproduce or thrive.
- Narrow leaves will lose less water than broad leaves.
- New growth emerges from near the base, not the tip of the plant, so they are not permanently damaged from grazing animals or fire.
- Wind pollination takes advantage of exposed, windy conditions.
- Soft stems bend in the wind.

Ecosystem Adaptations — Forests

Florida has both wetland and dry forested areas. During years of normal rainfall, they may receive up to 50 inches of rain. This abundance of water can cause problems such as promoting the growth of bacteria and fungi that could be harmful to plants.

Heavy rainfall also increases the risk of flooding, soil erosion and rapid leaching of nutrients from the soil. (Leaching occurs when the minerals and organic nutrients of the soil are "washed" out of the soil by rainfall as the water soaks into the ground.) Plants grow rapidly and quickly use up any organic material left from decomposing plants and animals. This results in soil that is poor and provides few nutrients for plants.

Plants that live in forests have many ***adaptations***:

- Leaves with drip tips and *waxy* surfaces allow water to run off, discouraging the growth of bacteria and fungi.
- Buttresses and prop and stilt roots help hold up plants in shallow soil.
- Some plants climb or grow on other plants so they can reach sunlight.
- Flowers on the forest floor are designed to attract animal ***pollinators*** since there is relatively no wind on the forest floor to aid in pollination.
- Smooth bark and smooth or waxy flowers speed the run-off of water.
- Shallow roots help capture nutrients from the top level of soil.
- Many bromeliads collect rainwater in a "bowl" formed at their base by overlapping leaves. The water is absorbed through hairs on their leaves instead of through roots. Some bromeliads are ***epiphytes*** (plants that live on other plants).
- Epiphytes have aerial roots that cling to the host plant, absorb minerals and absorb water from the atmosphere.
- Wildflowers and other plants or trees in dry upland forests often have small leaves to prevent drying out between rainfalls.

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Unit 5 Activity 6 Web Quest

Wildflower Adaptations

Objective

Students will investigate and be able to demonstrate an understanding of wildflower adaptations through short answers and expounded writing.

Directions

Students may perform the research part of this activity individually or in pairs/groups, but should complete the short answers and single page response individually.

1. Give each student a copy of the "Wildflower Adaptations" worksheet.
2. Direct students to search the Internet to find answers to the questions on the worksheet.
3. Have each student choose one question on which to write a single page response.

Materials

- "Wildflower Adaptations Web Quest" worksheet (one per student)

Standards

Grade 3: ELA.3.C.2.1, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.C.5.2, SC.3.N.1.1

Grade 4: ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Tip

One website for students to investigate is mbgnet.net/bioplants/main.html.

Note: Internet access is needed for this activity. If Internet or computer access is limited, students may work together to research the questions in the library or using texts provided by the teacher.

Wildflower Adaptations Web Quest

Search the Internet to find short answers to the following questions. Then choose one question and write a single page response.

1. What is an adaptation?

2. How do plants change to suit their environment?

3. Why do some plants have spines?

4. What adaptations does a wildflower that is pollinated by animals have?

5. What adaptations do wildflowers that are mostly pollinated by wind have?

6. List four ways wildflowers disperse their seeds.

7. Why are adaptations for wildflowers important?

8. List one adaptation for wildflowers found in each of these three Florida ecosystems: coastal dunes, wetlands and pine flatwoods. Explain why those adaptations are necessary.

9. How do epiphytes (air plants) survive?

10. What special adaptations do orchids have?

11. What special root adaptation does a dandelion have?

12. Why are wildflowers different colors?

13. What is the Venus flytrap's special adaptation?

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Unit 5 Activity 7 Writing Extension

Adaptations

Objective

Students will be able to demonstrate an understanding of wildflower adaptations through expounded research and writing.

Directions

1. Give each student one of the four "Adaptations" worksheets ("People and Plants," "Defend and Protect," "Finding Food," and "Life as a Vine.")
2. Direct students to write a single page response to the prompt on their worksheet.
3. Allow students to reference their work from previous activities in this section or use the Internet or other reference and resource materials to research their topic.

Materials

- "Adaptations" worksheets

Standards

Grade 3: ELA.3.C.2.1, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.C.5.2, SC.3.N.1.1

Grade 4: ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Note: Copies of the adaptation descriptions from this section's introduction may also be provided to students for this activity.

Adapted from Pelotes Island Nature Preserve, JEA & FPL

Adaptations — People and Plants

Like people, plants must get food, deal with predators, and protect their young. Think about similarities between the ways that plants and people deal with these issues. Write an explanation of the similar ways in which people and plants try to survive.

Adaptations — Defend and Protect

Many plants have spines or thorns that protect them from being eaten by animals. Think about ways that people might protect themselves from animals. Write an explanation of the similar ways in which plants and people might defend themselves.

Adaptations — Finding Food

When plants need more of the sun's energy, they grow toward sunlight. Think about what people do when they need more energy resources (like food). Write an explanation of what a group of people might do if there was no more food where they lived.

Adaptations — Life as a Vine

Imagine that you are a green thorny vine growing in a shady area with lots of predators. Think about what your life might be like as you try to survive. Write a story about a day in your life as a vine.

Glossary

adaptation: a change or feature that helps a plant live and grow better in its environment; anything that helps an organism survive and successfully reproduce in an ecosystem

alkaloid: chemical substance produced by many flowering plants; serves mainly as a defense against herbivorous insects

aquatic: growing or living in or near water

cross-pollination: pollination of one flower with pollen from another flower

defensive adaptation: any adaptation that helps a plant defend itself from predation

drought: a long period with little to no rainfall

ecosystem: a community of living things (plants, anmimals and other organisms) interacting with each other and their non-living environment (soil, water, air, sunlight)

epiphyte: a plant that grows on another plant, using it only for support

evaporation: the physical process of liquid water converting into vapor on plant surfaces (leaves, stems), contributing to water loss

fire-dependent: plants that depend on naturally occurring fires for their survival, to clear out underbrush and make way for seedlings

functional adaptation: any adaptation that helps an organism survive

habitat: the natural environment in which an organism (plant or animal) lives

mimicry: the close resemblance of an animal or plant (or part of one) to another animal or plant

physical adaptation: any adaptation to the physical or structural part of an organism that helps it survive

photosynthesis: the process by which plants use sunlight to create food from carbon dioxide and water

pollen: fine, powder-like material that covers the anthers within a flower

Note: This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

pollinator: an organism (usually an insect, bird or small mammal) that moves pollen from one plant to another

predator: an animal that hunts and eats other animals; an organism that naturally preys on other organisms

reproductive adaptation: any adaptation that helps a plant reproduce successfully

(Continued on following page.)

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

succulent: a plant or leaf adapted to dry conditions and having fleshy tissues that store water

transpiration: the process by which plants release water vapor through tiny openings in their leaves

waxy: a coating on leaves (called a cuticle) to prevent excess water loss through transpiration

Note: This coating is similar to beeswax or paraffin wax and is usually on the leaf surface.

Wildflower Adaptations Crossword Puzzle

Use the clues and the Word Bank to fill in the puzzle on the next page.

Word Bank

alkaloid	ecosystem	habitat	predator	waxy
aquatic	epiphyte	mimicry	reproductive	
cross pollination	evaporation	physical	succulent	
defensive	functional	pollen	transpiration	

Across

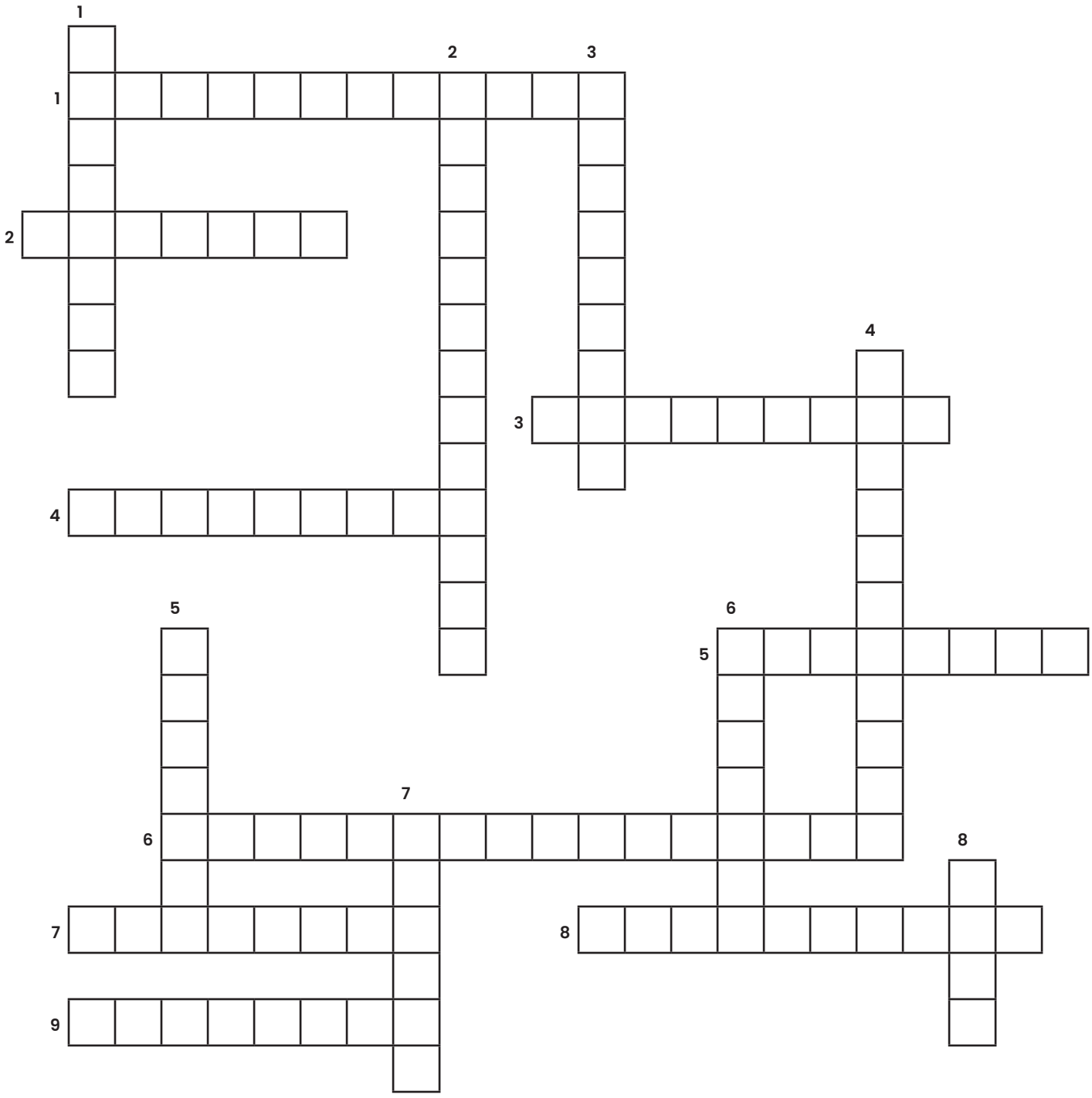
1. any adaptation that helps a plant reproduce successfully
2. the natural environment in which an organism (plant or animal) lives
3. any adaptation that helps a plant defend itself from predation
4. a plant or leaf adapted to dry conditions and having fleshy tissues that store water
5. chemical substance produced by many flowering plants; serves mainly as a defense against herbivorous insects
6. pollination of one flower with pollen from another flower
7. any adaptation to the structural part of an organism that helps it survive
8. any adaptation that helps an organism survive
9. a plant that grows on another plant, using it only for support

Down

1. an animal that hunts and eats other animals; an organism that naturally preys on other organisms
2. the process by which plants release water vapor through tiny openings in their leaves
3. a community of living things (plants, anmimals and other organisms) interacting with each other and their non-living environment (soil, water, air, sunlight)
4. the physical process of liquid water converting into vapor on plant surfaces (leaves, stems), contributing to water loss
5. the close resemblance of an animal or plant (or part of one) to another animal or plant
6. growing or living in or near water
7. fine, powder-like material that covers the anthers within a flower
8. a coating on leaves (called a cuticle) to prevent excess water loss through transpiration

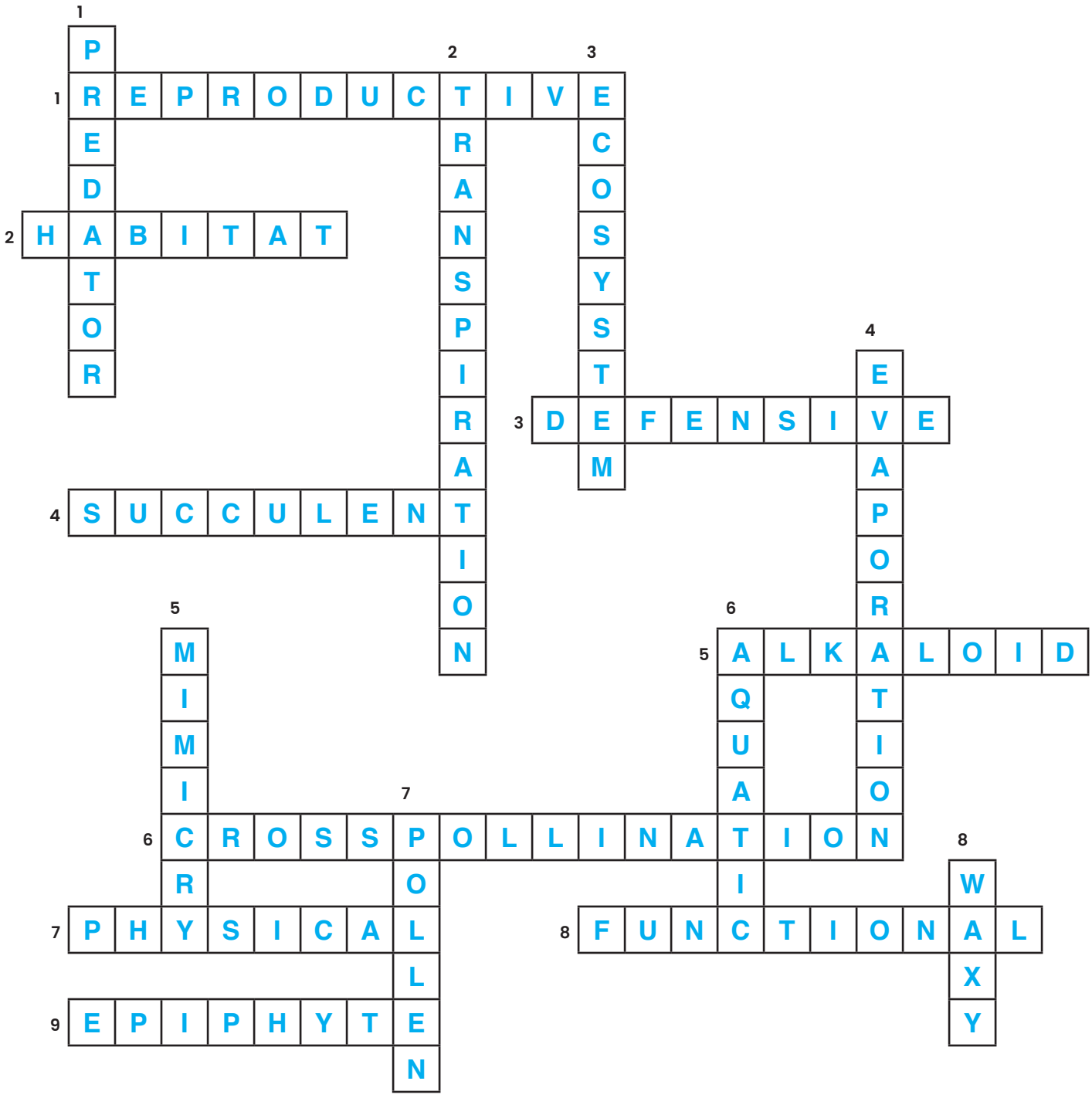
Wildflower Adaptations Crossword Puzzle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Wildflower Adaptations Crossword Puzzle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Resources

Literary connections

Echoes for the Eye: Poems to Celebrate Patterns in Nature by Barbara J. Esbensen

How Plants Survive by Kathleen Kudlinski

How Seeds Travel (A Lerner Natural Science Book) by Cynthia Overbeck

Lily's Pesky Plant by Kirsten Larsen

Max and the Milkweed by Auggie Grand

The Milkweed and Its World of Animals by Ada and Frank Graham

Mysteries & Marvels of Plant Life by Barbara Cork

The Nature And Science Of Flowers (Exploring the Science of Nature) by Kim Taylor and Jane Burton

Plants Bite Back! by Richard Platt

Pollination by Mary King Hoff

The Secret Lives of Plants! (Adventures in Science) by Janet Slingerland

Wetlands by Lynn M. Stone

Wetlands by Peter Benoit

What Do Roots Do? by Kathleen V. Kudlinski

What Is a Plant? (Science of Living Things) by Bobbie Kalman

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Surviving the Wilds of Florida by Reid Tillery

Websites and other web resources

Biology of Plants (Missouri Botanical Garden) www.mbgnet.net/bioplants/main.html

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives) www.FlaWildflowers.org

iNaturalist SEEK (image recognition app for identifying plants and animals) www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat) www.Wildflower.org/plants-main

Plant defense against herbivory en.wikipedia.org/wiki/Plant_defense_against_herbivory

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Unit 6

Plant and Animal Interactions

Overview

Wildflowers don't exist in isolation — they are part of complex ecological communities where plants and animals depend on each other for survival. In this unit, students investigate the relationships between plants — especially wildflowers — and the animals and other plants that interact with them. Using real-world examples, students explore how these interactions influence survival, reproduction, and ecosystem balance.

This unit introduces the concept of symbiosis, which includes mutualism, commensalism, and parasitism. Students will investigate how wildflowers and animals interact through pollination, seed dispersal, food webs and habitat sharing, and they'll discover that protecting wildflowers means protecting entire communities of life.

Building on knowledge of pollination and adaptations from earlier units, students will now explore the broader web of relationships connecting wildflowers to insects, birds, mammals, and other organisms. Activities emphasize critical thinking, observation and discussion as students consider how organisms are connected and how changes to one part of an ecosystem can affect many others.

This unit supports understanding of ecological relationships and helps students recognize wildflowers not as isolated plants, but as active participants in complex living systems. Understanding these interactions helps students appreciate why biodiversity and habitat conservation matter.

Activities

1. Cohort Combos
2. Insect Evidence Survey
3. Food Web Connections
4. Habitat Highways

Vocabulary

benefit
carnivore
cohort
commensalism
food web
herbivore
host
hypothesis
interaction
mutualism
omnivore
parasite
parasitism
predator
prey
producer
relationship
symbiosis

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.1.3, ELA.3.C.2.1, ELA.3.C.4.1, SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: ELA.4.C.1.3, ELA.4.C.2.1, ELA.4.C.4.1, SC.4.E.6.5, SC.4.L.16.2, SC.4.L.17.2, SC.4.L.17.3, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.3.1

FLORIDA Wildflower FOUNDATION

Unit 6

Plant and Animal Interactions

Introduction

Plants, including wildflowers, ***interact*** with animals and other plants in many different ways. Wildflowers don't live alone. They're surrounded by insects that pollinate them, animals that eat their seeds and spread them to new places, caterpillars that munch on their leaves, and birds that hunt those caterpillars. All of these relationships connect wildflowers to the animals around them in a web of life, and these ***relationships*** affect the survival of both the plants and the organisms that depend on them.

One type of interaction is called ***symbiosis***, which is a close relationship between two different kinds of organisms. In the plant world, there are three main types of symbiotic relationships:

- ***Mutualism*** — both organisms ***benefit*** from the relationship
- ***Commensalism*** — one organism benefits, while the other is neither helped nor harmed
- ***Parasitism*** — one organism (the ***parasite***) benefits while the other (the ***host***) is harmed

Symbiotic relationships can occur between two plants, between a plant and an insect, or between a plant and an animal. Plants, insects and animals that share these relationships are sometimes referred to as ***cohorts***, because their survival is connected.

Some of these relationships help both the wildflower and the animal. Other relationships might help one more than the other. In this unit, you'll investigate how wildflowers and animals depend on each other, and discover why protecting wildflowers means protecting entire communities of living things.

Habitat Highways

Many pollinators, especially insects, live and gather food within small areas. That's why it's important for neighborhoods and communities to have wildflower habitat. Even a small strip of wildflowers can feed a hungry pollinator! It's even better when these wildflower areas are connected or close together — this creates "habitat highways" that allow pollinators to move through developed areas safely. When your school plants Florida wildflowers, your garden becomes part of that habitat highway.

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Unit 6 Activity 1

Cohort Combos

Objective

Students will be able to distinguish different types of symbiotic relationships between plants and animals.

Materials

- "Cohort Combo Matching Cards" (enough sets so that each student gets one card)
- "Cohort Combo Information Sheets" (enough copies so each pair gets their appropriate sheet)

Standards

Grade 3: SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Note: Print cards and information sheets on card stock and laminate for multiple uses.

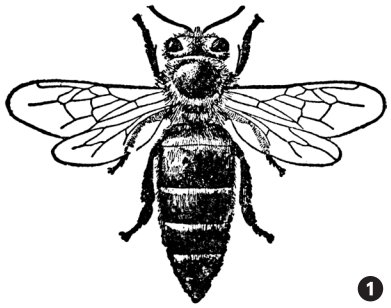
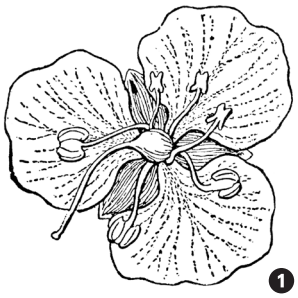
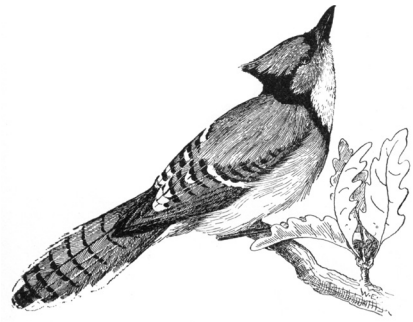
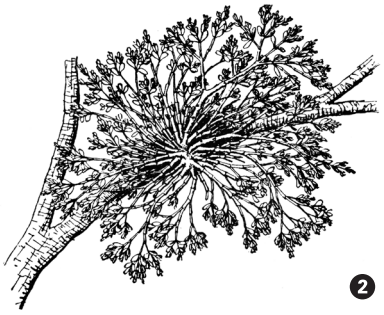
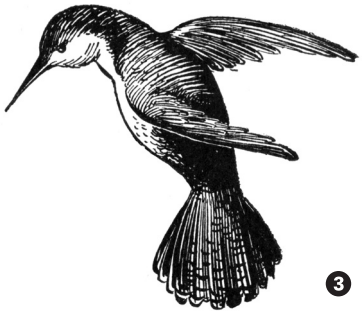
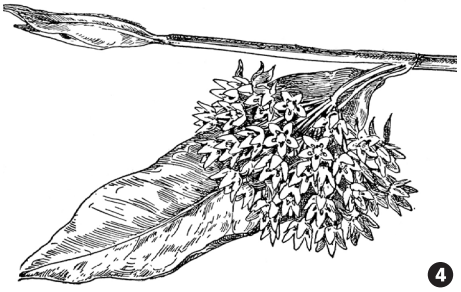
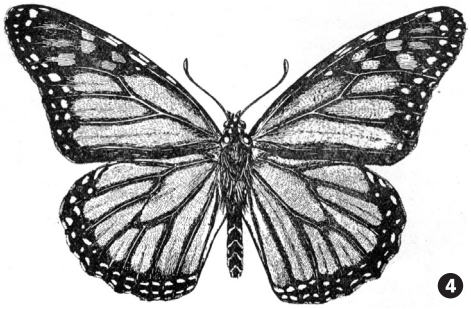
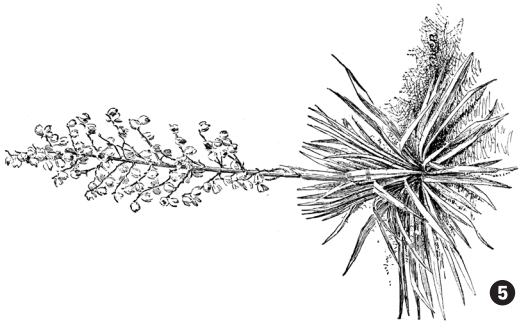
Directions

1. Hand out the classroom set of "Cohort Combos Matching Cards," one card per student.
2. Tell students to find their "cohorts," i.e. the student with a card bearing the same number but different organism.
3. When all the cohorts are together, tell each pair of students to make a ***hypothesis*** about how their relationship might work. (If the students have not been introduced to the term hypothesis, define the word for the students at this time. You may also wish to go over the definition of the word *cohort*.)
4. Give them some leading questions, such as:
   - Do the cohorts depend on each other?
   - Does one partner accidentally assist the other?
   - Does one partner cause problems for the other?
5. After the students have had a few minutes to discuss their relationship with each other, have them write down their hypothesis. Then hand out the appropriate "Cohort Combo Information Sheet" to the corresponding students.
6. Ask the students to discuss with their partners what they now know about the symbiotic relationship between their animal or plant cohort, and how it differs from their hypothesis.
7. Have students plan a way to present their relationship to the rest of the class. (Encourage students to use the terms ***mutualism***, ***commensalism*** and ***parasitism***, and to "act out" the relationship. Be sure to have the term definitions on the white board, a chart, or another prominent place in the room).
8. Correct any misconceptions with an explanation as the acts proceed.

Extension

1. Have the cohorts gather in three groups: mutualism cohorts, commensalism cohorts, and parasitism cohorts.
2. Ask them to compare and contrast the different examples of each symbiotic relationship within their larger group.
3. Have students return to their seats for a follow-up discussion to review what they learned in this lesson. (Topics should include terms and types of relationships.)

Cohort Combo Matching Cards

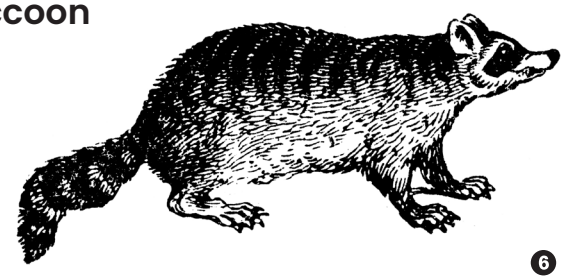
Bee  1	Spiderwort  1
Blue jay  2	Mistletoe  2
Cardinalflower  3	Hummingbird  3
Milkweed  4	Monarch butterfly  4
Yucca  5	Yucca moth  5

Clipart courtesy FCIT (etc.usf.edu/clipart) except yucca moth, a public domain image (srufaculty.sru.edu/david.dailey/public/insects/yuccamoth.gif)

Beggarticks

6

Raccoon

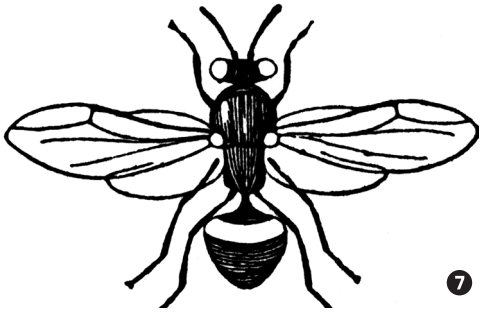


6

Goldenrod

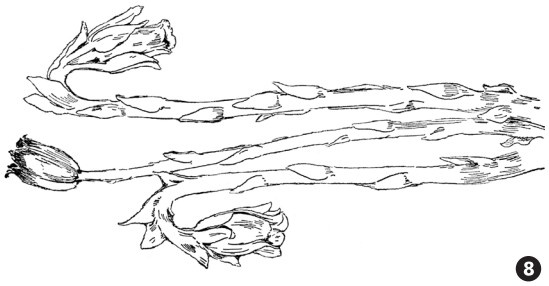
7

Gall fly



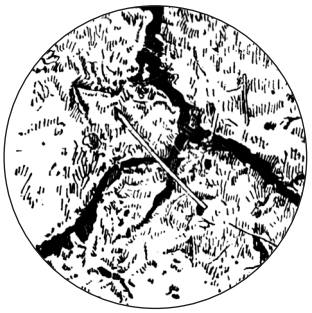
7

Indian pipes



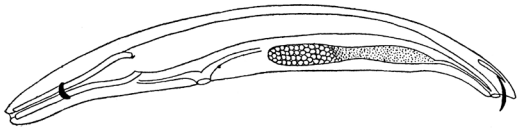
8

Soil fungi



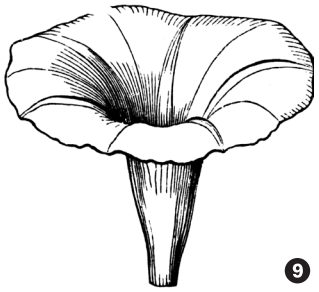
8

Nematode



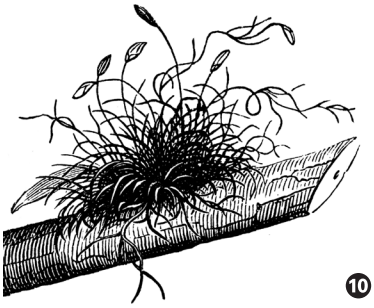
9

Morning glory



9

Spanish moss



10

Live oak

10

Cohort Combo Information Sheets

Teachers: Reproduce these sheets and cut them into information slips for each Cohort Combo pair.

Bee and Spiderwort
Bees are attracted to this wildflower's showy petals. When a bee's head enters the flower to draw up the nectar with a proboscis, sticky pollen on the flower's hanging stamens is caught by the bee's hairy body. When the bee goes to the next flower, some of the pollen is left behind on the flower's pistil, where it will fertilize the ovules. Plants have no use for nectar other than as an attractant for pollinators. The flower provides food for the bee, and the bee carries the pollen between blossoms to fertilize the flowers.

Blue jay and Mistletoe
The blue jay eats the mistletoe berries. Inside each berry is a seed that is inedible, and the blue jay tries to spit it out. However, the seed is sticky, making it difficult to shake, so the bird scrapes it off on tree bark. This is where mistletoe needs to grow to survive. If the blue jay accidentally swallows the seed, it passes through the bird and is left on another tree branch in the bird's waste. Either way, the blue jay carries the beginnings of the plant to new homes, while enjoying a meal in the process.

Goldenrod and Gall fly
The female goldenrod gall fly injects her fertilized eggs into the stem of the goldenrod. In about 10 days, the eggs hatch and the larvae begin to eat the goldenrod stem. The saliva of the larvae has a chemical that irritates the stem and causes a sphere-shaped scar, or "gall," to form. This is where the larvae will live and feed for the next year until they burrow out to look for mates.

Spanish moss and Live oaks
Although it is called a moss, Spanish moss is not a moss at all, but is a bromeliad related to pineapples. The Spanish moss sits on the branches of live oak trees, where it can gather sunlight, rainwater and nutrients. It does not penetrate the tree bark. Spanish moss seeds are blown off by wind and carried to nearby trees, wires, and other supports. The trees are usually not bothered by the Spanish moss, but it can sometimes slow a tree's growth by reducing the amount of light the tree can receive.

Morning glory and Root knot nematodes
Nematodes are a type of roundworm that live in the soil. Nematodes burrow into the roots of morning glories (as well as several other plants). They feed on the roots and lay their eggs within the roots. As the nematode eggs hatch, large galls are formed that prevent the root from properly absorbing water and nutrients.

Cardinalflower and Hummingbird
Because hummingbirds do not have a sense of smell, the cardinalflower does not need a strong scent to attract the hummingbird. Rather, hummingbirds are attracted to the flower's bright red color. The cardinalflower's nectar is almost all sugar. To feed, the hummingbird inserts his long, thin beak into the tube-shaped flower. Pollen is brushed off the flower stamens onto the bird and carried to the next flower's pistil where it is deposited. The cardinalflower provides food to the hummingbird, and the hummingbird helps the flower make new seeds by pollinating it.

Indian pipes and Soil fungi
Indian pipes do not have chlorophyll so they cannot make their own food as green plants commonly do. Instead, it gets its food from a fungus found in or on the soil. The roots of the Indian pipe tap into the root-like structures (mycelium) of the fungus and steal the nutrients that the fungus is simultaneously gathering from nearby trees.

Milkweed and Monarch butterfly
Monarch butterfly larvae feed on plants in the milkweed family. Monarchs lay their eggs on milkweed leaves and, when the eggs hatch, the small larvae feed on the plant's leaves. Milkweed plants contain a chemical that is toxic to vertebrates (animals with backbones). The butterfly larvae are able to store this chemical. When a bird catches the butterfly and eats it, the milkweed chemicals cause the bird to get sick and throw up. The recovered bird avoids eating another Monarch butterfly and teaches its young to stay away.

Yucca and Yucca moth
The yucca plant is fertilized only by this special moth. The moth climbs in and gathers pollen under her chin. She then carries the pollen to another yucca flower and, after depositing the pollen ball, breaks into one of three chambers of the ovary of the plant and lays her eggs. Her developing larvae feed on one of the ovules (developing seeds) but leave the other two chambers with ovules alone. Pollen fertilizes those two ovules, which mature into seeds.

Beggarticks and Raccoon
Beggarticks is also called pitchfork weed because its seeds have two or more prongs that stick to almost anything—especially to the fur of a small animal like a raccoon as it wanders through a patch of the plant. The raccoon carries the seeds to another location where they are scratched or rubbed off, away from their former site, to grow in an area with less competition from the parent plant.

Cohort Combo Information Sheets

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Morning glory and Root knot nematodes **Parasitism**

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FLORIDA Wildflower FOUNDATION

Unit 6 Activity 2

Insect Evidence Survey

Objective

Students will look for and be able to identify evidence of insects.

Directions

This activity can be done in pairs.

1. Give each student an "Insect Evidence Survey" worksheet and a hand lens. Explain that they will be conducting a survey of insect damage on plants.
2. Lead students into a natural or landscaped area of the school campus.
3. Tell them to look for evidence of insects on the plants and record it on their "Insect Evidence Survey" worksheet.
   - In the "Evidence" column, have students draw the damage that they see.
   - In the "Location" column, students will write where on the plant they saw the insect damage.
   - If students see an insect causing the damage, have them note that and indicate if it is an insect other than the example given.
4. Select a tree or shrub and lay the cloth under it. Shake the plant gently, but vigorously. Then invite students to examine the cloth to see what kinds of insects fell from the plant. Be sure to select a plant that is not fruiting so that the fruit is not lost.

Discussion

- Ask students to hypothesize what the different types of damage may mean. Have them provide support for their hypothesis.
- Ask students how a plant might protect itself from insects.
- Have students make a list of possible plant defenses.

Materials

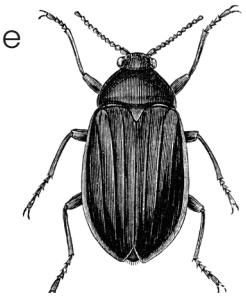
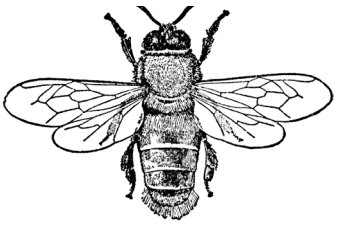
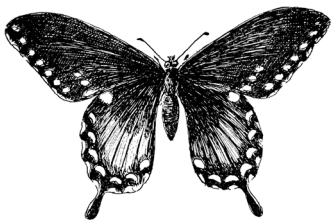
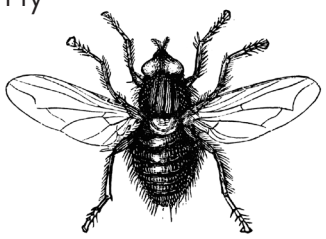
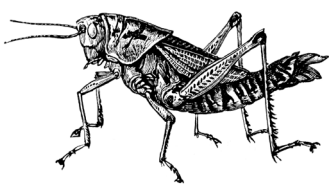
- "Insect Evidence Survey" worksheet (one per student)
- large white cloth or sheet
- hand lens (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6

Grade 4: SC.4.E.6.5, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.6

Insect Evidence Survey

Evidence	Plant	Location on Plant	Examples of insects
Tunnels			Beetle 
Wrapped leaf			Bee 
Chewed leaf			Butterfly 
Galls			Fly 
Foam			Grasshopper 

FLORIDA Wildflower FOUNDATION

Unit 6 Activity 3

Food Web Connections

Objective

Students will be able to identify how plants and animals are connected in a food web and determine how the disappearance of one plant or animal impacts the entire web.

Materials

- "Food Web Organisms" picture cards (one set per group) (see Tip)
- "Sun Mat" (one per group)
- chart paper or whiteboard
- paper/plastic cups (20 per group)
- scissors
- Scotch tape or glue

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.3.2

Grade 4: SC.4.L.17.2, SC.4.L.17.3, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.3.1

Directions

This activity can be done as a whole class, in two larger groups or in small groups, depending on class size.

1. Review what students have learned so far about food webs. Ask them to define ***food web*** and give examples.
2. Create a T-Chart labelled with "Plants" and "Animals." Ask students which types of plants and animals are part of a food web in Florida and list them on the chart. Emphasize specific wildflowers to include under producers. Prompt them with examples: Tickseed (*Coreopsis* spp.), Blazing star (*Liatris* spp.), Milkweed (*Asclepias* spp.), Black-eyed Susan (*Rudbeckia hirta*). Discuss which animals rely on these specific wildflowers for food — not just the nectar and pollen, but also seeds and leaves.
3. After the chart has been filled in, discuss the different roles of organisms in a food web: ***producers***, ***herbivores***, ***carnivores***, ***omnivores***. Define each role for students.
4. Create a new chart with four columns labeled "Producers," "Herbivores," "Carnivores" and "Omnivores." Use the previous chart of plants and animals to categorize those organisms into the new chart according to their role in the food web.
5. Split students into groups and give each group 20 cups.
6. Have students label eight cups with different Florida producers (emphasizing wildflowers), eight with herbivores and/or omnivores, and four with carnivores. Students may use the "Food Web Organisms" cards or use the blank template to create their own cards.
7. Give each group a "Sun Mat" (a large sheet of yellow paper labeled "SUN"). Explain that this represents the energy source for all life in the food web. Instruct students to place their producer cups on the "Sun Mat," arranging them in a row or cluster. Explain that producers get their energy from the sun through photosynthesis.
8. Ask students which herbivores and/or omnivores eat the producers they chose. Instruct them to stack those herbivore/omnivore cups on top of the corresponding producer cups. Remind them that herbivores eat only plants, while omnivores eat both plants and animals.
9. Then ask which carnivores eat the herbivores and omnivores they chose. Instruct them to stack carnivore cups on top of the herbivore/omnivore cups they feed on. This creates a food chain pyramid showing energy transfer.

Tip

Students can use the blank Food Web Organism template to create their own cards as a preparatory activity. This builds research skills and helps students better understand each organism's role before building the food web. Provide each group with blank card templates and have them research Florida organisms to illustrate and label.

(Continued on following page)

10. Remind students that in nature, most organisms are part of multiple food chains that interconnect. If time allows, students can use string or yarn to connect cups that have feeding relationships to show the complexity of a food web.

11. When each group has completed their food web pyramid, conduct the following experiment:
    a. First, have students carefully remove one producer cup from the bottom. What happens to the cups above it?
    b. Rebuild the pyramid, then have students remove one herbivore/omnivore cup from the middle. What happens?
    c. Rebuild again, then have students remove one carnivore cup from the top. What happens?
    d. Discuss: Which removal had the biggest impact? Why? What would happen if that organism became extinct in real life?

Discussion

Use the questions below to lead a discussion with students about what happens when organisms disappear from their food webs.

- How are plants and animals in a food web connected?
- Why are all plants and animals in an environment important?
- If you remove a carnivore from the top of the pyramid, the pyramid does not fall. Infer what could be a consequence in the food web if a carnivore became extinct. (Possible answer: Herbivore populations might increase, leading to overgrazing of plants; balance would be disrupted.)
- How are wildflowers an important part of a food web?
- What would happen to the food web if wildflowers disappeared from their environment?
- Why do we say it's a food "web" instead of a food "chain"? (Answer: Most animals eat many different foods and are eaten by many different ***predators***, creating an interconnected web rather than a simple chain)
- Besides providing food, what other roles do wildflowers play for animals in the ecosystem? (Possible answers: shelter, nesting materials, hiding places from predators)

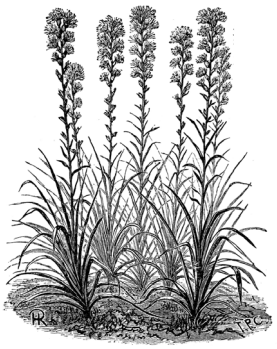
Food Web Organisms

PRODUCER

Tickseed

Nectar and pollen for bees and butterflies; seeds for birds

PRODUCER



Blazing star

Nectar and pollen for bees, butterflies and hummingbirds; seeds for birds

PRODUCER

Black-eyed Susan

Nectar and pollen for bees and butterflies; seeds for songbirds and small mammals

PRODUCER

Milkweed

Host plant for Monarch caterpillars; nectar for many butterflies

PRODUCER

Sunflower

Nectar and pollen for bees and butterflies; seeds for birds

PRODUCER

Dewberry

Nectar and pollen for bees and butterflies; berries for many mammals

PRODUCER

Blueberry

Nectar and pollen for bees and butterflies; berries for birds and many mammals

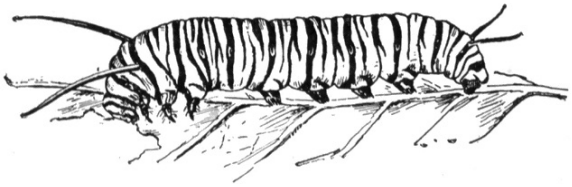
PRODUCER

Oak

Host plant for caterpillars; pollen for insects; acorns for many animals

Food Web Organisms

HERBIVORE



Monarch caterpillar

Eats only Milkweed leaves

HERBIVORE

Bumble bee

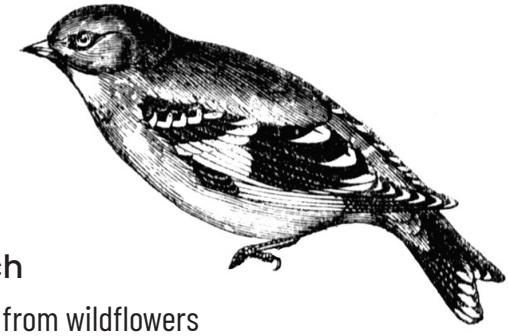
Drinks nectar and collects pollen from wildflowers

HERBIVORE

Spicebush swallowtail

Drinks nectar from wildflowers

HERBIVORE



Goldfinch

Eats seeds from wildflowers

HERBIVORE

Cottontail rabbit

Eats grasses, wildflower leaves and stems

HERBIVORE

White-tailed deer

Browses on wildflower leaves, grasses and shrubs

OMNIVORE

Ovenbird

Eats seeds and insects

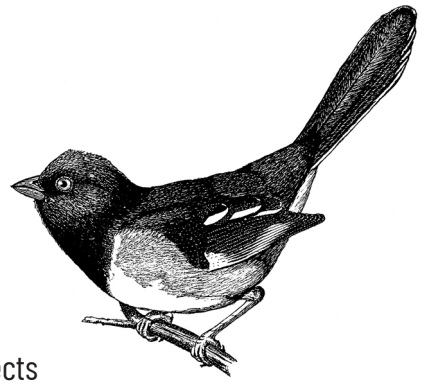
OMNIVORE

Gray squirrel

Eats seeds, nuts and occasionally insects

Food Web Organisms

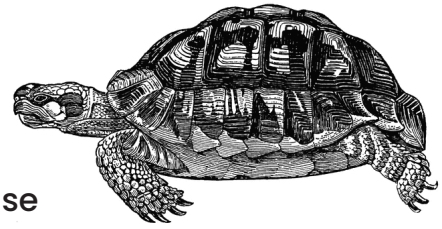
OMNIVORE



Towhee

Eats seeds and insects

OMNIVORE



Gopher tortoise

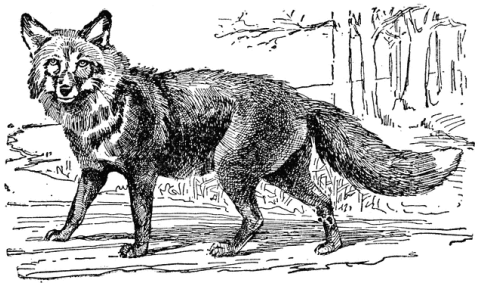
Eats grasses, fruit, seeds, occasionally insects, bones and carrion

OMNIVORE

Raccoon

Eats fruit, nuts and small invertebrates

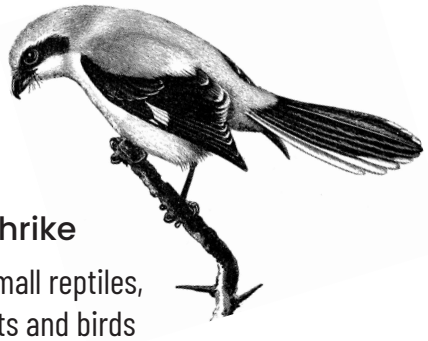
OMNIVORE



Red fox

Eats fruit, eggs, insects, small rodents and birds

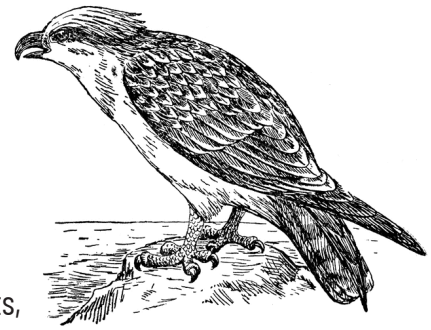
CARNIVORE



Loggerhead shrike

Eats insects and small reptiles, amphibians, rodents and birds

CARNIVORE



Osprey

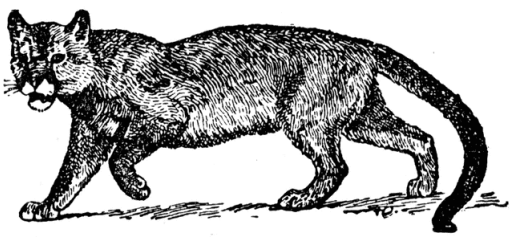
Eats mostly fish, occasionally rodents, birds and small reptiles

CARNIVORE

Green anole

Eats insects, spiders and other small invertebrates

CARNIVORE



Florida panther

Eats mostly deer, occasionally armadillos, rabbits and birds

Food Web Organisms

PRODUCER: Used by:	PRODUCER: Used by:
HERBIVORE: Eats:	HERBIVORE: Eats:
OMNIVORE: Eats:	OMNIVORE: Eats:
CARNIVORE: Eats:	CARNIVORE: Eats:

FLORIDA Wildflower FOUNDATION

Unit 6 Activity 4

Habitat Highway

Objective

Students will be able to define a "habitat highway," identify examples of wildflowers that can create them and pollinators that benefit from them, and conduct research to create an argument for improving the "habitat highways" in their community.

Discussion

Because most insects live and gather food within small areas, it is very important that our neighborhoods and communities have natural or planted habitat. Even a small strip of wildflowers can be of use to a hungry pollinator. It is even better for pollinators if such areas are connected or within close proximity to one another. That helps form "habitat highways" through developed areas, which allows insects to move about and thrive. Pollinators can travel between these areas of wildflowers within a developed area to have a place to eat and rest on their journey.

When your school plants Florida wildflowers and other native plants, your garden serves as part of that habitat highway.

Materials

- paper
- clipboards (one per pair)
- pencils
- camera/tablet to take photos (optional)

Standards

Grade 3: ELA.3.C.1.3, ELA.3.C.2.1, ELA.3.C.4.1, SC.3.N.1.6, SC.3.N.3.2, SC.3.N.3.3

Grade 4: ELA.4.C.1.3, ELA.4.C.2.1, ELA.4.C.4.1, SC.4.L.16.2, SC.4.L.17.4, SC.4.N.3.1

Directions

Students should work in pairs.

1. Review the list of pollinators from "Pollination Game" Unit 3, Activity 1 or have students name some ***pollinators*** (e.g., bees, hummingbirds, moths, bats, butterflies, beetles, flies) and write them on the board.
2. Take a walk around your school grounds and note any pollinator gardens on the school property. Have students bring a clipboard, paper, and pen or pencil to list pollinators and wildflowers that they see present. Take photos if possible.
3. Once students have recorded their observations, have them create a rough sketch of your school's garden area / green space. You can also create your own sketch ahead of time for your class to use.
4. Once students have completed their observations and sketches, return to class and have students share out what they have learned. Students can show the photographs they've taken or find digital photographs of the pollinators that were observed.
5. After sharing out observations, have students research 5-10 wildflowers that grow well in your area and direct them to then identify and list pollinators that are attracted to those wildflowers.
6. Using the students' sketches or the pre-drawn sketch as a guide, have students come up with a plan to modify your school's existing garden area to encourage more pollinator activity. Students should keep the following elements in mind when researching and coming up with their plan:
    - What do the wildflowers need to thrive in terms of sunlight, water, etc.?
    - What resources are already existing and available vs. what will you need to outsource with donations and/or purchasing?

(*Continued on following page*)

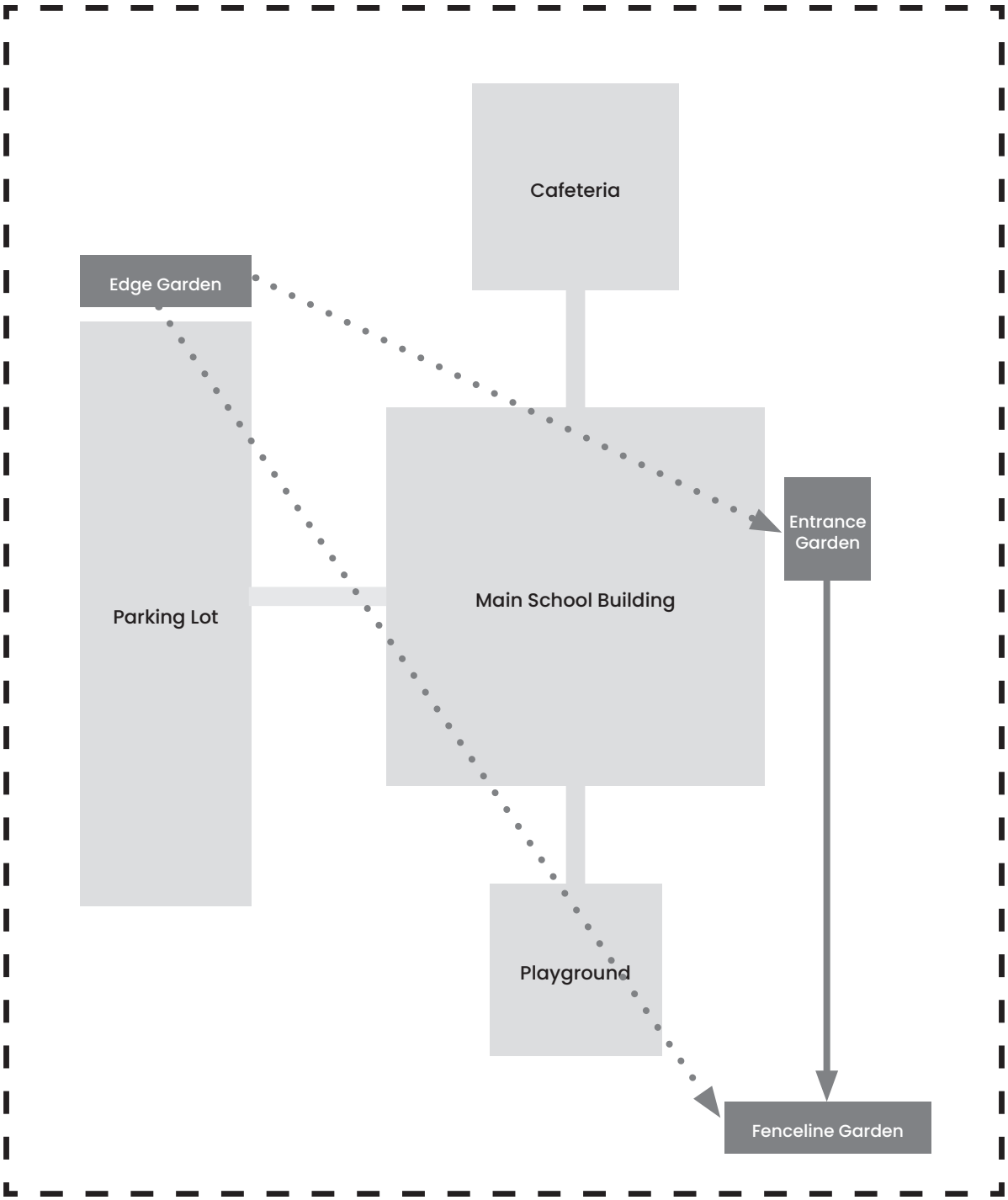
- How much time will the garden area need to be tended to?
- What type of care will the garden need throughout different seasons? Will the plants need to be cut back, covered, replanted, etc.
- **Optional Extension**: You can also give students a budget to work within for this activity.

7. Have students use their research, sketches, and observations to write a persuasive pitch for altering your garden's space. Have them include why encouraging more pollinators would be beneficial to the environment and school community. This pitch can be presented orally, with a visual presentation, or could even be written as a persuasive letter to your school's leadership team.
8. Use the questions below to lead a discussion with students about pollinators and "habitat highways."

Discussion

- How can models like your "habitat highway" sketch be used to create a plan of action?
- How could this model help pollinators?
- Do you think your school has enough habitats for pollinators to create a "habitat highway"?
- Where do you think more pollinator habitats are needed to create a better "habitat highway" for pollinators in your environment? Think both within your school community and within your local community as well!
- How can you help pollinators?

Sample School Campus

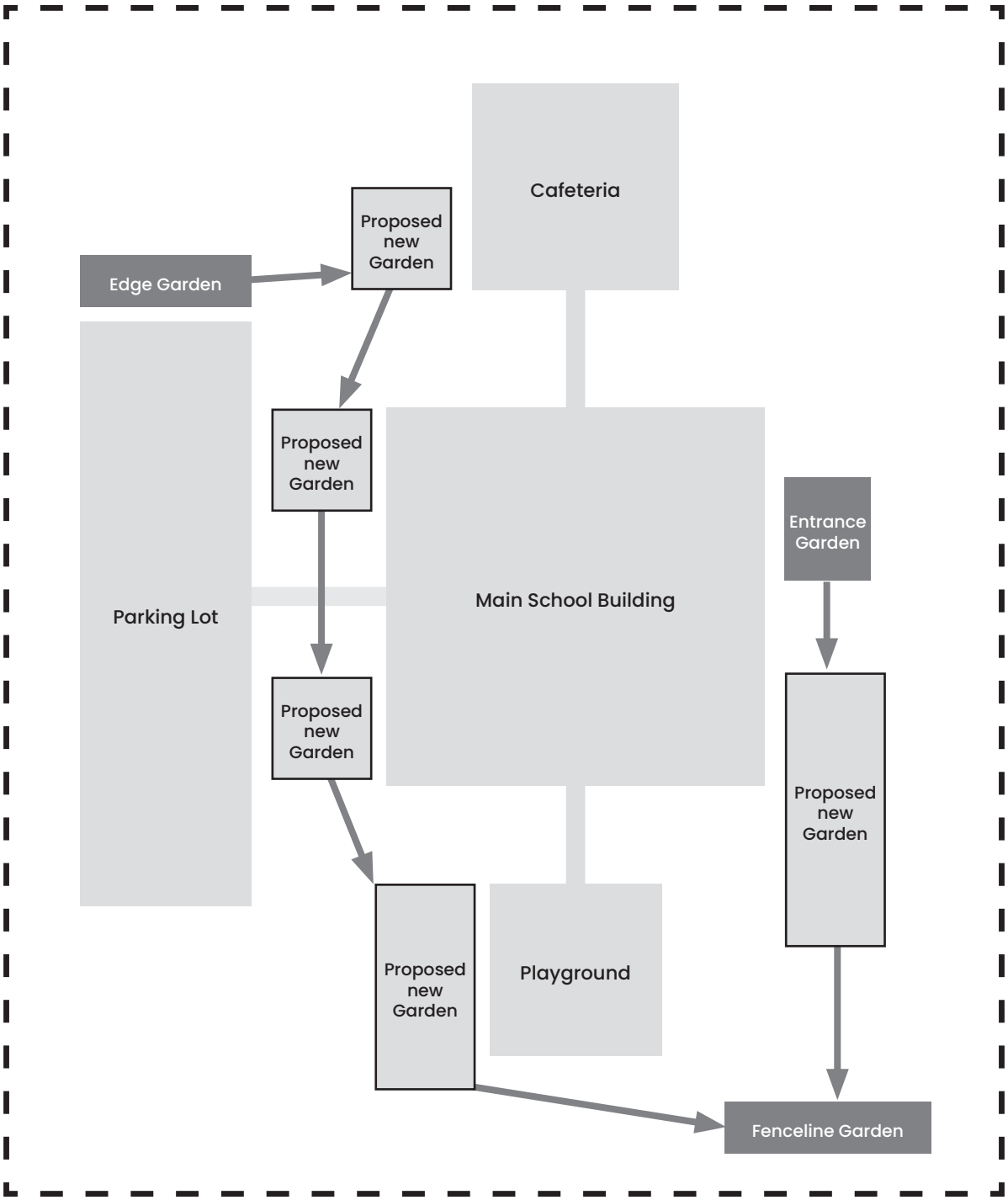


Legend:

- Existing pollinator habitat
- Mowed grass areas
- Buildings and paved areas
- Current habitat highway connection
- Potential connection

Note: This sketch shows limited pollinator habitats with large gaps between them. Pollinators must travel long distances across mowed grass and paved areas to reach food sources.

Sample School Campus Habitat Highway



Legend:

- Existing pollinator habitat
- Mowed grass areas
- Buildings and paved areas
- Proposed pollinator habitat
- Current habitat highway connection
- Potential connection

Note: This improved plan shows new pollinator garden options strategically placed to create continuous pathways. Now pollinators can easily travel across campus with regular "rest stops" for food and shelter.

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Glossary

benefit: a service provided; something that promotes or enhances well-being; an advantage

carnivore: an animal that eats only other animals

cohort: a group or pair that has something in common; plants, insects, and animals that have symbiotic relationships

commensalism: a relationship between two organisms (plants and/or animals) in which one benefits, while the other obtains neither benefit nor harm

community: all the different plants, animals and other organisms living together in the same area

food chain: a simple diagram showing who eats whom in an ecosystem; for example: wildflower >> caterpillar >> bird

food web: a diagram showing how many food chains connect and overlap in an ecosystem, and how most animals eat more than one thing

herbivore: an animal that eats only plants

host: in a symbiotic relationship, an organism that supplies nutrients, support or additional resources to another organism

hypothesis: something not proved but assumed to be true for purposes of argument or further study or investigation

interaction: a particular way in which organisms affect one another

mutualism: an association between two different organisms in which both organisms benefit

omnivore: an animal that eats both plants and animals

parasite: an organism that lives on or inside another (called the host) and obtains nutrients at the host's expense

parasitism: an association between two different organisms in which one benefits while the other is harmed

predator: an animal that hunts and eats other animals; an organism that naturally preys on other organisms

prey: an animal that is hunted and eaten by other animals

producer: an organism (usually a plant) that makes its own food using energy from the sun

relationship: the way in which two (or more) organisms are connected

symbiosis: two different organisms (plant and/or animal) living together in close association, typically benefitting both organisms

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Plant and Animal Interactions Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

benefit	commensalism	hypothesis	mutualism	relationship
cohor	host	interaction	parasitism	symbiosis

_____ A relationship between two organisms (plants and/or animals) in which one benefits, while the other obtains neither benefit nor harm.

_____ An association between two different organisms in which one benefits while the other is harmed.

_____ The way in which two (or more) organisms are connected.

_____ In a symbiotic relationship, an organism that supplies nutrients, support, or additional resources to another organism.

_____ A service provided or something that promotes or enhances well-being; an advantage.

_____ A particular way in which organisms affect one another.

_____ Two different organisms (plant and/or animal) living together in close association, typically benefitting both organisms.

_____ An association between two different organisms in which both organisms benefit.

_____ Something not proved but assumed to be true for purposes of argument or further study or investigation.

_____ A group or pair of plants, insects, or animals that have symbiotic relationships or something in common.

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relationship The way in which two (or more) organisms are connected.

host In a symbiotic relationship, an organism that supplies nutrients, support, or additional resources to another organism.

benefit A service provided or something that promotes or enhances well-being; an advantage.

interaction A particular way in which organisms affect one another.

symbiosis Two different organisms (plant and/or animal) living together in close association, typically benefitting both organisms.

mutualism An association between two different organisms in which both organisms benefit.

hypothesis Something not proved but assumed to be true for purposes of argument or further study or investigation.

cohort A group or pair of plants, insects, or animals that have symbiotic relationships or something in common.

Resources

Literary connections

Bugs in the Garden by Beatrice Alemagna

From Flower to Flower: Animals and Pollination by Patricia Lauber

The Garden Next Door by Collin Pine

Insects and Flowers by Oda Hidetomo

Max and the Milkweed by Auggie Grand

The Milkweed and Its World of Animals by Ada & Frank Graham

The Nature And Science Of Flowers (Exploring the Science of Nature) by Kim Taylor and Jane Burton

On One Flower: Butterflies, Ticks and a Few More by Anthony Fredericks

Poppy, Buttercup, Bluebell and Dandy by Fiona Woodock

Seeds, Bees, Butterflies, and More! Poems for Two Voices by Carole Gerber

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Surviving the Wilds of Florida by Reid Tillery

Websites and other web resources

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat)
www.Wildflower.org/plants-main

Plant defense against herbivory
en.wikipedia.org/wiki/Plant_defense_against_herbivory

FLORIDA Wildflower FOUNDATION

Unit 7

Wildflowers are Important

Overview

Wildflowers have played an important role in human life for thousands of years. Long before modern medicine, grocery stores, and manufactured materials, people relied on native plants for food, medicine, tools, dyes, and shelter. Even today, wildflowers continue to support human communities in ways that are not always obvious.

Beyond their beauty and cultural significance, wildflowers provide essential services to ecosystems and the people who depend on them. They support pollinators, prevent soil erosion, filter water, and help maintain balanced, resilient ecosystems. When wildflower habitat is lost, it affects entire communities of plants and animals—and ultimately impacts human well-being too.

In this unit, students explore how Florida's native wildflowers have been used by people past and present, including their ethnobotanical uses—how plants are used for practical, cultural, and medicinal purposes. Students will also learn how wildflowers contribute to human well-being by supporting pollinators, protecting soil and water, and helping maintain healthy ecosystems that people depend on.

This unit synthesizes concepts from earlier units—showing how flower parts, life cycles, pollination, and adaptations all contribute to wildflowers' essential roles in both natural ecosystems and human communities. Students will connect their scientific knowledge to real-world conservation and stewardship.

By understanding the many ways wildflowers support human life, students will see these plants not just as part of the landscape, but as essential partners in Florida's natural and cultural history.

Activities

1. Pass the Wildflowers, Please!
2. Dr. Wildflower's Remedies
3. Why Wildflowers are Important to Me
4. Get to Know a Wildflower
5. Wildflower Walkabout

Vocabulary

benefit
biodiversity
consume
ecosystem services
edible
environment
erosion
ethnobotany
forage
habitat
indigenous
medicinal plant
Muscogee (Creek)
native plant
pollutant
Seminole
textile
Timucua

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.1.4, ELA.3.C.2.1, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.C.5.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3

Grade 4: ELA.4.C.1.4, ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.E.6.3, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6

Note: This unit references edible native plants. **Students should be warned never to eat any wild plants without an expert's/adult's authorization,** as many edible plants closely resemble poisonous plants.

FLORIDA Wildflower FOUNDATION

Unit 7

Wildflowers are Important

Introduction

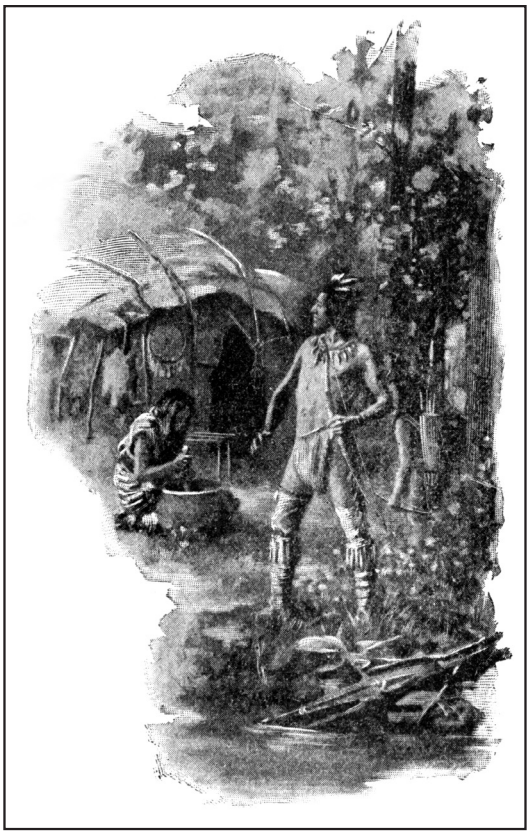
What would our world look like if there were no wildflowers? It is hard to imagine, isn't it? Everywhere we look, from the country roadsides to cracks in city sidewalks to pine forest meadows, Florida has an abundance of wildflowers. After all, it was named *La Florida*, which means "Land of Flowers," by Spanish explorer Ponce de Leon when he arrived in 1513.

It is awesome that there is such a variety of wildflowers that dazzle us with their beauty all across our state. But wildflowers aren't just for looking at. They do much more than look pretty! Besides providing beauty, they also sustain populations of wildlife and provide homes for critters you may not have thought about. Wildflowers prevent soil from washing away, filter pollution from water, and even give us ***medicines*** and foods. When wildflowers disappear, the animals that depend on them disappear too.

Humans also rely on wildflowers for many different purposes. Think about all the things you've learned about wildflowers so far — their parts, how they grow, how they're pollinated, and how they've adapted to survive. All of these amazing features work together to make wildflowers essential to healthy ecosystems and to us!

In this unit, we will be looking at some of the less obvious ***benefits*** of wildflowers, including their ***ethnobotanical*** uses and their roles in the ***environment***. You'll discover why wildflowers are so important to wildlife, to agriculture and to people!

The Importance of Wildflowers



Ethnobotany is the scientific study of the relationship between people and plants, specifically those used by primitive societies for food, medicine and products such as ***textiles***, tools and construction materials for shelter.

Edible* wildflowers**: For centuries, people have been eating native wildflowers and plants. Throughout history, many people have ***foraged for wildflowers, roots, berries, leaves and other plant parts for a large portion of their food. Many of the plants and wildflowers that Ponce de Leon encountered in 1513 provided an important source of food for the ***Indigenous*** people who lived here. Among the edibles were Cocoplum (*Chrysobalanus icaco*) fruit, Saw palmetto (*Serenoa repens*) berries, Cabbage palm (*Sabal palmetto*) hearts and Coontie (*Zamia integrifolia*) roots.

The ***Timucua*** *consumed* a wide variety of ***native plant*** foods. They collected fruits such as Persimmon (*Diospyros virginiana*), Blackberry (*Rubus* spp.), Blueberry (*Vaccinium* spp.) and Pricklypear cactus (*Opuntia* spp.); vegetables such as Wild onions (*Allium canadense*) and Cabbage palm hearts; acorns (*Quercus* spp.) and Hickory (*Carya* spp.) nuts; and grains, including Wild rice (*Zizania aquatica*) and Pigweed (*Amaranthus* spp.). They even made gum from the sap of the Sweetgum (*Liquidambar styraciflua*) tree.

Other Native Americans in Florida ***consumed*** native plants and wildflowers. The diet of the ***Muscogee (Creek)*** in North Florida included nuts from Hickory and Black walnuts (*Juglans nigra*), as well as Crabapples (*Malus angustifolia*) and Groundnuts (*Apios americana*). ***Seminoles*** ate Red mulberries (*Morus rubra*), wild plums (*Prunus* spp.) and grapes (*Vitis* spp.).

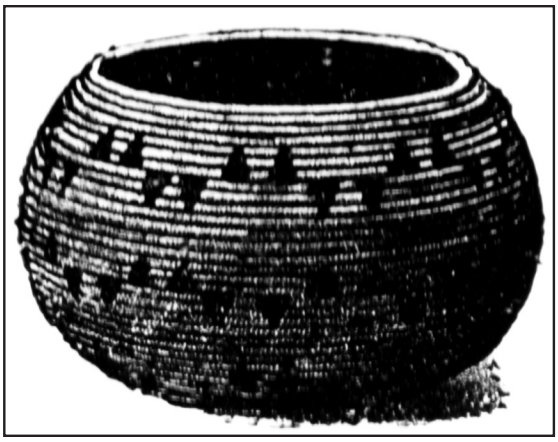
Today, although we in the United States buy most of our food from grocery stores and markets, some people still forage for food in the wild.

Wildflowers used as *medicine*: In the past, almost from the beginning of recorded history, certain plants have been used as medicine. Before there were doctors and pharmacies, people knew the healing powers of wildflowers and other plants for many injuries and illnesses.

Members of the Muscogee tribe treated fever with Partridgeberry (*Mitchella repens*), tonsillitis with Grapevine (*Vitis* spp.), and tuberculosis with Mistletoe (*Phoradendron leucarpum*). The Timucua treated coughs with the inner bark of the Black cherry tree (*Prunus serotina*). They made teas out of Passionflower (*Passiflora* spp.) leaves for relaxation, and from Elderberries (*Sambucus nigra*) to treat what we now know as the common cold. Seminoles used Beautyberry (*Callicarpa americana*) to treat skin conditions, Buttonbush (*Cephalanthus occidentalis*) for stomach and digestive ailments, and Milkwort (*Senega* spp.) to help with breathing issues.

A brief scan of the Internet or a trip to a health food store will reveal many plant-based medicines still available today.

The Importance of Wildflowers



Other uses for wildflowers: Native Americans in Florida used the native vegetation for many everyday items, including construction materials, tools and ***textiles***. Many leaves, grasses, stems and vines were woven into a variety of products: palm fronds into thatching; grasses such as Wiregrass (*Aristida stricta*), Bluestem (*Andropogon* spp.) and Sugarcane (*Saccharum* spp.), and vines such as grape (*Vitis* spp.) into baskets; Cattail (*Typha* spp.) leaves into mats; and other fibrous plants such as Indianhemp into fabric.

Dyes made from plants such as Bloodroot (*Sanguinaria canadensis*), Pokeberry (*Phytolacca american*) and Sumac (*Rhus* spp.) provided color for textiles, crafts, pottery and even hair and skin. Different parts of plants were used to make dye: Beach sunflower (*Helianthus debilis*), Tickseed (*Coreopsis* spp.) and St. John's wort (*Hypericum* spp.) flowers; Elderberry (*Sambucus nigra*), Red mulberry (*Morus rubra*) and Rougeplant (*Rivina humilis*) berries; Red maple (*Acer rubrum*), oak (*Quercus* spp.) and Wax myrtle (*Morella cerifera*) leaves, just to name a few.

Did you know that native wildflowers and plants are still used in many commercial products today? From scented shampoos to fibers in clothing, plant materials are big components in everyday items. Look around your house at tags and labels, and see what types of materials you use that are made from wildflowers. You may be surprised! Next time you go grocery shopping, look for products that use natural components like flowers and plants. Or go "shopping" around your home and see what kind of products you already have that were made from wildflowers.

Other ways in which wildflowers are important: Wildflowers provide ***ecosystem services*** — benefits that nature gives to people and the environment — in many ways.

- **Air quality**: Wildflowers, like all plants, produce oxygen and absorb carbon dioxide.
- **Ecosystem stability**: Different kinds of plants and animals are important to the health of an ecosystem. Wildflowers play an important role in maintaining ***biodiversity***.
- ***Erosion* control**: Soils are held in place by the root systems of wildflowers and other plants. Without them, wind and water would carry the soil away.
- **Water quality**: Wildflowers in wetlands help filter ***pollutants*** from water and hold soil in place, which helps regulate water flow.
- **Wildlife *habitat***: Plants, including wildflowers, provide food and shelter for wildlife.
- **Pollinator support**: Pollinators that play a critical role in plant reproduction rely on wildflowers for nectar and pollen. Wildflowers also serve as "host plants" for butterflies and moths to complete their life cycles.

- **Agriculture**: Wildflowers are key in attracting pollinators and other insects to commercial food crops. This increases the amount of crops successfully yielded in commercial farming, while also attracting insects that aid in pest control. Using native wildflowers can also help improve the quality of the soil and environment where commercial crops are grown.
- **Connectivity of wildlife habitat:** Naturally occurring or planted wildflowers help build pathways for Florida insects and animals. Plants, including wildflowers, provides food and shelter for wildlife.
- **Food webs**: An abundance of wildflowers in an area contributes to the food web and directly influences the lifecycles and migrations of insects, birds, small animals and reptiles.
- **Sense of place**: Wildflowers are the ground floor of the unique ecosystems of Florida that makes our state like no other!

FLORIDA Wildflower FOUNDATION

Pass the Wildflowers, Please!

Objective

Students will be able to demonstrate an understanding of ***edible*** parts and uses of wildflowers using creative writing skills to create a restaurant "menu."

Directions

Students should work in pairs.

1. Tell students they will be designing a meal featuring wildflowers.
2. Give each pair a "Pass the Wildflowers, Please!" worksheet set.
3. Review the informational list that identifies the edible parts of a wildflower (leaves and stems, roots and tubers, fruit and nuts, and flowers).
4. Have student pairs create a menu using items from the list. Instruct them to include a minimum of one item from each "part" of a wildflower.
5. Once they've selected their menu items, have students be creative and add descriptive words to make each menu item sound very appealing. Encourage them to approach it as if they manage a very exclusive restaurant that serves meals featuring wildflowers.
6. Have them write out their menu and descriptions on the worksheet.
7. If time permits, allow students to decorate their menus with illustrations of the flowers used in their creations.
8. Have students present their menus to the class. Students should explain what they have selected and why.

Extension

1. Direct student pairs to use the Internet or the libary to research other edible Florida native wildflowers to add to their menus.
2. Have them present information on the additional species to the class, including what parts are edible.

Materials

- "Pass the Wildflowers, Please!" worksheets (one set per pair)

Standards

Grade 3: ELA.3.C.4.1, ELA.3.C.5.2, SC.3.N.1.1

Grade 4: ELA.4.C.4.1, ELA.4.C.5.2, SC.4.N.1.1

Note: The wildflowers included in this activity are only a few of the Florida wildflowers that are used for food now or have been used in the past.

If possible, you may wish to provide students with field guides or other books that explore Florida's edible wildflowers. Suggestions may be found in the Resource Guide at the end of this section.

Pass the Wildflowers, Please!

Work with a partner to design a meal featuring wildflowers. Include at least one item from each "part" of a wildflower. Choose from the list below or find others from books or the Internet.

Leaves and Stems

- Wild onion (seasoning in cooked vegetables or salads)
- Smilax (cooked greens)
- Pine needles (tea)
- Fern fiddleheads (sautéed)
- Cattails (young shoots eaten raw or in salads)
- Creeping water mint (tea, raw in salads or as garnish)

NEVER eat *any* wild plants without an adult's permission.

Many edible plants closely resemble poisonous plants.

Roots, Bulbs and Tubers

- Cattails (boiled as a vegetable)
- Jack-in-the-pulpit (ground into flour)
- Arrowhead (boiled as a starch or vegetable)
- Sassafras (tea, candy flavoring)
- Wild onion (seasoning in cooked vegetables)

Fruit and Nuts

- Red mulberry (eaten fresh, made into jelly, pie, or sauce)
- Blackberry (eaten fresh, made into jelly or pie)
- Pawpaws (eaten fresh, made into jelly or pie)
- Blueberry (eaten fresh, made into jelly or pie)
- Muscadine or Scuppernong grapes (eaten fresh or made into jelly)
- Elderberry (eaten fresh, made into jelly or syrup)

Flowers

- Yucca (boiled, battered and fried)
- Elderberry (battered and fried, cooked into pancake or biscuit batter)
- Spanish needle (salads, as a garnish)
- Violets (tea, salad)
- Spiderwort (candied, as a garnish)
- Cattails (pollen used as flour for bread, cakes or pancakes; flower stalks boiled and eaten like corn-on-the-cob)

The entries above are only a few of the Florida wildflowers that can be gathered and used for food. You are encouraged to find others to add to your menu. You might do an Internet or library search for Florida edible plants, edible wildflowers of Florida, Florida edible wildflowers, and similar topics. If you do not add "Florida" to your search, you may find plants that do not live in Florida!

Now that you have selected your menu items, it is time to be creative! Pretend that you manage a very exclusive restaurant that serves meals featuring wildflowers. Add descriptive words to make each menu item sound very appealing, such as, "freshly picked," "crisp and juicy," or "dew-misted petals." Each team will add a unique page to the menu. Use the template on the following page as your sample menu page.

Wildflower Menu Selection

by

_____

(Team member names)

Appetizer

Entreé

Sides

Dessert

Beverage

FLORIDA Wildflower FOUNDATION

Unit 7 Activity 2

Dr. Wildflower's Natural Remedies

Objective

Students will be able to identify traditional ***medicinal*** uses of wildflowers using historical context and clues within the worksheet.

Discussion

- Explain to students that, had they lived in the United States in the 1600s, 1700s, or 1800s, they would probably be very familiar with many wildflowers that were used to treat injuries and illnesses.
- For this activity, students will imagine that they are an early settler in the New World. There is no doctor, pharmacy or hospital available for their settlement. Tell them that, upon arriving in the New World, they learned from a Timucuan medicine man that many of the native plants have healing properties that can help sick or injured people.

Directions

1. Provide each student with a set of "Dr. Wildflower's Natural Remedies" worksheets.
2. Discuss the information on page 1 of the worksheet that they will be using for the activity and answer any questions they might have about the plants or illnesses.
3. Have them read the scenarios on page 2 of the worksheet, and instruct them to use the table on page 1 to help them find "cures" for the scenarios.
4. After the worksheets have been completed (and scored, if desired), discuss the answers and then let students create new injuries or illnesses to treat. This could be presented as a group activity in which one student creates a scenario and the rest of the students race to look for a cure.

Materials

- "Dr. Wildflower's Natural Remedies" worksheets (one set per student)

Standards

Grade 4: SC.4.E.6.3, SC.4.N.1.4

Dr. Wildflower's Natural Remedies

If you had lived in the United States in the 1600s, 1700s or 1800s, you would probably be very familiar with many wildflowers that were used to treat injuries and illnesses. For this activity, you will imagine that you are an early settler in the New World. There is no doctor, pharmacy, or hospital available for your settlement.

Upon arriving in the New World, you learn from a Timucuan medicine man that many of the native plants have healing properties that can help sick or injured people.

Here is a list of native wildflowers. (Remember that vines, small bushes, and other plants that have flowers can all be considered wildflowers).

Wildflower	**Disease, illness or injury**
Pink sundew (*Drosera capillaris*)	Skin disorders, warts
Black-eyed Susan (*Rudbeckia hirta*)	Colds, worms, snakebite, swelling, earache
Colicroot (*Aletris* spp.)	Stomach ache, colic, dysentery
Butterflyweed (*Asclepias tuberosa*)	Pleurisy (lung condition), bruises, sore muscles
Witchhazel (*Hamamelis virginiana*)	Bruises sprains, coughs, asthma, insect bites, teething infants, backaches
Wax myrtle (*Morella cerifera*)	Fever, stomach pain, intestinal worms, inflamed tonsils, sore gums
Partridgepea (*Chamaecrista fasciculata*)	Fainting, fatigue, nausea
Skullcap (*Scutellaria* spp.)	Headache
Boneset (*Eupatorium* spp.)	Flu, fever, malaria
Maypop (Passionflower) (*Passiflora* spp.)	Bruises and sores, insomnia, muscle spasm, anti-anxiety
Wild persimmon (*Diospyros virginiana*)	Sore throat, mouth or lip sores, heartburn, toothache
Button snakeroot (*Eryngium yuccifolium*)	Blood disorders, fever, snakebite
Pricklypear cactus (*Opuntia* spp.)	Headache, eye trouble, insomnia
Greenbrier (Smilax vine) (*Smilax* spp.)	Health tonic, poultice for sore legs, skin ulcers
Beautyberry (*Callicarpa americana*)	Colic, dizziness
Devil's walkingstick (*Aralia spinosa*)	Rattlesnake bite

Dr. Wildflower's Natural Remedies

After you read through some of the many uses for Florida wildflowers as medicine to treat illnesses, continue on to the text below to "treat" patients that have come to you for help!

Read each scenario below and "prescribe" medicine made from wildflowers that you think will help.

1. A young mother brings her baby to you; the baby has been crying for hours. You diagnose the baby with colic (stomach pains). What two wildflowers could you prescribe for the mother to give to her baby?

   _____ and _____

2. A young boy comes to you to ask you to get rid of a large wart growing on his finger. You decide to apply a remedy used by Native Americans, a wildflower named.

   _____

3. Flu and high fevers seem to be spreading throughout your settlement. You need to stock up on medicinal plants to help treat your patients. The two wildflowers you need to gather are

   _____ and _____

4. You have just prescribed a poultice (dressing) of Devil's walkingstick for a man that was brought to you. What was most likely wrong with him?

   _____

5. Many people come in complaining of headaches. You keep a good supply of

   _____ and _____

6. Describe below an illness or injury that you could treat, and list the Florida wildflower that you would use to treat it.

   _____

   _____

   _____

   _____

Dr. Wildflower's Natural Remedies

After you read through some of the many uses for Florida wildflowers as medicine to treat illnesses, continue on to the text below to "treat" patients that have come to you for help!

Read each scenario below and "prescribe" medicine made from wildflowers that you think will help.

1. A young mother brings her baby to you; the baby has been crying for hours. You diagnose the baby with colic (stomach pains). What two wildflowers could you prescribe for the mother to give to her baby?

   colicroot and American beautyberry

2. A young boy comes to you to ask you to get rid of a large wart growing on his finger. You decide to apply a remedy used by Native Americans, a wildflower named.

   pink sundew

3. Flu and high fevers seem to be spreading throughout your settlement. You need to stock up on medicinal plants to help treat your patients. The two wildflowers you need to gather are

   wax myrtle and boneset

4. You have just prescribed a poultice (dressing) of devil's walkingstick for a man that was brought to you. What was most likely wrong with him?

   He was bitten by a snake.

5. Many people come in complaining of headaches. You keep a good supply of

   skullcap and pricklypear cactus

6. Describe below an illness or injury that you could treat, and list the Florida wildflower that you would use to treat it.

   Answers will vary.

Wildflowers are Important to Me

Objective

Through group and class discussions, students will be able to demonstrate an understanding of the general benefits of wildflowers. Students will then use exploratory creative writing to reflect personal opinions on the importance of wildflowers.

Materials

- "Why Wildflowers are Important to Me" worksheet (one per student)

Standards

Grade 3: ELA.3.C.3.1

Grade 4: ELA.4.C.3.1, SC.4.L.17.4

Directions

Students should work in groups.

1. Ask students to list all of the benefits of wildflowers. (Define "benefit" if necessary.) Since the class has just studied wildflowers used as medicine and as food, these two will almost certainly be on the list. Encourage the students to dig deeper into their thoughts to find other good things about wildflowers. Use the discussion questions below to help.
2. Add the following to the class list if not suggested by students:
   - Wildflowers help reduce stress.
   - Wildflowers help clean the air.
   - Wildflowers help lower background noise.
   - Wildflowers help stabilize the ecosystem.
   - Wildflowers contribute to a healthy lifestyle.
   - Wildflowers inspire our creativity.
3. Provide each student with a "Why Wildflowers are Important to Me" worksheet set. Have them be creative and express how or why wildflowers are important to them. They may write a song, poem, narrative or other descriptive expression. Have them come up with a creative title for their paper. They may also draw a picture to illustrate their writing.
4. Leave the list and responses up to help students remember all of the benefits that we get from wildflowers.

Discussion

Discuss each of the benefits and chart student responses to the following questions:

- How do you think wildflowers can help reduce stress?

  Let the students add their ideas to the discussion. If necessary, lead their responses with suggestions such as:

  - Being close to nature makes people feel more relaxed and at ease.
  - Most people have an instinctive need to be in natural settings.
  - Fields or small patches of wildflowers make us happy because of their beauty."

  Add any other reasons that come from you or the students.

(*Continued on following page.*)

- How do wildflowers help clear the air?

  Solicit ideas from the students. Be sure to include:

  - Wildflowers absorb some toxins into their roots and convert them into food.
  - They remove carbon dioxide from the air and convert it into oxygen.
  - They increase humidity.
  - Wildflowers reduce airborne dust levels.
  - They keep air temperatures down.

- How do wildflowers help lower background noise?

  Begin a class discussion with students expressing their ideas. Your summary should include that leaves and flowers can absorb or reflect background noise so that nearby road or city noises are softened.

- How do wildflowers help stabilize the ecosystem?

  Again, lead a class discussion that allows students to express their ideas. Be sure that your conclusion includes that the wildflower community is an important part of the natural food web, and other plants and animals might perish without the wildflowers.

- How do wildflowers help contribute to a healthy lifestyle?

  Lead a discussion and try to encourage students to include walking to enjoy the beauty of wildflowers, or tending a wildflower garden, and refer back to some of the other things listed above like cleaner air, reduction of stress (and thereby fewer stress-related diseases), and food/medicinal uses.

- How do wildflowers inspire creativity?

  Allow students to express their ideas on what creativity is and how it might be influenced by wildflowers. Be sure that the following ideas come out:

  - Artists often choose to paint wildflowers.
  - Songwriters write about flowers.
  - Poets feature wildflowers in many lyrical or poetic descriptions.
  - Children often pick bouquets of wildflowers for their mothers.
  - Many people have picked wildflowers to bring into their house to beautify an area.

Why Wildflowers are Important to Me

Use your creativity to write a song, poem or description or draw a picture of how wildflowers are important to you. You can use our class discussion notes to help you remember all of the benefits we get from wildflowers. Include a title on your paper that is appropriate for your topic.

Title _____

FLORIDA Wildflower FOUNDATION

Unit 7 Activity 4 Web Quest

Get to Know a Wildflower

Objective

Students will be able to research a particular wildflower and its cultural uses using the Internet or library resources.

Discussion

Tell students they will be selecting a Florida native wildflower to research.

Directions

1. Direct students to use the Internet or other reference and resource materials to research a Florida native wildflower that has historic and cultural uses. Have them take notes on the plant's natural habitat and features. Tell them to also look for information on how the wildflower may be used today. Have them keep track of the sources they use.
2. Have students write a detailed and organized report on the wildflower.
3. Have them design a presentation in which they introduce their wildflower to the class. Presentations can be done on the computer or as poster sessions.

Standards

Grade 3: ELA.3.C.1.4, ELA.3.C.2.1, ELA.3.C.3.1, ELA.3.C.4.1, ELA.3.C.5.2, SC.3.N.1.1

Grade 4: ELA.4.C.1.4, ELA.4.C.2.1, ELA.4.C.3.1, ELA.4.C.4.1, ELA.4.C.5.2, SC.4.N.1.1

FLORIDA Wildflower FOUNDATION

Unit 7 Activity 5

Wildflower Walkabout

Objective

Students will be able to locate, observe and identify wildflowers growing on campus using observation skills.

Discussion

- Tell students that they are going to do a Wildflower Walkabout to try to identify the wildflowers that are growing right here on the school grounds.
- Ask if anyone remembers seeing flowers growing anywhere? Invite them to discuss where they've seen wildflowers
- Tell them they will use their best scientific observation skills to find lots of wildflowers that they haven't seen before.

Directions

Students should work in pairs or teams.

1. Give each student a set of "Wildflower Walkabout" worksheets.
2. Lead the students to pre-selected areas on the campus. Let them spread out to search for wildflowers, but remind them that they must stay in your sight at all times.
3. Instruct them to try and find one that they've not seen before, and to record the information about that wildflower on their worksheet. This can include drawing or making notes about what they see. If students have and are permitted to use cameras, they may prefer to take photos of the wildflowers.
4. Remind them that some wildflowers are very tiny, so they will need to look carefully.
5. If feasible, rotate the groups around the area so they each have access to the different species that are present.
6. After the students have had sufficient time to explore the area, take them back to the classroom.

Materials

- "Wildflower Walkabout" worksheets (one per student)
- measuring tape (one per pair or team)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3

Grade 4: SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6

Note: You should walk the campus before the activity to find areas where you can locate wildflowers (fence line, near buildings, in a field or playground, near the parking lot, along ditches beside the school grounds, behind the cafeteria, etc.).

Areas on your school grounds that are not tended or landscaped would be the best places to take the students.

Some wildflowers are very tiny, so the students will have to look carefully.

Discussion

Lead a class discussion and chart the results for the students. You can ask such questions as:

- What colors were the wildflowers you found?
- What sizes were the wildflowers you found?
- In which microhabitats did you find the most wildflowers?
- What kinds of wildflowers were found most often?
- Remind students that wildflowers often go unnoticed because of their size and location and ask how that could be important for their survival.

Wildflower Walkabout

Your task today is to find as many kinds of wildflowers growing on our school grounds as possible. As you find a wildflower you haven't seen before, describe its color and shape, its location on campus, and the microhabitat in which it is growing.

Tips for observing wildflowers

Microhabitat Climate Descriptions

Sunny all day
Sunny part of the day
Shady all day
Sometimes underwater
Other:

Location

Near a fence
Near a building
On a field or playground
In a mowed, grassy area
In an unmowed area
Near a parking lot
Near or in a ditch
Other:

Size and Shape of the Wildflower/Plant

Small, close to ground
Small, spreading across the ground
Medium-sized, 4 to 12 inches tall
Large, over 12 inches tall
Other:

Wildflower Walkabout Observation Sheet

For each type of flower located, describe the flower's color, shape, location and microhabitat.

Flower #	Flower Description				
	Flower name (Take a guess)	**Color**	**Size/Shape**	**Location**	**Microhabitat**
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Glossary

benefit: a service provided; something that promotes or enhances well-being; an advantage

biodiversity: the variety of different plants, animals, and other living things in an area; greater biodiversity makes ecosystems healthier and more stable

consume: to eat, drink or ingest food or drink

ecosystem services: the many benefits that nature provides to people, such as clean air and water, pollination of crops, and prevention of soil erosion

edible: something that can be eaten, especially by humans

environment: the surroundings or conditions in which a person, animal, or plant lives; the natural world

erosion: the process of wearing away by wind, water, or other natural agent

ethnobotany: the scientific study of the relationship between people and plants

forage: to search for food

habitat: the natural home or environment in which an organism (plant or animal) lives

Indigenous: originating or occurring naturally in a particular place

medicinal plant: a plant that contains substances used to prevent or treat illness; many modern medicines originally came from plants

Muscogee (Creek): Native American people who lived in the Southeastern United States, including parts of North Florida. The name "Creek" was given to them by English settlers; the name they use for themselves is Muscogee.

Note: The Muscogee were a confederation of as many as 100 separate tribes.

native plant: any plant that is indigenous to an area

Note: In Florida, a native plant is any plant that naturally occurred there at the time of Columbus' arrival in the New World.

pollutant: something that contaminates, dirties or harms air, water or a natural environment

Seminole: Native American people (namely Muscogee and Miccosukee) who migrated into the Florida peninsula and established their own identity; many still live in Florida today

textile: a type of cloth or woven fabric

Timucua: Native American people who lived in Northeast and North Central Florida

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

The Importance of Wildflowers Crossword Puzzle

Use the clues and the Word Bank to fill in the puzzle on the next page.

Word Bank

benefit	environment	habitat	pollutant
biodiversity	erosion	indigenous	Seminole
consume	ethnobotany	Muscogee	textile
edible	forage	native plant	Timucua

Across

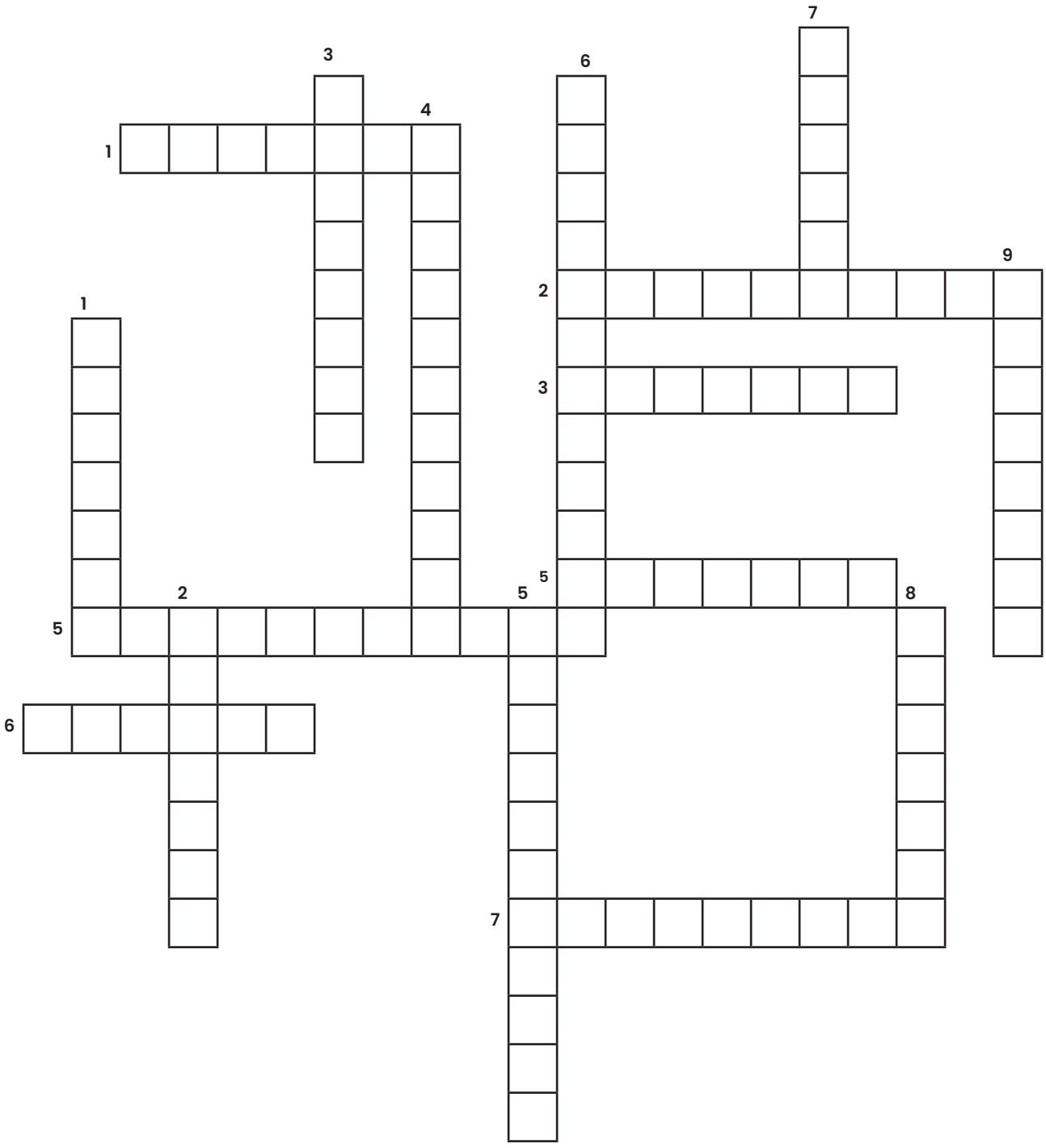
1. To eat, drink or ingest food or drink.
2. Originating or occurring naturally in a particular place.
3. The process of wearing away by wind, water, or other natural agent.
4. Native American people who lived in Northeast and North Central Florida. Their presence dates back to between 1100 and 1300 AD.
5. The scientific study of the relationship between people and plants.
6. Something that can be eaten, especially by humans.
7. Something that contaminates, dirties or harms air, water or a natural environment.

Down

1. A type of cloth or woven fabric.
2. The natural home or environment in which an organism (plant or animal) lives.
3. Native American people who lived in the Southeastern United States, including parts of North Florida.
4. The natural world, or the surroundings or conditions in which a person, animal, or plant lives.
5. Any plant that is indigenous to an area. In Florida, a native plant is any plant that naturally occurred there at the time of Columbus' arrival in the New World.
6. A range or variety of plant and animal species.
7. To search for food.
8. A service provided or something that promotes or enhances well-being; an advantage.
9. Native American people (namely Muscogee and Miccosukee) who migrated into the Florida peninsula and established their own identity. Many still live in Florida today.

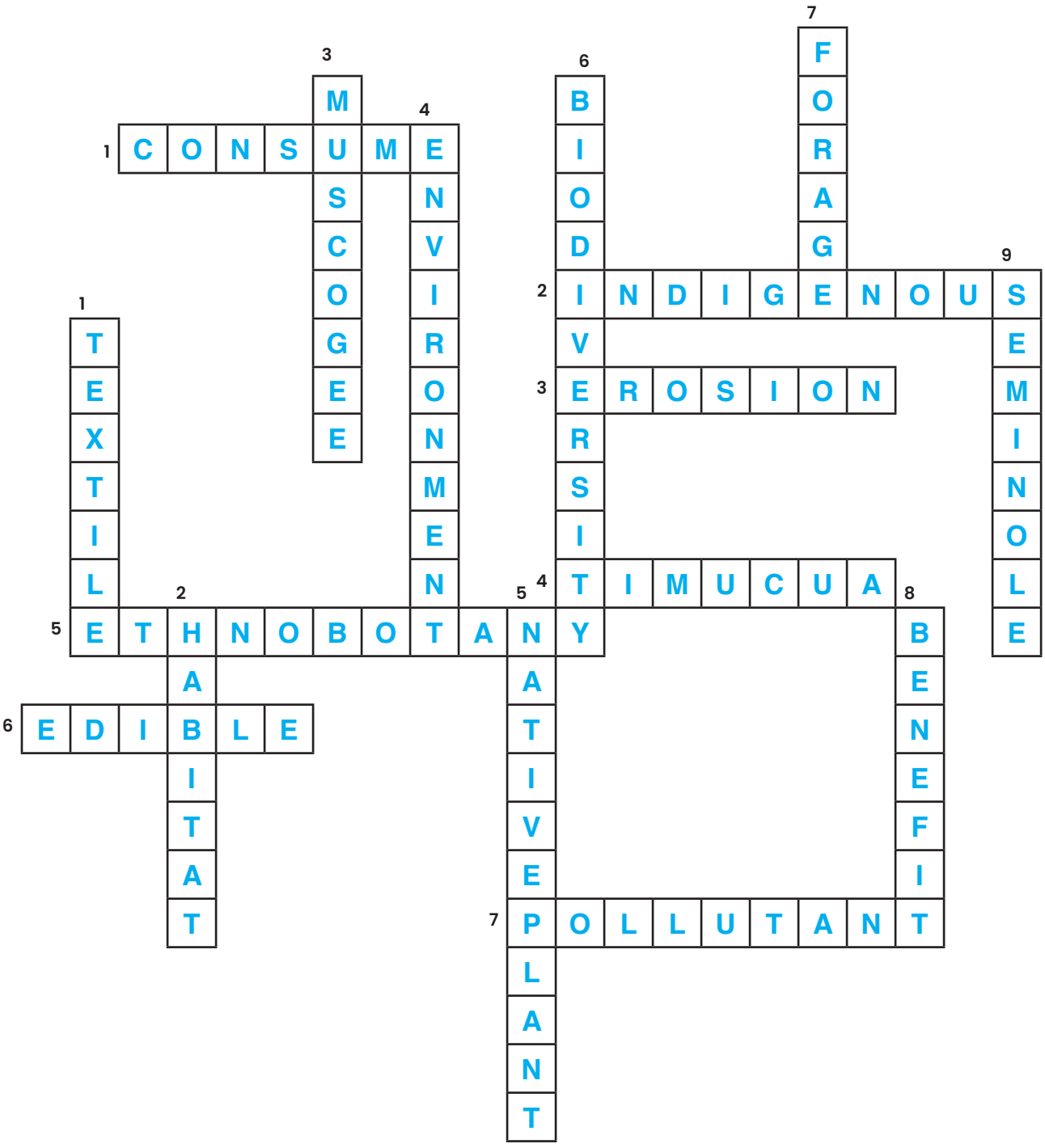
The Importance of Wildflowers Crossword Puzzle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



The Importance of Wildflowers Crossword Puzzle

Use the clues and the Word Bank to fill in the puzzle on the next page.



Resources

Literary connections

Acorn Pancakes, Dandelion Salad, and Other Wild Dishes by Jean Craighead George

Big Yellow Sunflower by Frances Barry

Citizen Scientists: Be a Part of a Scientific Discovery from Your Own Backyard by Loree Griffin Burns and Ellen Harasimowicz

Claire Goes Foraging by Margaret Aycock

The Curious Garden by Peter Brown

The Garden Next Door by Collin Pine

Hare and the Big Green Lawn by K.C. Robey and L MacDougall

Jack's Garden by Henry Cole

Lily's Pesky Plant by Kirsten Larsen

Miss Lady Bird's Wildflowers: How a First Lady Changed America by Kathi Appelt

Miss Rumphius by Barbara Cooney

Mother Earth and Her Children by Sybil Van Offers and S. Shoen-Smith

Mrs. Peanuckle's Flower Alphabet by Mrs. Peanuckle

My Wild Garden: An introduction to edible and non-edible wild plants by Ruth Johnson

Native American Gardening: Stories, Projects and Recipes for Families by Micahel J. Caduto

Nature's Pharmacy: Potent Medicines from Plants by Renee A. Kidd and J.S. Kidd

On Meadowview Street by Henry Cole

Pharmacy in the Forest: How Medicines Are Found in the Natural World by Fred Powledge

Restoring Wetlands (Let's Explore Science) by Jeanne Sturm

The Secret Garden of George Washington Carver by Gene Barretta

We are the Gardeners by Joanna Gaines

Wetlands by Lynn M. Stone

Wetlands by Peter Benoit

What Does the Bunny See? by Linda Sue Park

The Wild Flower Book for Young People by Alice Lounsberry

Reference books

The A to Z Book of Weeds and Other Useful Plants by Michael P. Earney

The Calusa and Their Legacy: South Florida People and Their Environments by Darcie A. Macmahon and William H. Marquardt

Complete Guide to Florida Wildflowers by Roger Hammer

(Continued on following page.)

The Crafts of Florida's First People by Robin C. Brown

The Creek (First Books — Indians of the Americas) by Shirlee Petkin Newman

Field Guide to Edible Wild Plants of Eastern and Central North America by Lee Allen Peterson

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

Florida's Edible Wild Plants: A Guide to Collecting and Cooking by Peggy Sias Lantz

Florida's Ethnobotany by Daniel F. Austin

The Flower Hunter: William Bartram, America's First Naturalist by Deborah Kogan Ray

Greening School Grounds — Creating Habitats for Learning by Tim Grant and Gail Littlejohn

Healing Plants: Medicine of the Florida Seminole Indians by Alice Micco Snow and Susan Enns Stans

Homes for Wildlife: A Planning Guide for Habitat Enhancement on School Grounds by Marilyn C. Wyzga

The Seminole by Liz Sonneborn

Southeast Foraging: 120 Wild and Flavorful Edibles from Angelica to Wild Plums by Chris Bennett

Surviving the Wilds of Florida by Reid Tillery

The Timucua by Emily J. Dolbear and Peter Benoit

Websites and other web resources

50 Common Native Plants Important In Florida's Ethnobotanical History by Ginger M. Allen, Michael D. Bond, and Martin B. Main
www.growables.org/informationVeg/documents/50NativePlamtsEthno.pdf

Eat the Weeds by Green Dean
www.eattheweeds.com

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat)
www.Wildflower.org/plants-main

Native American Ethnobotany
naeb.brit.org

Wildflowers — A Growing Part of Florida History
www.FlaWildflowers.org/wildflower-ethnobotany

FLORIDA Wildflower FOUNDATION

Unit 8

Wildflower Identification

Overview

Learning to identify wildflowers connects students directly to the natural world around them. By observing flower shapes, leaf patterns, and other distinctive features, students become plant detectives who can recognize and name the wildflowers in their communities. This unit provides hands-on practice with identification skills that students can use throughout their lives to explore and appreciate Florida's botanical diversity.

After learning about flower parts, life cycles, adaptations and ecological relationships in earlier units, students are now equipped with the vocabulary and observational skills needed for accurate plant identification. This unit transforms previous learning into practical field skills.

Activities

1. Identifying Flower Shapes
2. Identifying Leaf Shapes
3. Which Yellow Flower Are You?
4. Wildflower Hunt

Vocabulary

annual
compound leaf
field guide
flower arrangement
flower shape
growth habit
habitat
identification key
leaf arrangement
leaf margin
leaf shape
life cycle
perennial
petal
simple leaf

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6

Grade 4: SC.4.L.16.2, SC.4.L.16.4, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.3, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7

FLORIDA Wildflower FOUNDATION

Unit 8

Wildflower Identification

Introduction

Being able to identify plants and animals in natural areas or gardens is a rewarding hobby — and also an important scientific skill. Learning wildflower names and life cycles helps you understand how everything is connected in a living web of life. You can identify plants in the field or take photos to study later.

The flower of a wildflower can help you identify it:

- Flower color and ***petals*** – Note the flower color(s) and count its petals.
- ***Flower shape*** – Is it round and flat, cup- or funnel-shaped, tubular or ray-like?
- ***Flower arrangement*** – Is there one flower per stem, or are there clusters along a stem?

Leaves are also important for identification. Consider:

- ***Leaf shape*** – Linear, elliptic, oval, lance-shaped, heart-shaped, needle-like
- ***Leaf margins*** – Entire, toothed or lobed
- ***Leaf arrangement*** – Opposite, alternating or whorled. Leaves may also be basal (at the bottom of the stem), spaced along the stem, or clustered at the top.

Growth habit describes the plant's overall form: upright, branching, stemless, thorny, climbing, twining or aquatic.

Life cycles vary. ***Annual*** wildflowers live for one growing season. ***Perennials*** live for several years. Some may seem to disappear after flowering, but their roots survive underground and send up new growth in spring.

Habitat is where the plant naturally occurs, such as woodlands, flatwoods, prairies, marshes, swamps, scrub, coastal dunes or sandhills.

Wildflower Identification Resources

Florida wildflower ***identification keys***, or ***field guides***, can help you identify wildflowers by comparing a blooming plant with color photographs. Guides usually include a plant's Latin name and common name. They may also include its bloom season and where you are most likely to find it in nature.

Field guides may list other interesting facts, such as how the plant got its name or its place in Florida history.

Identification keys are used to identify plants by choosing between statements that describe plant parts, like flowers or leaves. Botanists use keys to accurately describe wildflowers and place them in scientific families by genus and species.

Some computer websites and apps are devoted to identifying Florida wildflowers or wildflower photography. They can be accessed at home or while you travel. Submit a photo on your computer or phone of a plant you find and search for its name. Try the iNaturalist or SEEK apps – they can also help you identify insects, reptiles and birds!

The Florida Wildflower Foundation also has a gallery of information on wildflowers at Flawildflowers.org/plant-profiles.

One of the best ways to learn about wildflowers is to go on a nature hike at a Florida park with a ranger or naturalist who can point out plants and tell you about them.

FLORIDA Wildflower FOUNDATION

Unit 8 Activity 1

Identifying Flower Shapes

Objective

Students will be able to identify common ***flower shapes*** and explain how these shapes may affect pollination, growth, and survival.

Materials

- "Identifying Flower Shapes" worksheets (one per student/pair)

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.6

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1

Directions

Students may work individually or in pairs.

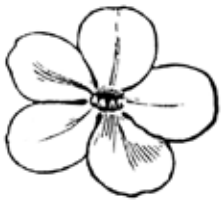
1. Review with students how to recognize different flower shapes (round, tubular, funnel-shaped, etc.).
2. Give each student an "Identifying Flower Shapes" worksheet and have students complete it.
3. Check student work, clarifying any misidentified shapes.
4. Lead a class discussion using the worksheet's inference question and the prompts below. Encourage students to connect flower shape to pollination and survival.

Discussion

- How might the flower shape influence which insects, birds or other wildlife visit the flower? Which shapes might be easiest for bees, butterflies, hummingbirds or beetles to use?
- How might environmental factors (such as wind, rainfall, sun exposure or available pollinators) influence flower shape over time?
- Why might having a variety of flower shapes in an ecosystem be beneficial?

Identifying Flower Shapes

Draw a line to connect each flower with its appropriate shape description.



BELL-SHAPED

TUBULAR

RAY-LIKE PETALS

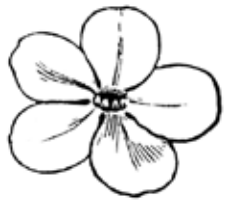
FUNNEL-SHAPED

ROUND and FLAT

Look at the shape of each flower. Why do you think flowers adapted to have these different shapes? How might this help the flowers with their survival?

Identifying Flower Shapes

Draw a line to connect each flower with its appropriate shape description.



BELL-SHAPED

TUBULAR

RAY-LIKE PETALS

FUNNEL-SHAPED

ROUND and FLAT

Look at the shape of each flower. Why do you think flowers adapted to have these different shapes? How might this help the flowers with their survival?

FLORIDA Wildflower FOUNDATION

Unit 8 Activity 2

Identifying Leaf Shapes

Objective

Students will be able to identify common leaf shapes and explain how these shapes may affect wildflower growth, photosynthesis and survival.

Materials

- "Identifying Leaf Shapes" worksheets (one per student/pair)

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.6

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1

Directions

Students may work individually or in pairs.

1. Review with students how to recognize different leaf shapes (linear, oval, lance-shaped, heart-shaped, etc.).
2. Distribute the "Identifying Leaf Shapes" worksheet and have students complete it individually or in pairs.
3. Check student work, clarifying any misidentified shapes.
4. Lead a class discussion using the worksheet's inference question and the prompts below. Encourage students to connect leaf shape to both plant survival and ecological interactions.

Discussion

- How might the shape of leaves affect the way insects or other animals use the plant (for food, shelter or camouflage)?
- How can the environment (such as sunlight, water, wind or soil conditions) influence the shape of leaves?
- How does leaf shape impact photosynthesis and a plant's ability to capture sunlight?
- Why might it be beneficial for different wildflowers to have different leaf shapes in the same habitat?

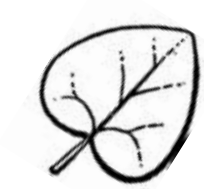
Identifying Leaf Shapes

Draw a line to connect each leaf with its appropriate shape description.

ELLIPTIC

LANCE-SHAPED

OVAL



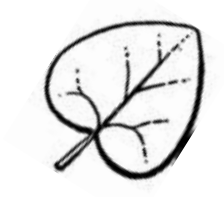
LINEAR

HEART-SHAPED

Make an inference: How might different leaf shapes help plants survive and grow?

Identifying Leaf Shapes

Draw a line to connect each leaf with its appropriate shape description.



ELLIPTIC

LANCE-SHAPED

OVAL

LINEAR

HEART-SHAPED

Make an inference: How might different leaf shapes help plants survive and grow?

FLORIDA Wildflower FOUNDATION

Unit 8 Activity 3

Which Yellow Flower Are You?

Objective

Students will be able to work collaboratively to observe, describe and record characteristics of wildflowers, then use those observations to identify wildflowers accurately.

Materials

- "Which Yellow Flower Are You?" worksheets (one per pair)
- "Which Yellow Flower Are You?" visual presentation (click to download)

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6

Grade 4: SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6

Directions

Students should work in pairs.

1. Review wildflower identifiers students have learned in this unit (flower shape, leaf shape, leaf margin, growth habit, etc.).
2. Divide students into pairs. Assign one student as the Observer and the other as the Identifier.
3. Explain the roles:
   - Observers will look at flower pictures shown by the teacher and record detailed descriptions.
   - Identifiers will face away while pictures are shown and later use their partner's observations to match descriptions to the correct flower.
4. Give each Observer a "Which Yellow Flower Are You?" worksheet.
5. Open the "Which Yellow Flower Are You" visual presentation. Show slides 2–5 one at a time, displaying each for about 2 minutes. Observers write down as many details as they can (petal number, shape, color patterns, leaf type, etc.).
6. After all flowers have been shown, display slides 1–4 together (or cycle through them) so Identifiers can now see all the numbered flowers at once.
7. Observers share their notes one description at a time. Identifiers use these clues to match each description with the correct picture. Observers record their partner's guesses on the worksheet.
8. Once all guesses are recorded, advance to slides 6-9 to reveal the plant names so pairs can check their answers.

Discussion

- Identifiers: Which types of descriptions were most useful in helping you identify the flowers? Which were more difficult to use?
- Observers: What strategies helped you record good observations? Did your approach change as you saw more flowers?
- How were different pairs' observations alike or different? What does that tell you about how people observe?
- What wildflower features might you focus on more closely next time?

Note: Student recordings can highlight which plant features may need further review before moving on.

Which Yellow Flower Are You?

#1 Observer Notes **Identifier guess:**	**#2 Observer Notes** **Identifier guess:**
#3 Observer Notes **Identifier guess:**	**#4 Observer Notes** **Identifier guess:**

FLORIDA Wildflower FOUNDATION

Unit 8 Activity 4

Wildflower Hunt

Objective

Students will be able to use observation and reference materials to identify and classify wildflower species.

Directions

1. Give each student a "Wildflower Hunt" worksheet and a "Wildflower and Leaf Forms" handout.
2. Discuss new vocabulary words and have students share ways to determine the meaning of challenging words. Use word parts and motions to help remember the word meanings before beginning the activity. For example, spin hands around to illustrate *whorled*, tap the ground to illustrate *basal*.
3. Take students outside to an area where wildflowers are growing. (Survey the campus to find a suitable area prior to taking students outside.)
4. Have students locate individual wildflowers and use the worksheet to record their observations. Students should use their knowledge of wildflower parts to help them document what they see.
5. Return to the classroom and have students use online resources and ***field guides*** to identify the wildflowers they observed.

Materials

- "Wildflower Hunt" worksheets (one per student)
- "Wildflower and Leaf Forms" handout (one per student)
- clipboards
- online resources or field guides

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.1, SC.3.N.1.3, SC.3.N.1.6

Grade 4: SC.4.L.16.4, SC.4.N.1.1, SC.4.N.1.3, SC.4.N.1.4, SC.4.N.1.6, SC.4.N.1.7

Wildflower Hunt

Visit an area on campus where wildflowers are in bloom. Use the Wildflower Identification chart on the next page to describe the wildflowers you see**.**

Flower color: _____

Number of petals: _____

Flower shape: _____

Flower arrangement: _____

Leaf shape: _____

Leaf margin: _____

Leaf arrangement: _____

Draw your wildflower below.

Use your observations and resources to find the name of your wildflower.

_____

Flower color: _____

Number of petals: _____

Flower shape: _____

Flower arrangement: _____

Leaf shape: _____

Leaf margin: _____

Leaf arrangement: _____

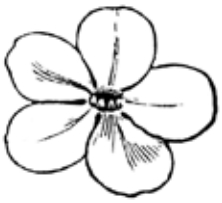
Draw your wildflower below.

Use your observations and resources to find the name of your wildflower.

_____

Wildflower and Leaf Forms

FLOWER SHAPE



simple

composite

funnel-shaped

tubular

bell-shaped

FLOWER ARRANGEMENT

1 per stem (solitary)

many per stem

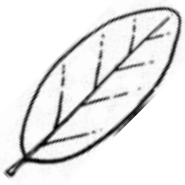
LEAF TYPE

simple

compound

LEAF SHAPE

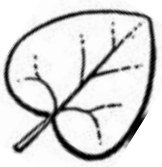
linear



elliptic

oval

lance-shaped



heart-shaped

needle-like

LEAF MARGIN

entire (smooth)

toothed

lobed

LEAF ARRANGEMENT

opposite

alternate

whorled

FLORIDA Wildflower FOUNDATION

Unit 8

Glossary

annual: a plant that lives for one growing season

compound leaf: a leaf made up of two or more smaller leaflets attached to a single leaf stem; looks like several leaves but is actually one leaf

field guide: a book or resource with pictures and descriptions that helps people identify plants, animals or other things found in nature

flower arrangement: the pattern of how flowers are attached to a stem; flowers can be single (one flower per stem), clustered (many flowers grouped together), or arranged in other patterns like spikes or umbels

flower shape: the form of a flower (for example, round, tubular or funnel-shaped)

growth habit: the way a plant grows, such as upright, climbing or branching

habitat: the natural home or environment in which an organism (plant or animal) lives

identification key: a tool that helps identify plants by asking a series of yes/no questions about observable features like leaf shape, flower color or stem type

leaf arrangement: the pattern of how leaves grow on a stem; can be opposite (paired), alternate (staggered), whorled (in a circle around the stem) or basal in a ring at the base of the stem)

leaf margin: the edge of a leaf; can be smooth, toothed (like a saw), lobed or wavy

leaf shape: the outline or form of a leaf blade; common shapes include oval, heart-shaped, lance-shaped (long and narrow), round, triangular or lobed (with rounded sections)

life cycle: the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds

perennial: a plant that lives for many years

petal: the colorful parts of the flower that often attract pollinators

simple leaf: a leaf with one blade attached to the stem; the blade might be lobed or divided, but it's still one piece

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Wildflower Identification Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

annual	growth habit	leaf shape
compound leaf	habitat	life cycle
field guide	identification key	perennial
flower arrangement	leaf arrangement	petal
flower shape	leaf margin	simple leaf

_____ the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds

_____ the way a plant grows, such as upright, climbing or branching

_____ the form of a flower; (for example, round, tubular or funnel-shaped)

_____ the pattern of how leaves grow on a stem; can be oopposite (paired), alternate (staggered), whorled (in a circle around the stem) or basal in a ring at the base of the stem)

_____ a plant that lives for one growing season

_____ the outline or form of a leaf blade; common shapes include oval, heart-shaped, lance-shaped (long and narrow), round, triangular or lobed (with rounded sections)

_____ the natural home or environment in which an organism (plant or animal) lives

_____ the colorful parts of the flower that often attract pollinators

_____ the edge of a leaf; can be smooth, toothed (like a saw), lobed or wavy

_____ a leaf made up of two or more smaller leaflets attached to a single leaf stem; looks like several leaves but is actually one leaf

_____ a tool that helps identify plants by asking a series of yes/no questions about observable features like leaf shape, flower color or stem type

_____ a plant that lives for many years

_____ a book or resource with pictures and descriptions that helps people identify plants, animals or other things found in nature

_____ a leaf with one blade attached to the stem; the blade might be lobed or divided, but it's still one piece

_____ the pattern of how flowers are attached to a stem

Wildflower Identification Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

annual	growth habit	leaf shape
compound leaf	habitat	life cycle
field guide	identification key	perennial
flower arrangement	leaf arrangement	petal
flower shape	leaf margin	simple leaf

life cycle	the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds
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flower shape	the form of a flower; (for example, round, tubular or funnel-shaped)
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habitat	the natural home or environment in which an organism (plant or animal) lives
petal	the colorful parts of the flower that often attract pollinators
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simple leaf	a leaf with one blade attached to the stem; the blade might be lobed or divided, but it's still one piece
flower arrangement	the pattern of how flowers are attached to a stem

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Unit 8

Resources

Literary connections

A Little Guide to Wildflowers by Charlotte Voake

Mrs. Peanuckle's Flower Alphabet by Mrs. Peanuckle

Poppy, Buttercup, Bluebell and Dandy by Fiona Woodock

The Wild Flower Book for Young People by Alice Lounsberry

Reference books

Complete Guide to Florida Wildflowers by Roger Hammer

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

National Audubon Society First Field Guide Series, Scholastic

Surviving the Wilds of Florida by Reid Tillery

Websites and other web resources

Florida Wildflower Foundation (plant profiles, photos and other resources on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database; search by state, family or habitat)
www.Wildflower.org/plants-main

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Unit 9

Learning Wildflower Names

Overview

Every wildflower has a story behind its name. Common names often describe how a plant looks, where it grows, or how people have used it, while scientific names reveal evolutionary relationships and help scientists worldwide communicate precisely. In this unit, students will explore the fascinating origins of wildflower names, discover how the same plant can have different common names in different places, and learn why scientific naming matters.

This unit celebrates the diversity of wildflowers students have studied throughout the guide. By learning about naming conventions and etymology, students gain a deeper appreciation for how humans have observed, valued, and organized knowledge about the plant world.

Activities

1. What's In a Name?
2. Common Names Around the World
3. Wildflowers Named After People
4. Name Your Own Wildflower

Vocabulary

binomial nomenclature
botanist
Carl Linnaeus
common name
family
genus
scientific name
species
taxonomist

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.3.2, SC.3.L.14.1, ELA.3.C.4.1, ELA.3.C.3.1, ELA.3.C.1.4

Grade 4: SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.3.1, SC.4.L.16.2, ELA.4.C.4.1, ELA.4.C.3.1

FLORIDA Wildflower FOUNDATION

Unit 9

Learning Wildflower Names

Introduction

Every wildflower has a ***common name*** (like "tickseed") and a ***scientific name*** in Latin (like *Coreopsis leavenworthii*). Scientists who name and organize plants are called ***botanists*** or ***taxonomists***. They place plants into groups, or families, based on shared features such as flowers, fruits or seeds. A ***family*** is a broad group of related plants that share general characteristics. For example, the Aster family includes plants with similar flower structures, like *Coreopsis*, sunflowers (*Helianthus*), and thistles (*Cirsium*).

Latin Wildflower Names

Each plant has its own ***scientific name*** in Latin, which is the same all over the world, no matter what language people speak. This two-part naming system is called ***binomial nomenclature***, and it was created by a Swedish scientist named ***Carl Linnaeus*** in the 1700s. Latin names often describe a plant's appearance, origin or honor the person who discovered it.

Scientific names have two parts: ***genus*** (like a plant's "first name") and ***species*** (its "last name"). Plants in the same genus share certain traits, but each species has its own unique details. For example, wildflowers in the *Coreopsis* genus all have bright, daisy-like flowers, but their leaf shapes or flower forms may differ.

Florida has 12 different native species of *Coreopsis*. They all share the genus name, but each has its own species name. One species, *Coreopsis leavenworthii*, is named after Dr. Melines Leavenworth, who lived in Florida in the 1800s.

Coreopsis belongs to the Aster family, which contains over 400 species in Florida alone. Here's how its scientific name breaks down:

- Family: Aster
- Genus: *Coreopsis*
- Species: *leavenworthii*

The genus name *Coreopsis* comes from the Greek word *koris* (meaning "bug") and *opsis* (meaning "appearance"), because the seeds look like tiny ticks or bugs.

Common Wildflower Names

In addition to scientific names, plants are also given ***common names***. These are the names people use every day, and they often describe the plant's look, where it grows, or how it has been used. For example:

- Swamp sunflower grows in wet habitats.
- Firebush is named for its bright reddish-orange flowers.
- Rattlesnakemaster got its name from its historical use as a medicine for snake bites.

Because common names vary, one plant may have several different common names depending on the region or tradition. That's why scientists rely on Latin names — they are always the same!

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Unit 9 Activity 1

What's In a Name?

Objective

Students will be able to make inferences about wildflower names based on their appearance, structure or other characteristics.

Materials

- "What's in a name" worksheet (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.3, SC.3.N.1.6

Grade 4: SC.4.N.1.1, SC.4.N.1.6, SC.4.N.1.7

Directions

1. Begin by reviewing what students have learned about ***common names*** of wildflowers. Discuss examples and ask: "Why do you think people gave these names to plants?"
2. Give each student a "What's In a Name" worksheet. Have them look at each wildflower picture and its common name, then fill out the chart, explaining why they think that common name was chosen.
3. Once students have inferred why each common name was chosen, ask them to create their own common name for the wildflower, using a different characteristic if possible. Have students share their common names aloud or in small groups.
4. After students finish, share the true explanations for each common name.s

Discussion

- How did your guesses compare to the real explanations? Were any surprising?
- What factors influenced the names (appearance, texture, habitat, historical use, etc.)?
- Can you think of a new common name that uses a different characteristic? (For example, if the original name was based on texture, try using color or habitat instead.)

What's In a Name?

How do "common names" describe wildflowers? Look at the wildflowers and their common names shown below. Why is each wildflower so named? Fill in the chart with what you think the common names might mean. Then fill in what you would name the wildflower.

Wildflower	Explanation	What I would name it
String lily		
Cardinalflower		
Milkweed		
Lizard's tail		
Cat's tongue		
Pitcherplant		
Greeneyes		
Coralbean		

FLORIDA Wildflower FOUNDATION

Unit 9 Activity 2

Common Names Around the World

Objective

Students will be able to compare ***common names*** for the same wildflower across different regions and explain reasons for the variations.

Materials

- paper

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6

Grade 4: SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.6, SC.4.N.1.7

Note: Internet access is needed for this activity. If Internet or computer access is limited, students may work together to research the questions in the library or using texts provided by the teacher.

Directions

1. Provide students with a short list of wildflowers that grow in Florida and elsewhere. Some examples include:
   - Black-eyed Susan (*Rudbeckia hirta*)
   - Spiderwort (*Tradescantia ohiensis*)
   - Swamp milkweed (*Asclepias incarnata*)
   - Purple coneflower (*Echinacea purpurea*)
   - Cardinalflower (*Lobelia cardinalis*)
   - Joe-Pye weed (*Eutrochium purpureum*)
   - Butterflyweed (*Asclepias tuberosa*)
2. Have students choose one wildflower to research. Students should record:
   - common name(s) in Florida
   - common name(s) in other states or countries
   - possible reasons for differences (appearance, habitat, cultural use, historical naming, etc.)
3. Ask students to share their findings with the class or in small groups.

Discussion

- How do the common names differ between Florida and other regions?
- Why do you think people in different places gave the same plant different names?
- What does this tell you about how humans relate to plants in their local environment?

Extension

Students can create a “global common name” chart, showing how one wildflower is called something different in different regions, highlighting patterns or surprises.

FLORIDA Wildflower FOUNDATION

Unit 9 Activity 3

Wildflowers Named After People

Objective

Students will be able to research people that wildflowers are named after and share about their contributions to the world.

Directions

1. Explain to students that some Florida wildflowers are named for people — scientists, ***botanists*** or historical figures — rather than for their appearance or the habitat in which they live.
2. Give each student a "Namesake Profile" worksheet.
3. Have them choose a wildflower from the provided list, research the person it is named after, and fill in the worksheet with their findings. Students should include:
   - who the person was
   - their contributions to science or Florida history
   - a drawing of the person and the wildflower (optional for artistic engagement)
4. Encourage students to make connections between the person's contributions and the plant itself, and to think about why these people were honored with a wildflower name.

Materials

- computer/tablet or field guide
- "Namesake Profile" worksheet (one per student)
- crayons, colored pencils or markers

Standards

Grade 3: ELA.3.C.1.4, ELA.3.C.3.1, ELA.3.C.4.1, SC.3.N.1.3

Grade 4: ELA.4.C.3.1, ELA.4.C.4.1, SC.4.N.1.6

Note: Internet access is needed for this activity. If Internet or computer access is limited, students may work together to research the questions in the library or using texts provided by the teacher.

Extension

1. After completing their worksheets, have students display their work and complete a "gallery walk" to view and discuss their peers' findings.
2. Have students reflect on their classmates' research by thinking about or writing responses to the following questions:
   - Which person's story surprised you? Why?
   - How did the person's work influence science or Florida history?
   - What patterns do you notice among the people honored?
   - Why might plants be named after people?
   - Can you connect the person's work to the wildflower's characteristics?

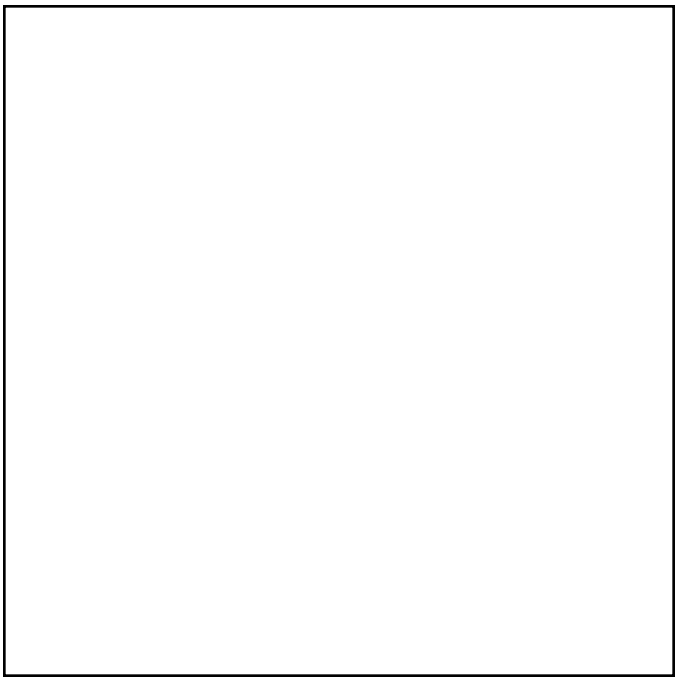
Namesake Profile

Name:

Where are they from?

When did they live?

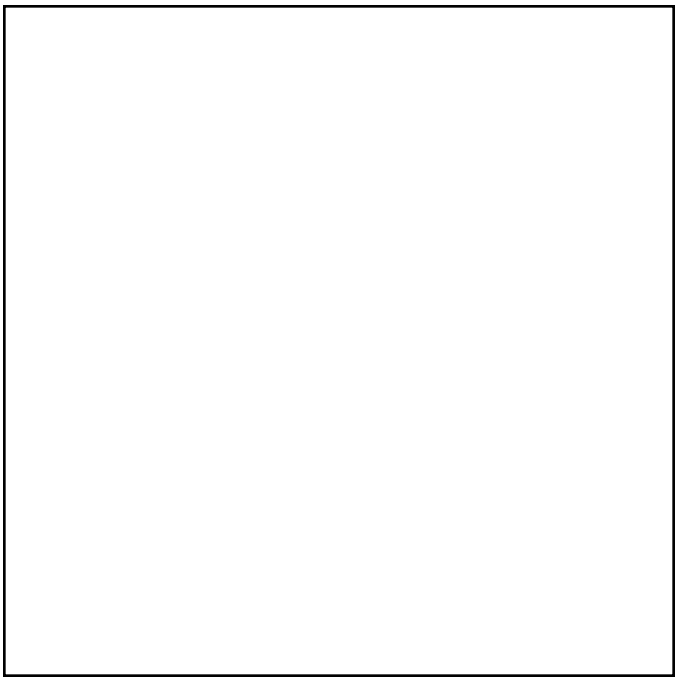
What did they do?



Wildflower common name:

Wildflower scientific name:

Where is it found?



If you could name a plant after someone today, who would it be and why?

Wildflower Namesakes

Below are a few wildflowers and their namesakes. The list is alphabetical for quick reference. Encourage students to use multiple sources, including field guides and online resources, to verify information.

Wildflower	Namesake
Mohr's coneflower (*Rudbeckia mohrii*)	Charles T. Mohr (1824-1901) was a German pharmacist who loved plants and spent 40 years writing *Plant Life of Alabama*.
Godfrey's false dragonhead (*Physostegia godfreyi*)	Robert K. Godfrey (1911-2000) was curator of the Florida State University herbarium. His specialty was aquatic plants.
Rugel's false pawpaw (*Asimina rugelii*)	Ferdinand Rugel (1806-1879) was a German pharmacist and botanist who traveled in the southern United Stated discovering new plants.
Ashe's calamint (*Calamintha ashei*)	William Willard Ashe (1872-1932) worked for the U.S. Forest Service and named more than 500 plant species.
Bartram's ixia (*Calydorea caelestina*)	William Bartram (1739-1823) was an American explorer, botanist and ornithologist who chronicled his exploration of the Southern Colonies in *Bartram's Travels*.
Small's milkpea (*Galactia smallii*)	John Kunkel Small (1869-1938) was an American botanist and naturalist who wrote *Flora of the Southeastern United States* in 1903.
Leavenworth's tickseed (*Coreopsis leavenworthii*)	Dr. Melines Conkling Leavenworth (1796-1862) was an American physician and botanist who collected plants in the southern US and Mexico.
Feay's palafox (*Palafoxia feayi*)	William T. Feay (1804-1879) was a physician and botanist from Savannah. He is credited with discovering Palafox and named it after Jose Rebolledo Palafox, Duke of Saragossa in Spain, who fought against Napolean in France.
Michaux's milkweed (*Aslcepias michauxii*)	Frenchman Andre Michaux (1746-1802) was the official botanist of King Louis XVI. He visited Florida in 1788.
Pineland jacquemontia (*Jacquemontia curtissii*)	Victor Jacquemont (1801-1832) was a French botanist and geologist. Allen Hiram Curtiss (1845-1907) was an American botanist who lived and worked largely in Florida.

FLORIDA Wildflower FOUNDATION

Unit 9 Activity 4

Name Your Own Wildflower

Objective

Students will be able to create and name a "new" wildflower and explain the reasoning behind the name.

Materials

- "Name Your Own Wildflower" worksheets (one per student)
- crayons, colored pencils or markers

Standards

Grade 3: SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.5 , SC.3.N.1.6, SC.3.N.3.2

Grade 4: SC.4.L.16.2, SC.4.N.1.4, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.3.1

Directions

1. Review what students have learned about wildflower structures, functions, names, and habitats.
2. Give each student a "Name Your Own Wildflower" worksheet.
3. Have students design a new wildflower on the worksheet, showing:
    - a close-up of the flower, leaves and stem
    - the plant in its natural habitat
4. Remind students to consider how structures (color, shape, size, etc.) help the flower survive in the chosen habitat.
5. Using the prompts on the worksheet, students will name their wildflower and explain their reasoning.

Discussion

- Have students share their wildflower designs and explain how each part helps the plant survive in its habitat.
- Ask students to explain the names they chose and how the name connects to the plant's features or environment.
- In pairs or small groups, have students compare flowers designed for the same habitat. How are they alike? How are they different?
- Ask students to reflect: If your flower lived in a different habitat, what would need to change about its structures?

Name Your Own Wildflower

Draw your wildflower. Be sure to show the whole plant in its natural habitat and include a close-up of the flower, leaves and stem.

What is the name of your wildflower?

Why did you choose this name?

Where does your wildflower live (habitat)?

What special structures or features help your wildflower survive in its habitat?

How do pollinators or animals use your wildflower?

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Glossary

binomial nomenclature: the two-part scientific naming system created by Carl Linnaeus; every organism gets a genus name and a species name (like *Coreopsis leavenworthii*)

botanist: a person who studies plants and their life cycles

Carl Linnaeus: Swedish scientist (1707-1778) who created the modern system for naming and classifying living things using two-part Latin names

common name: the everyday name that people use to describe an organism, such as "tickseed"

family: the largest group that classifies plants based on shared characteristics

genus: a group of closely related species; the first word in a scientific name (plural: genera)

scientific name: the official Latin name given to every organism, written in italics with genus capitalized and species lowercase (like *Rudbeckia hirta*)

species: a group of organisms that can reproduce with each other; the second word in a scientific name

taxonomist: a scientist who specializes in naming and classifying plants

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Wildflower Names Definition Match

Match the vocabulary words in the Word Bank to their definitions.

Word Bank

binomial nomenclature	common name	scientific name
botanist	family	species
Carl Linnaeus	genus	taxonomist

_____ the everyday name that people use to describe an organism, such as "tickseed"

_____ a group of organisms that can reproduce with each other; the second word in a scientific name

_____ a person who studies plants and their life cycles

_____ a group of closely related species; the first word in a scientific name

_____ the two-part scientific naming system created by Carl Linnaeus; every organism gets a genus name and a species name (like Coreopsis leavenworthii)

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_____ Swedish scientist (1707-1778) who created the modern system for naming and classifying living things using two-part Latin names

_____ a scientist who specializes in naming and classifying plants

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Wildflower Names Definition Match

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taxonomist — a scientist who specializes in naming and classifying plants

family — the largest group that classifies plants based on shared characteristics

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Resources

Reference books

100 Flowers and How They Got Their Names by Diana Wells

Carl Linnaeus: Father of Classification by Margaret Jean Anderson

Complete Guide to Florida Wildflowers by Roger Hammer

Conversations on Botany by Sarah Mary Fitton

Flora's Dictionary by Elizabeth Wirt

Florida Wildflowers in Their Natural Communities by Walter Kingsley Taylor

The Flower Hunter: William Bartram, America's First Naturalist by Deborah Kogan Ray

John and William Bartram: Travelers in Early America by Sandra Wallus Sammons

National Audubon Society First Field Guide Series, Scholastic

Wildflowers and the Stories Behind Their Names by Phyllis S. Busch

Websites and other web resources

Florida Wildflower Foundation (plant profiles, photos and resources focused on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies (Florida Museum of Natural History)
www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search

iNaturalist SEEK (image recognition app for identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center (national database, searchable by family or habitat)
www.Wildflower.org/plants-main

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Web Quest

Wildflower Profiles

Objective

Students will research and document specific native wildflowers.

Materials

- "Wildflower Profile" worksheet (at least one per student)

Standards

Grade 3: ELA.3.C.2.1, ELA.3.C.5.2, ELA.3.C.4.1, ELA.3.C.3.1, ELA.3.C.1.4, SC.3.N.1.1

Grade 4: ELA.4.C.2.1, ELA.4.C.5.2, ELA.4.C.4.1, ELA.4.C.3.1, ELA.4.C.1.4, SC.4.N.1.1

Directions

1. Assign students a wildflower to research. If time and resources permit, you may wish to assign multiple wildflowers or assign different wildflowers to each student. Profiles can also be assigned after each section using species relevant to that section.
2. Provide each student with a "Wildflower Profile" worksheet.
3. Have them research their wildflower(s) on the Internet to complete the worksheet. If computers are not available, consider reproducing pages from the websites to allow the students to find information to complete the profile sections.
4. Instruct students to use complete sentences when filling in the worksheet.
5. Completed profiles can be used as an additional assessment tool.

Below are some web resources that may help students complete this activity:

- Florida Wildflower Foundation plant profiles: FlaWildflowers.org/category/plant-profiles
- Florida Native Plant Society plant profile pages: www.FNPS.org/plants
- Institute for Regional Conservation, Natives for Your Neighborhood: RegionalConservation.org/beta/nfyn/
- Native Florida Wildflowers: HawthornHillWildflowers.blogspot.com
- Florida Museum of Natural History wildflower search: www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search/
- iNaturalist: iNaturalist.com
- Lady Bird Johnson Wildflower Center plant search: www.Wildflower.org/plants/

Wildflower Profile

Wildflower scientific name:	Common name(s):
Size, color, general appearance:	Habitat (in Florida):
Wildlife interactions:	Interesting facts:
Wildflower sketch:	

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Outdoor Exploration

Nature Scavenger Hunt

Objective

Students will observe and identify various plant parts, adaptations, and ecological interactions in a natural setting, applying knowledge from multiple units in this guide.

Directions

Before going outside:

1. Review the scavenger hunt categories with students: flowers, leaves, plant defenses, signs of insects, fruits, and other life forms.
2. Discuss what students might look for in each category. Remind them that they should observe and document, not pick or disturb plants and wildlife.
3. Establish boundaries for the outdoor exploration area and review safety rules.
4. Explain that students should check off items as they find them and may draw or write notes about their discoveries in the margins.

During the scavenger hunt:

1. Take students to a natural area such as a schoolyard garden, nature trail, park or wildflower habitat. Areas with diverse plant life will offer the most opportunities for discovery.
2. Have students work individually or in pairs to search for items on their worksheet. Encourage them to look carefully at different plants, observe closely, and use all their senses (except taste).
3. Circulate among students to help identify findings, answer questions, and encourage curiosity.
4. Allow 20–30 minutes for exploration, depending on the size and diversity of the area.

Discussion

After returning to the classroom, gather as a group and discuss what students found. Ask:

- Which items were easiest to find? Which were hardest?
- What surprised you?
- How do the things you found help plants survive?
- What signs of plant-animal interactions did you observe?

Optional: Have students share their favorite discovery or most interesting observation.

Extension

Students can photograph their findings and create a class nature journal, or research one item they found to learn more about it.

Materials

- "Nature Scavenger Hunt" worksheet (one per student or pair)
- pencils or clipboards
- hand lenses (optional, one per student or pair)
- camera or smartphone (optional, for documenting findings)

Tips

School gardens with native plants, nature preserves, parks with natural areas, or unmowed sections of the schoolyard tend to have the most diversity.

Spring through fall offers the most variety, but scavenger hunts can be adapted for any season.

If your outdoor space is limited, focus on fewer categories or modify the options to match what's available.

Safety reminder: Teach students to observe without touching unfamiliar plants, especially those with thorns, spines, or milky sap.

Note: This activity works well as a culminating experience after completing multiple units, or as an engaging introduction to spark curiosity about wildflowers and plant adaptations.

Nature Scavenger Hunt

Find examples of the following items. All items must be from nature. You may not use the same found item more than once. Each entry requires a different item.

FLOWERS

____ simple flower

____ composite flower

____ funnel- or tube-shaped flower

____ bell-shaped flower

____ white flower

____ pollen

LEAVES

____ simple leaf

____ compound leaf

____ triangular-shaped (deltoid)

____ lance-shaped (lanceolate)

____ arrow-shaped (saggitate)

____ toothed margins

PLANT DEFENSES

(try to find 2 of the following on different plants)

____ thorns or prickles

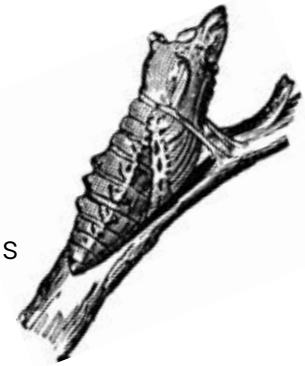
____ hairs

____ milky sap

____ strong aroma

SIGNS OF INSECTS

(try to find 2 of the following on different plants)



____ wrapped or chewed leaves

____ galls

____ cocoon or chrysalis

____ foam

FRUITS

____ berry

____ bean or pea pod (legume)

____ wildflower seed

____ other fruit or seed

OTHER LIFE FORMS

____ air plant (epiphyte)

____ moss

____ fungus

____ lichen

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Additional resources

Florida Wildflower Foundation Resources

"Seedlings for Schools" grants are available to schoolteachers statewide from the Florida Wildflower Foundation. Each grant provides $50 worth of plants with which to establish a campus wildflower garden. (FlaWildflowers.org/grants)

The **Florida Wildflower Foundation website** has extensive information on wildflower propagation, planting and other resources, and offers more than 450 plant profiles, as well as unique articles on wildflowers, pollinators and other related topics. (Flawildflowers.org)

Resources for purchasing native wildflowers and seeds

To find a nursery in your area that specializes in native plants, visit the **Florida Association of Native Nurseries** website. (PlantRealFlorida.org)

The **Florida Wildflowers Growers Cooperative** offers high quality, Florida native wildflower seeds. Florida Wildflower Foundation members receive a discount on seeds purchased through the cooperative. (www.FloridaWildflowers.com)

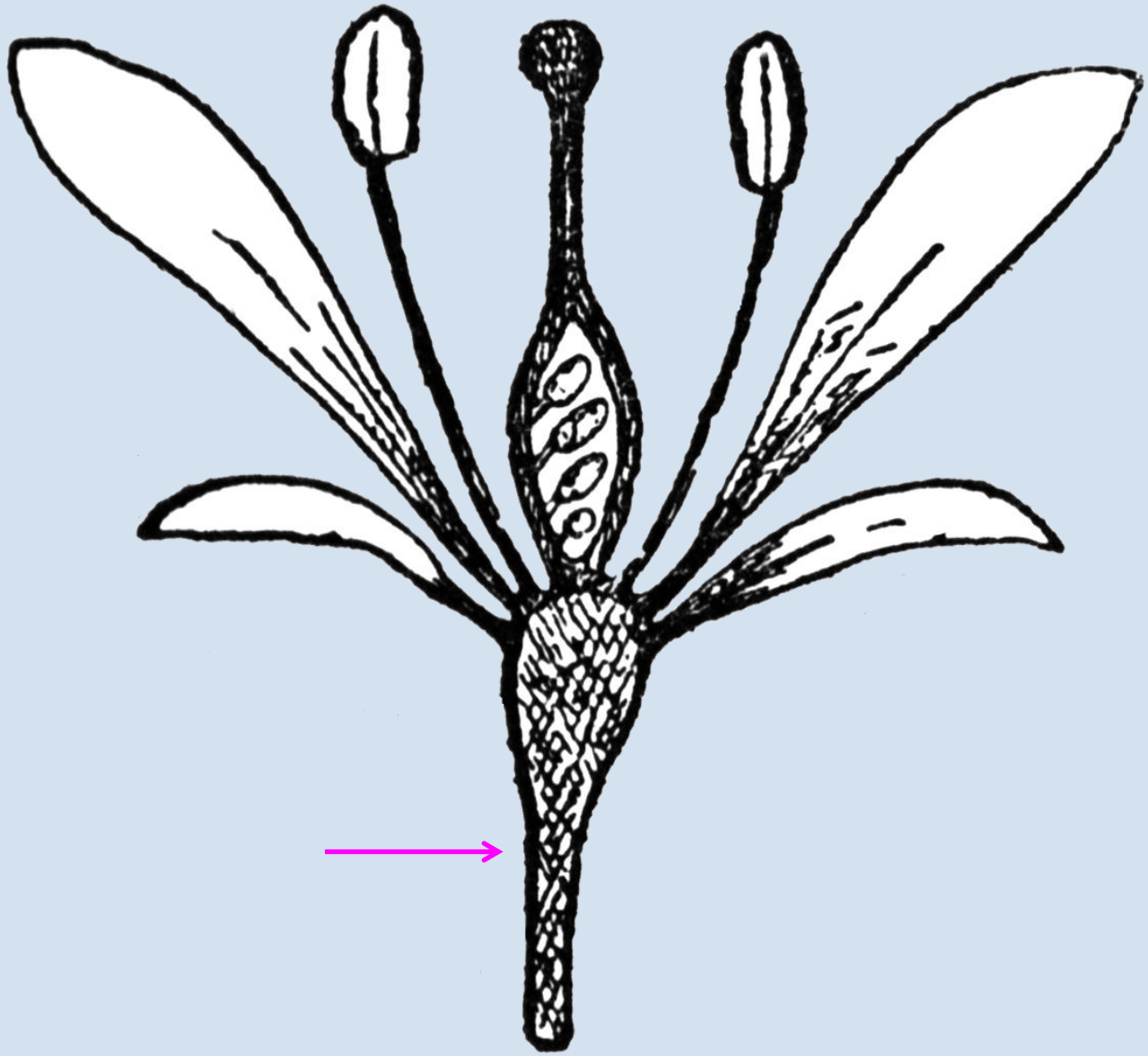
Other resources on native wildflowers

The **Florida Native Plant Society's plant list** offers profiles hundreds of Florida native plants. (www.FNPS.org/plants)

Although not specific to Florida, the **Lady Bird Johnson Wildflower Center**'s website provides a wealth of information on wildflowers, including many that are native to Florida. (www.Wildflower.org/plants/)

FLORIDA Wildflower FOUNDATION

Parts of a Wildflower



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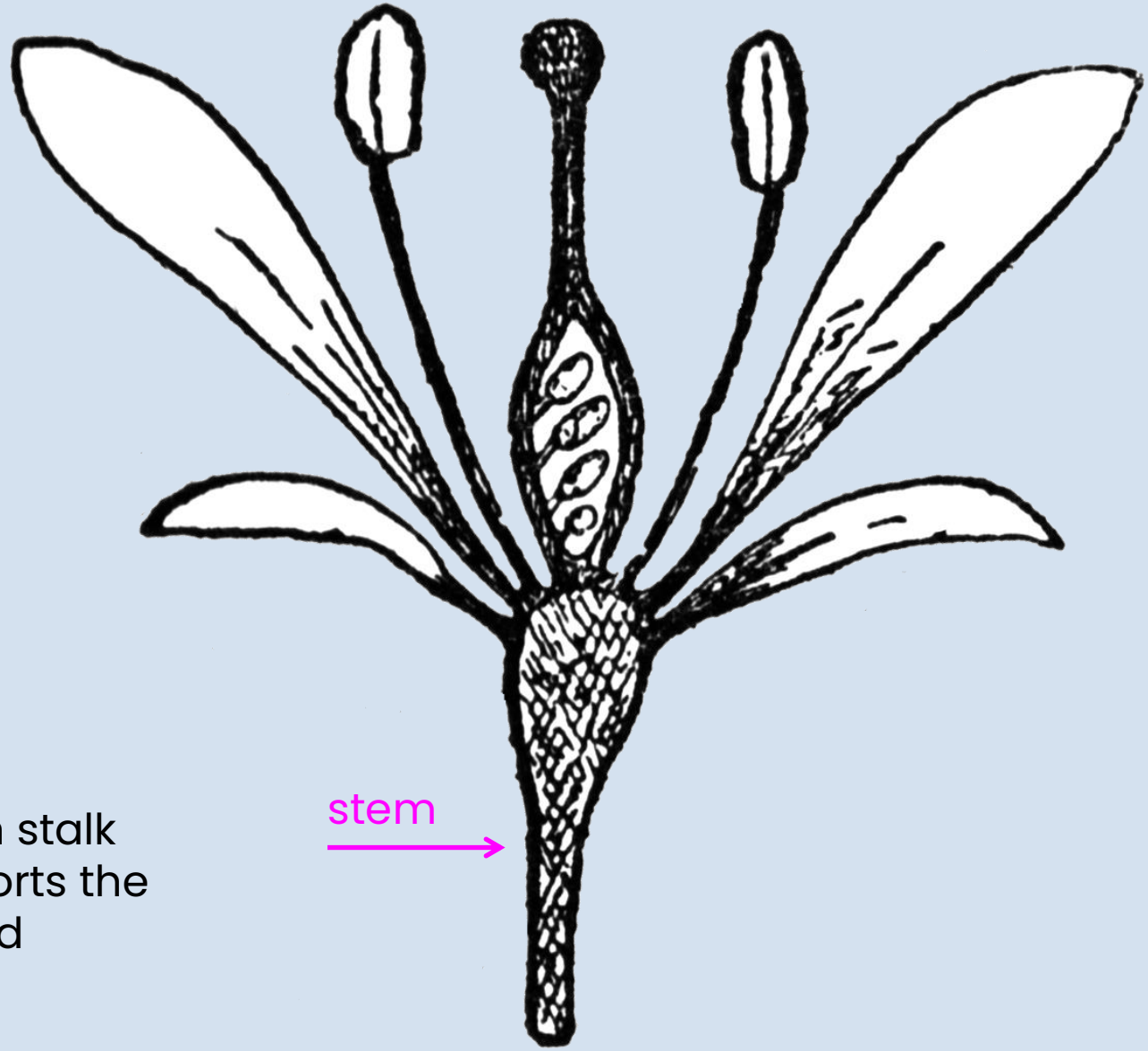
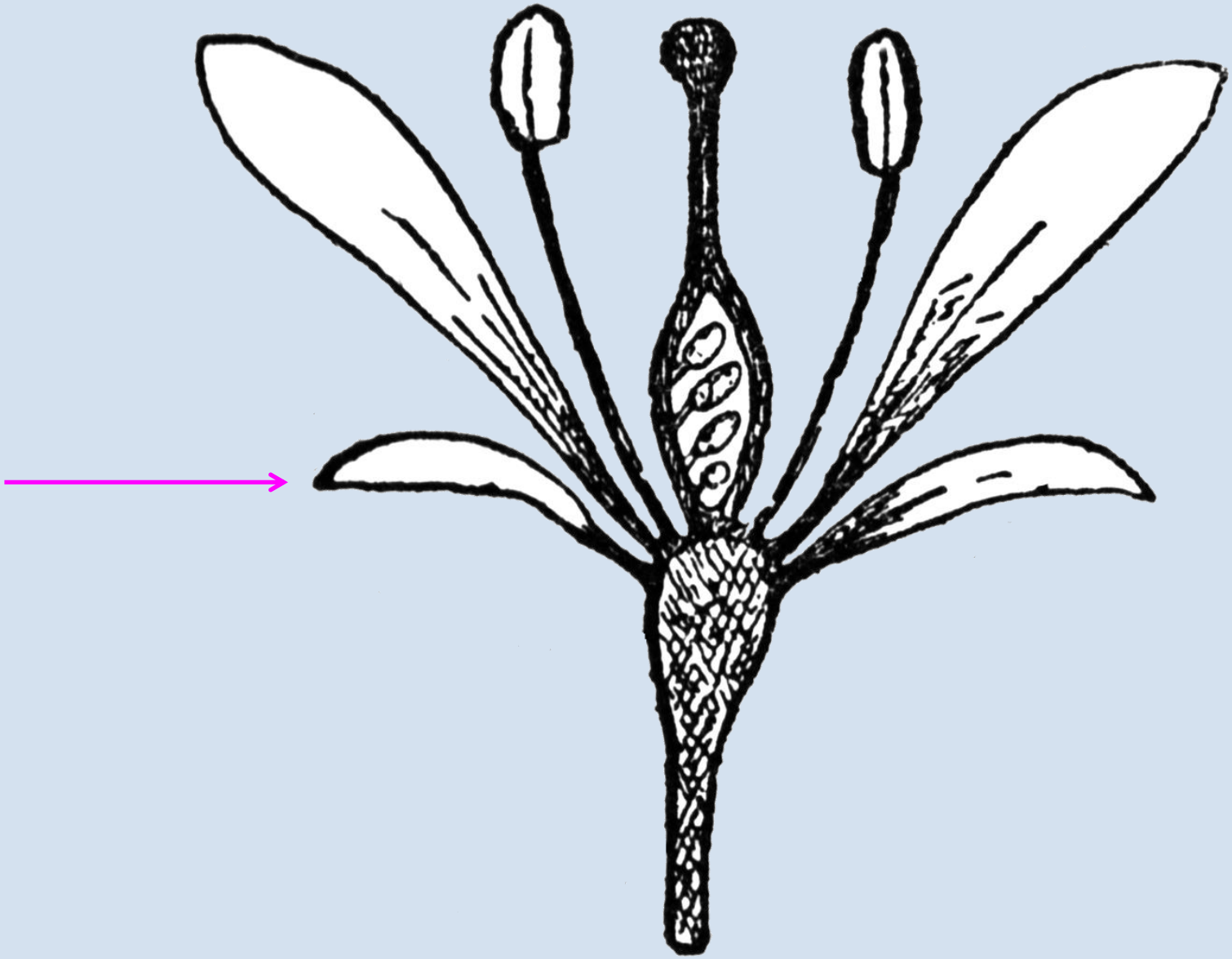
The stem is the main stalk of a plant that supports the leaves, branches and flowers.





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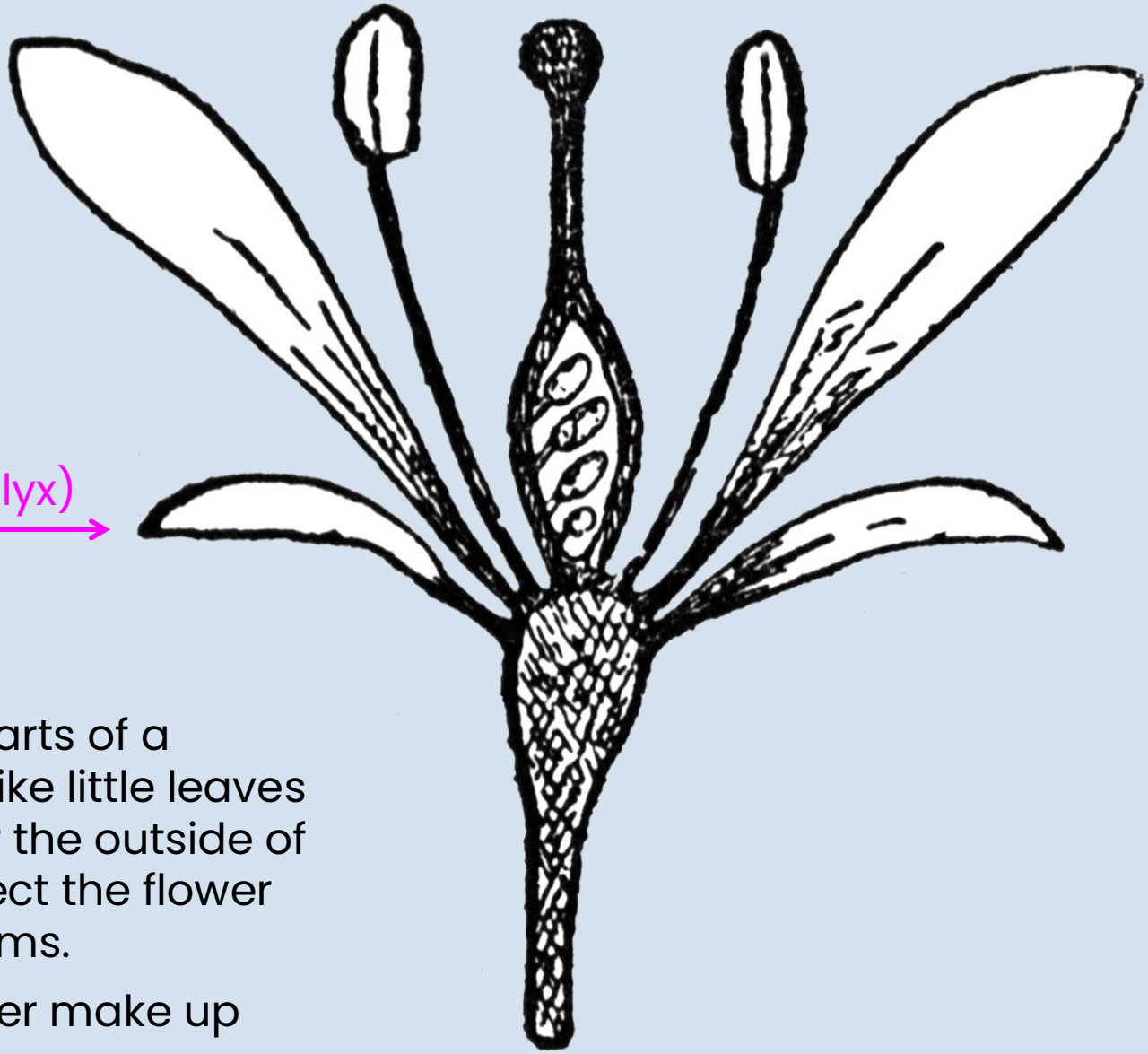
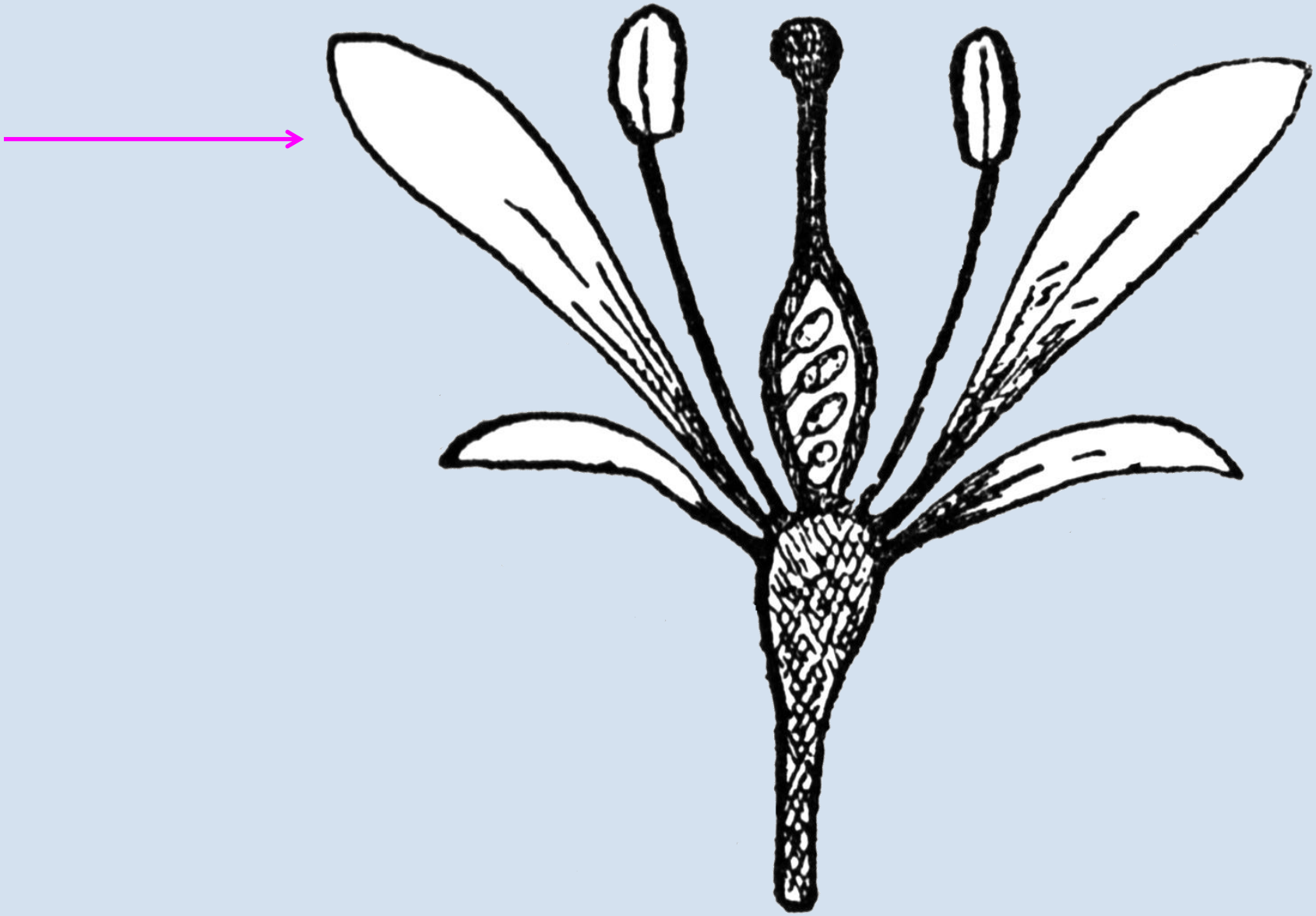


The sepals are the parts of a wildflower that look like little leaves or petals. They cover the outside of a flower bud to protect the flower until it opens or blooms.

All the sepals together make up the calyx.



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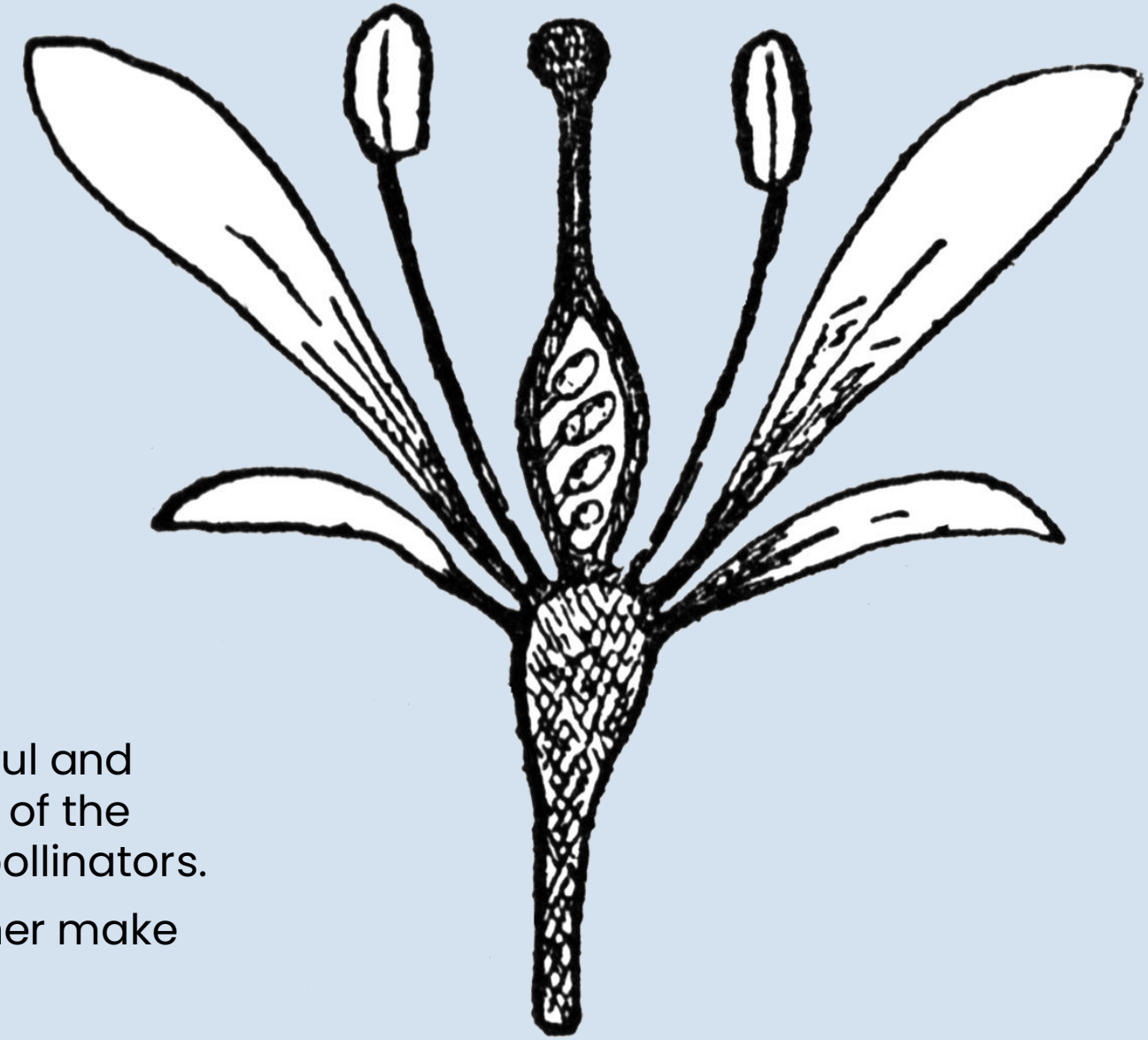
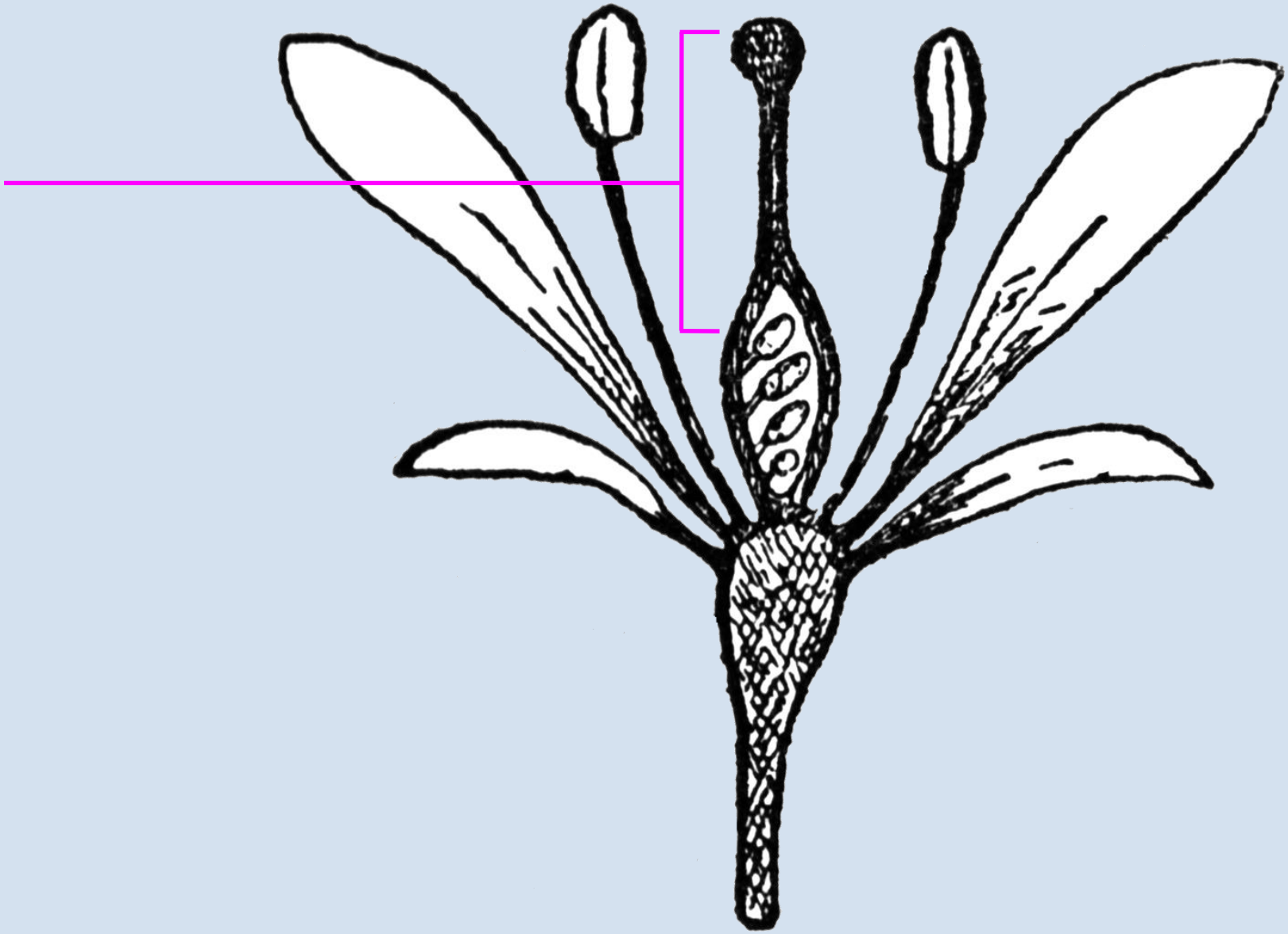
petal (corolla)



Petals are the colorful and often fragrant parts of the flower that attract pollinators.

All the petals together make up the corolla.



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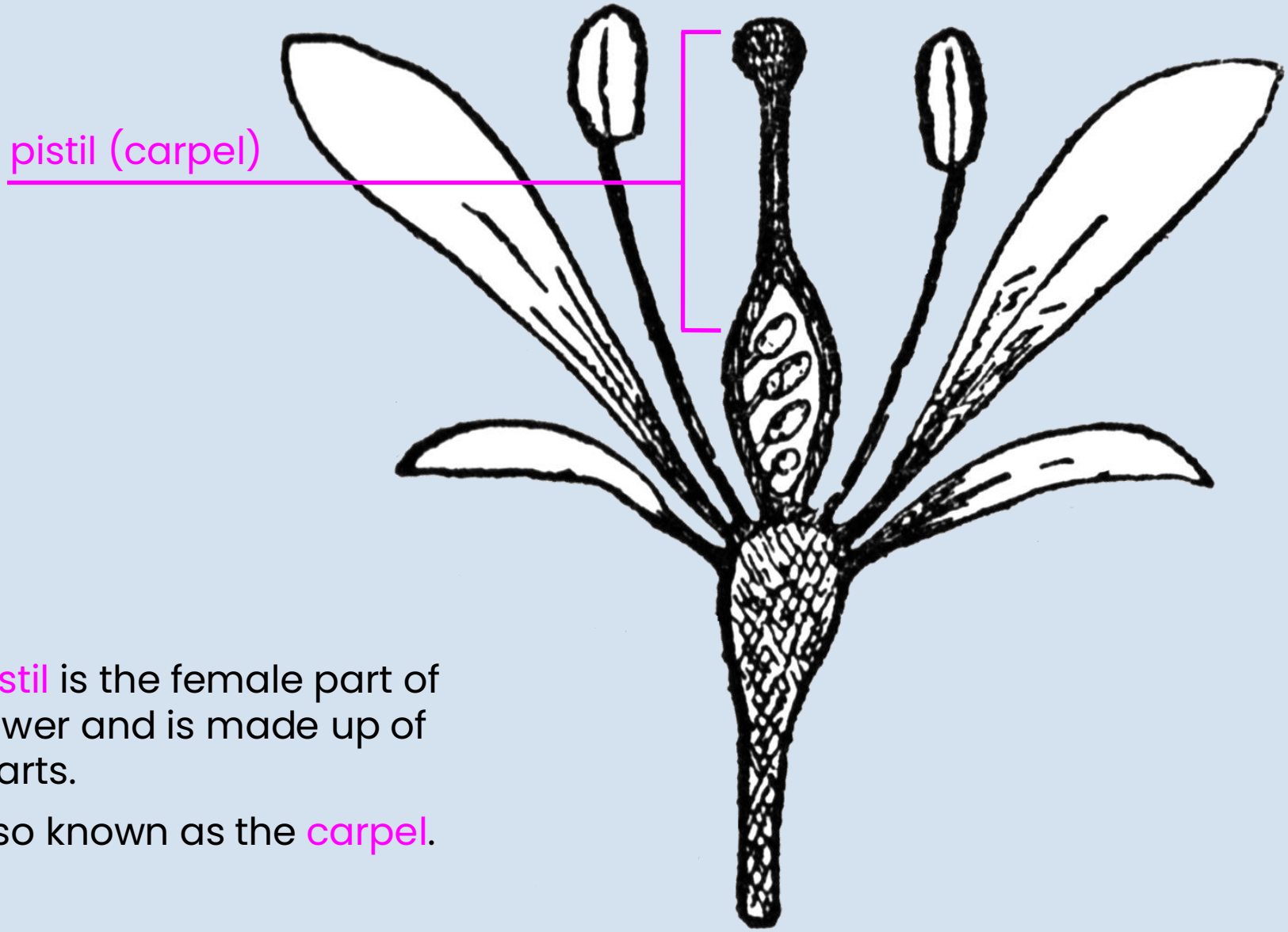
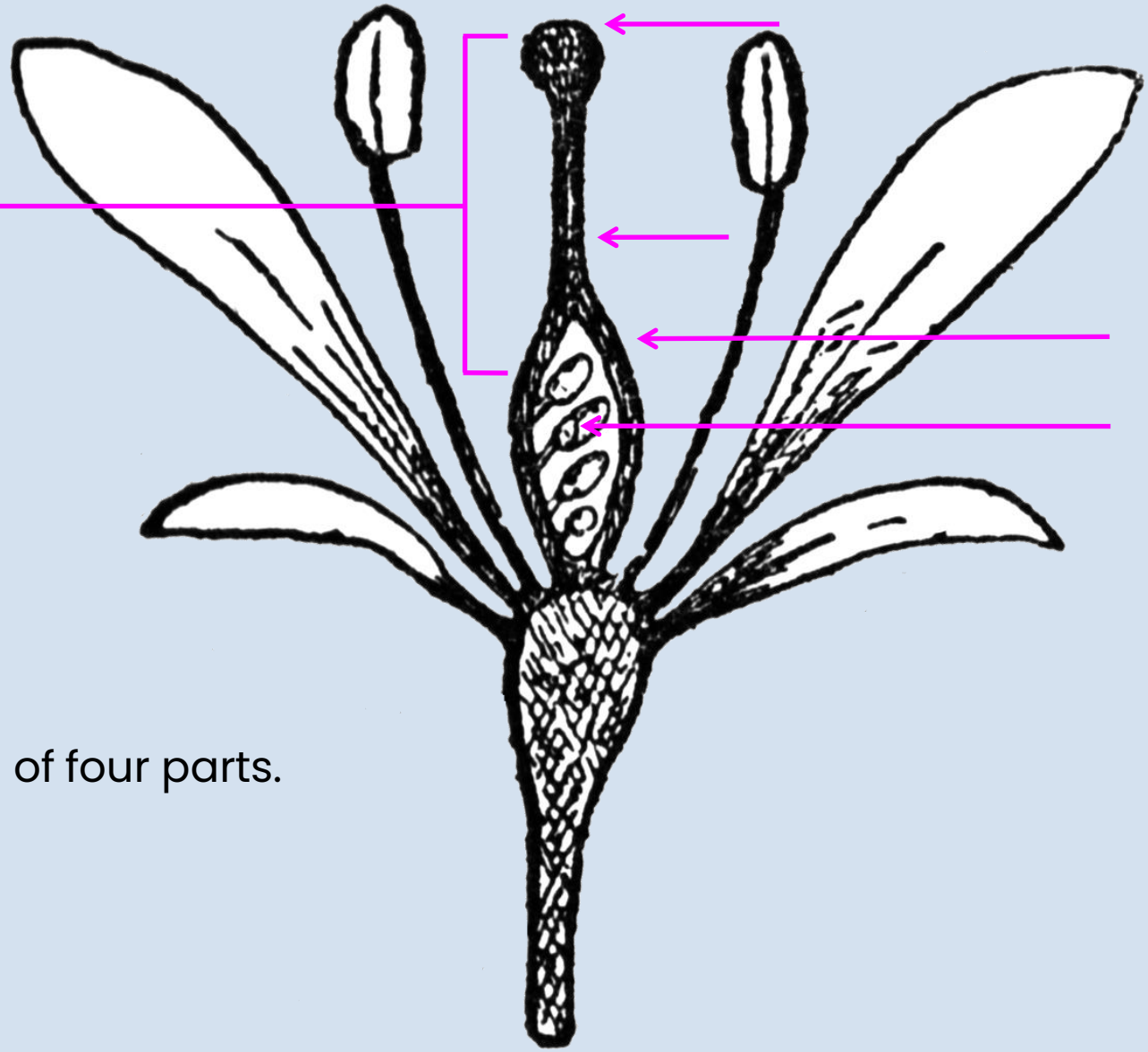


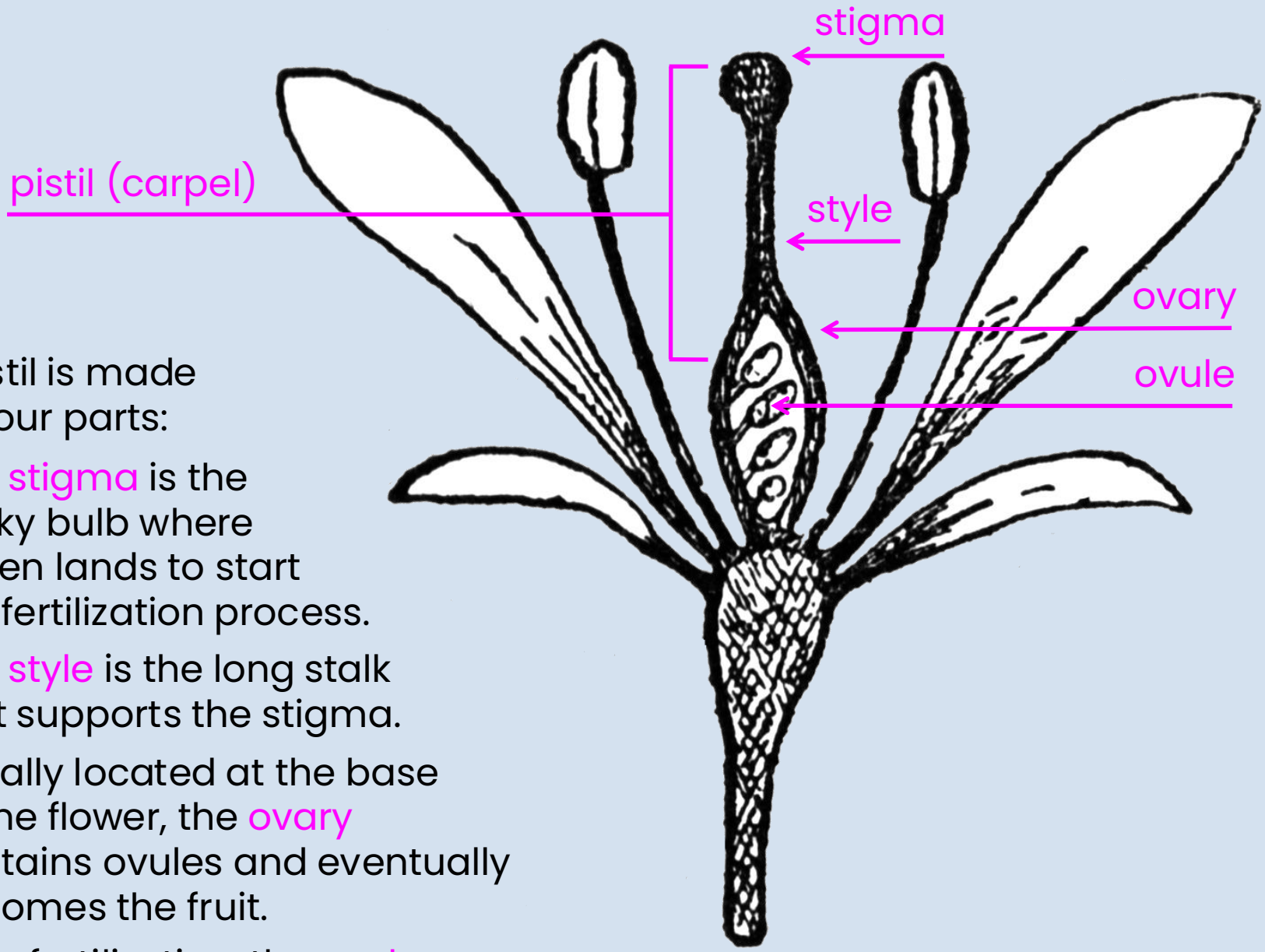
The pistil is the female part of the flower and is made up of four parts.

It is also known as the carpel.

pistil (carpel)

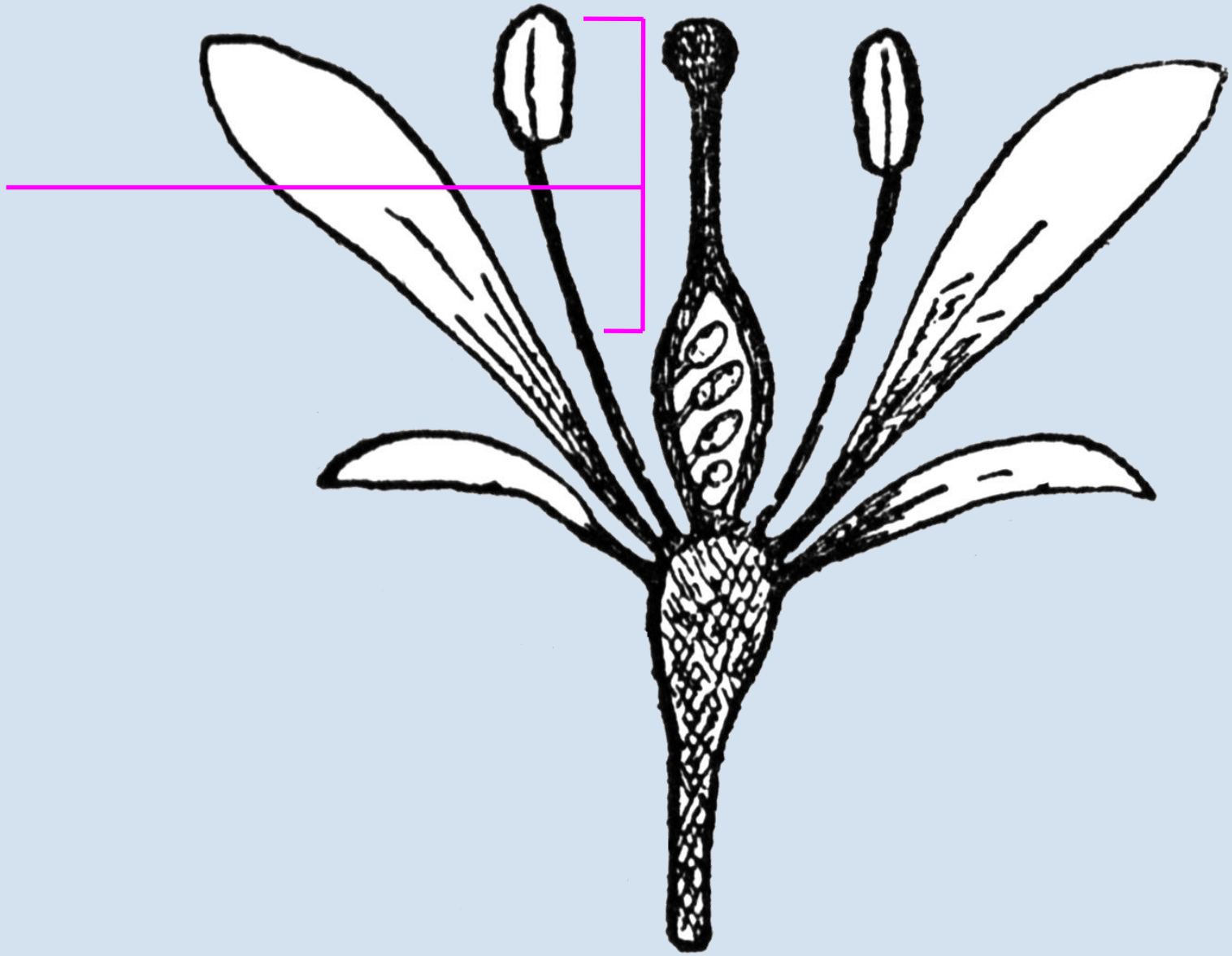


The pistil is made up of four parts.



The pistil is made up of four parts:

1. The stigma is the sticky bulb where pollen lands to start the fertilization process.
2. The style is the long stalk that supports the stigma.
3. Usually located at the base of the flower, the ovary contains ovules and eventually becomes the fruit.
4. After fertilization, the ovules become the seeds.



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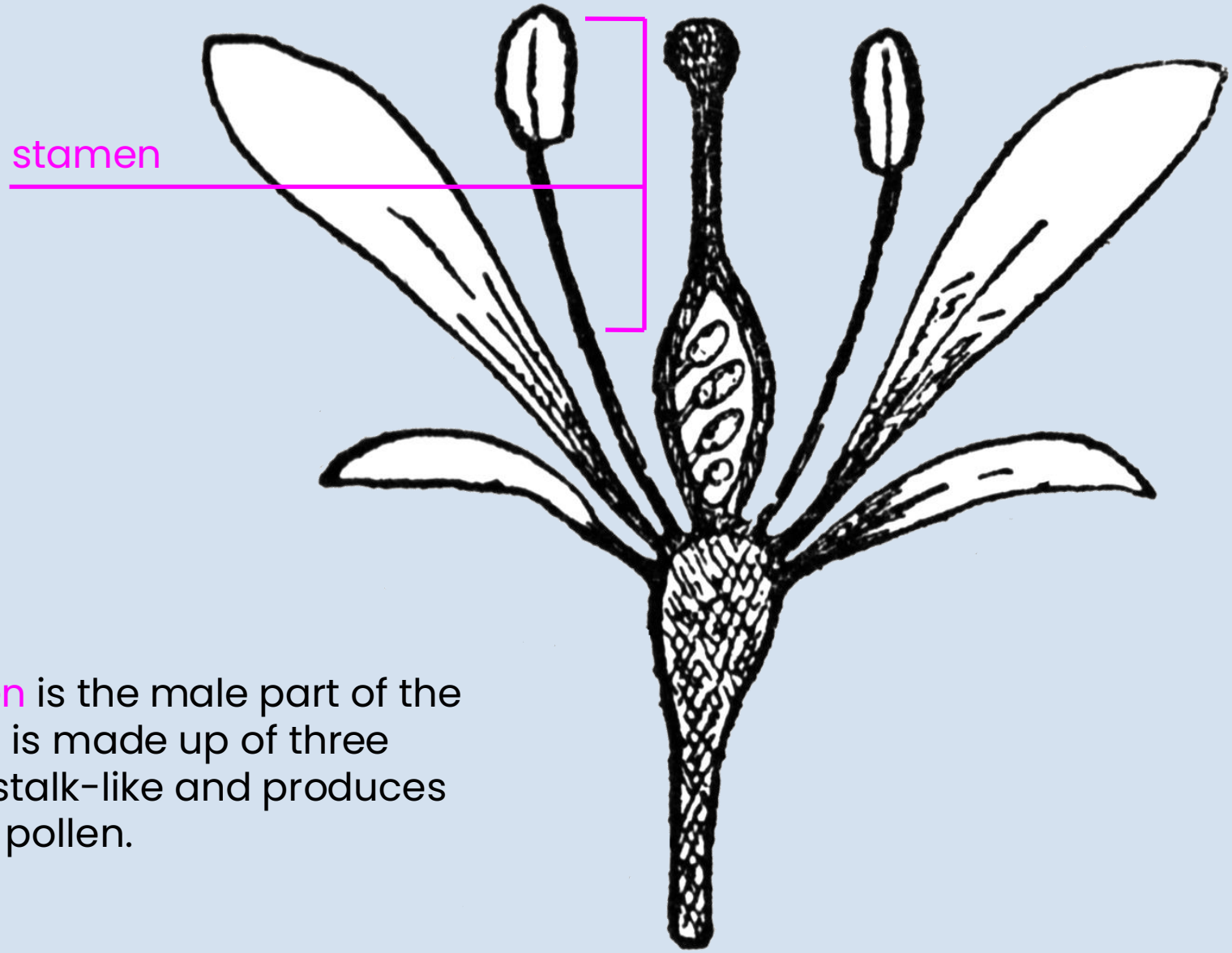
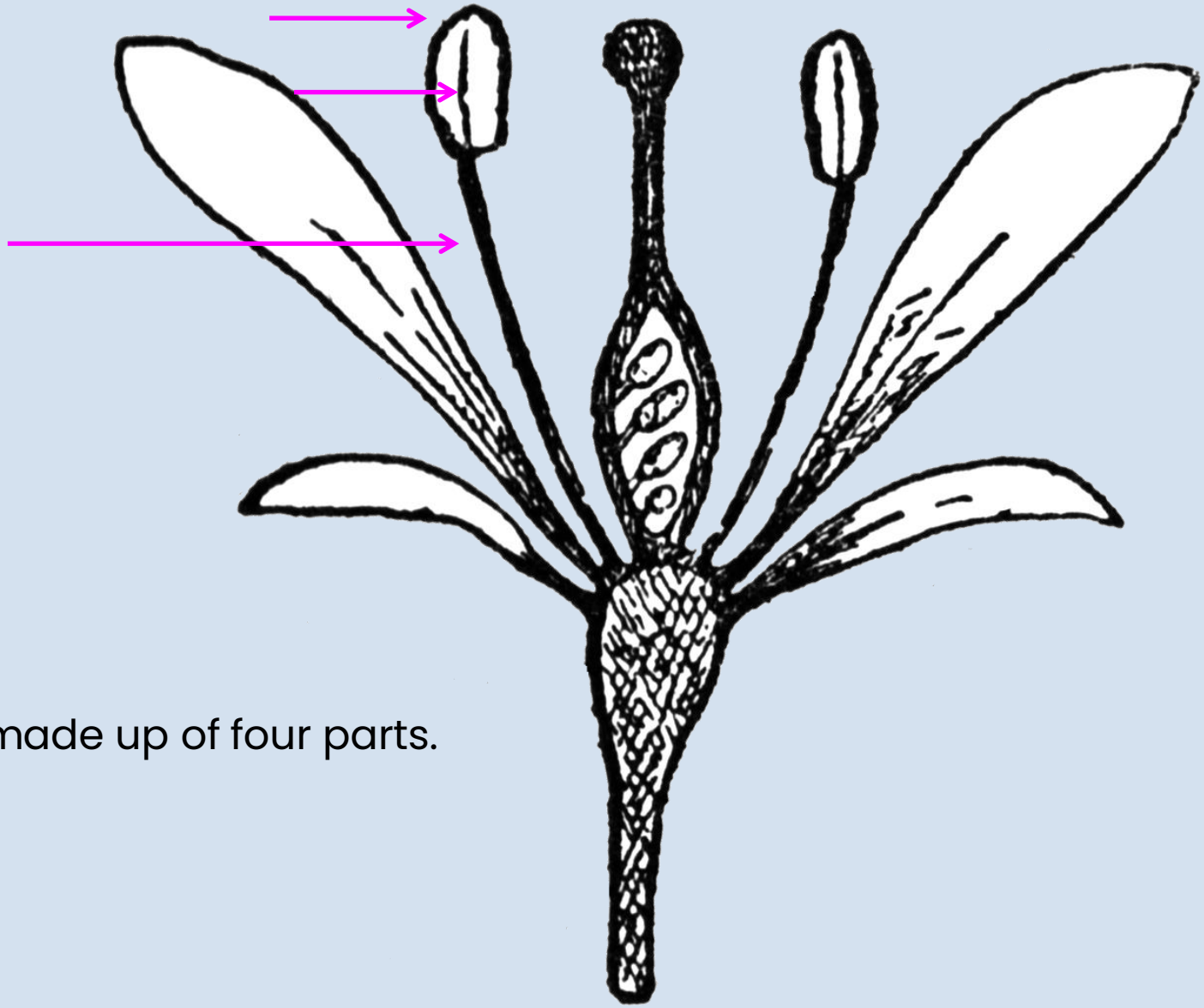


The stamen is the male part of the flower and is made up of three parts. It is stalk-like and produces and bears pollen.



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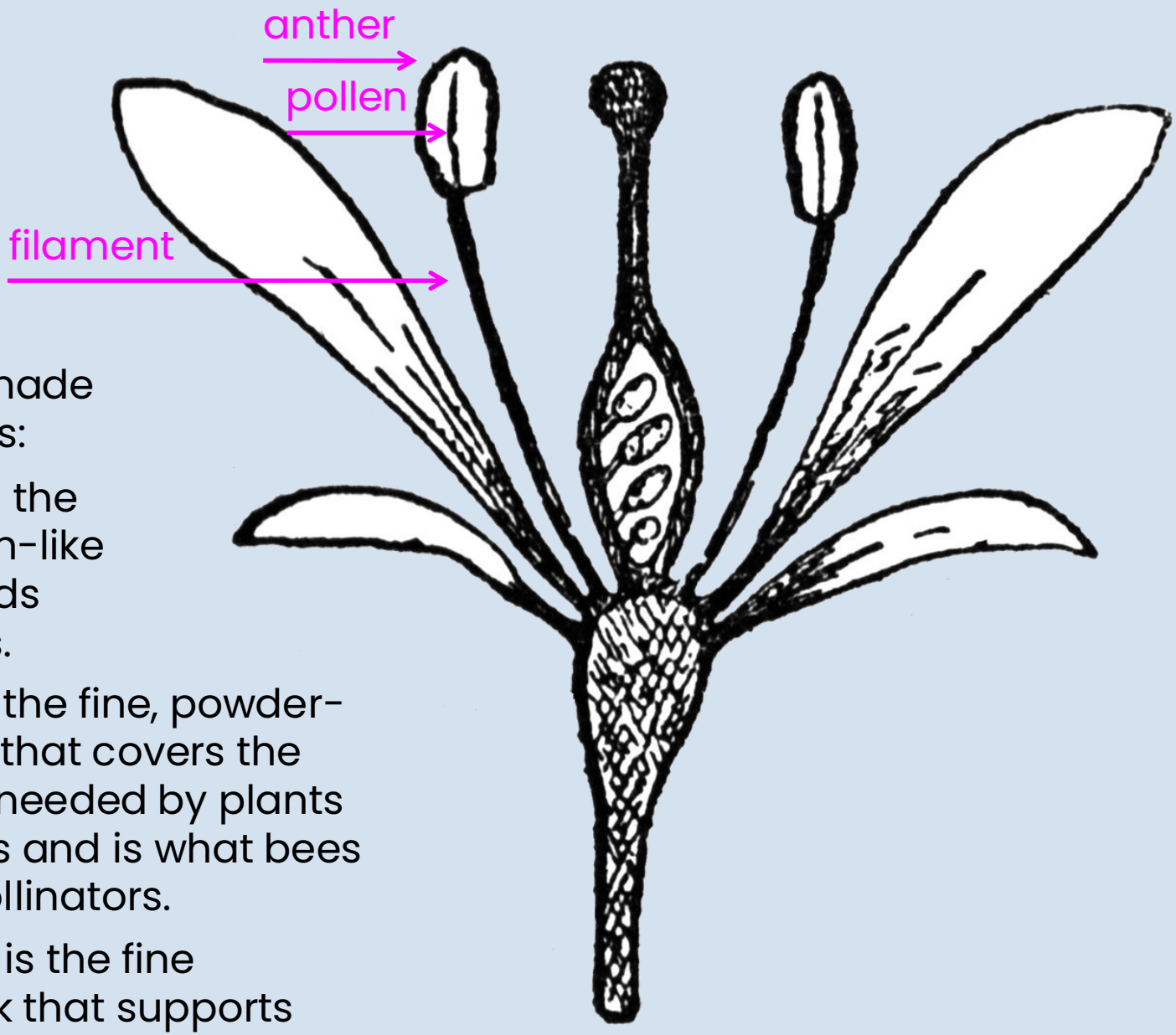
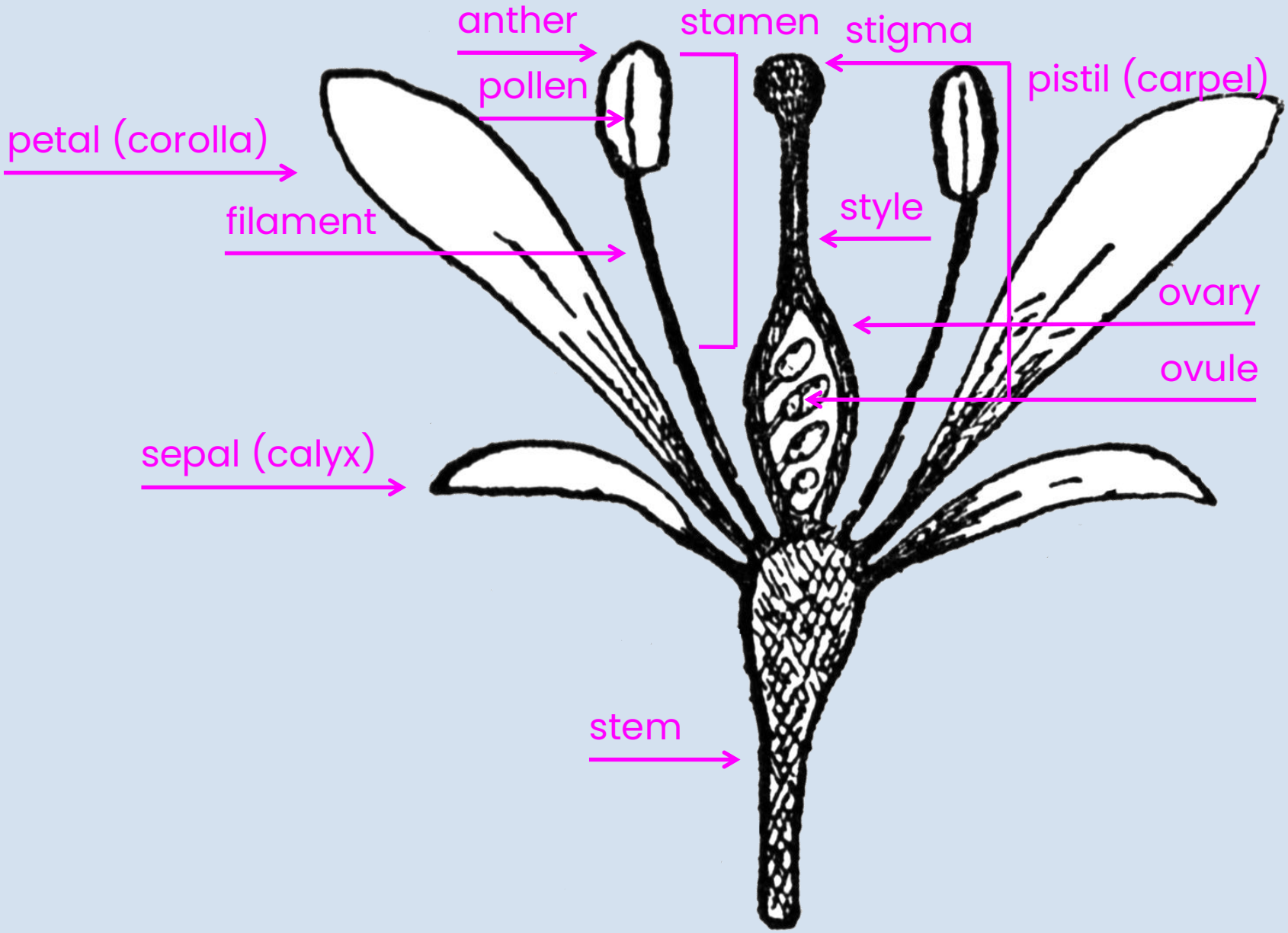


The stamen is made up of three parts:

1. The anther is the yellow, pouch-like part that holds pollen grains.
2. The pollen is the fine, powder-like material that covers the anthers. It is needed by plants to make sees and is what bees and other pollinators.
3. The filament is the fine hair-like stalk that supports the anther.



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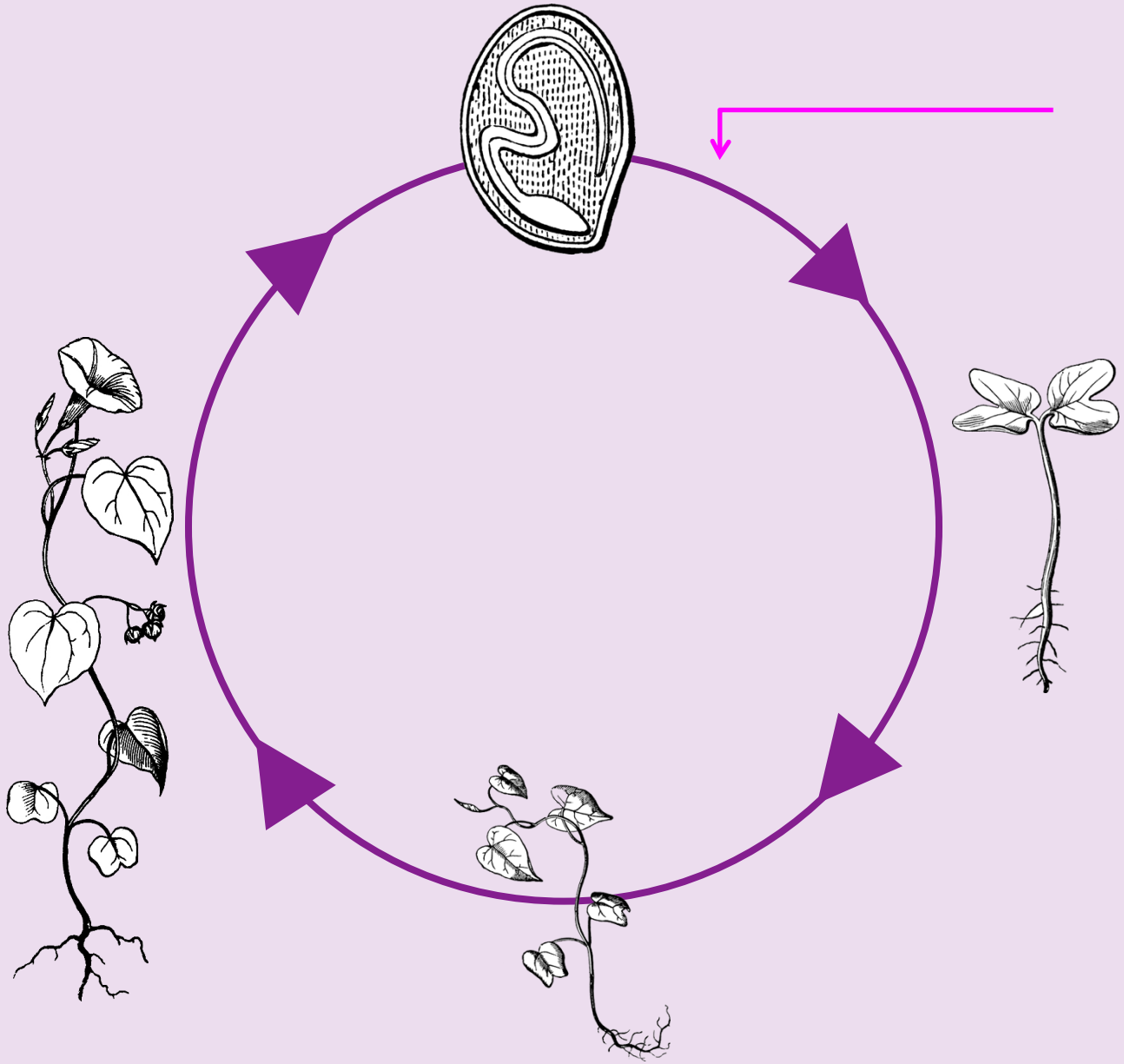
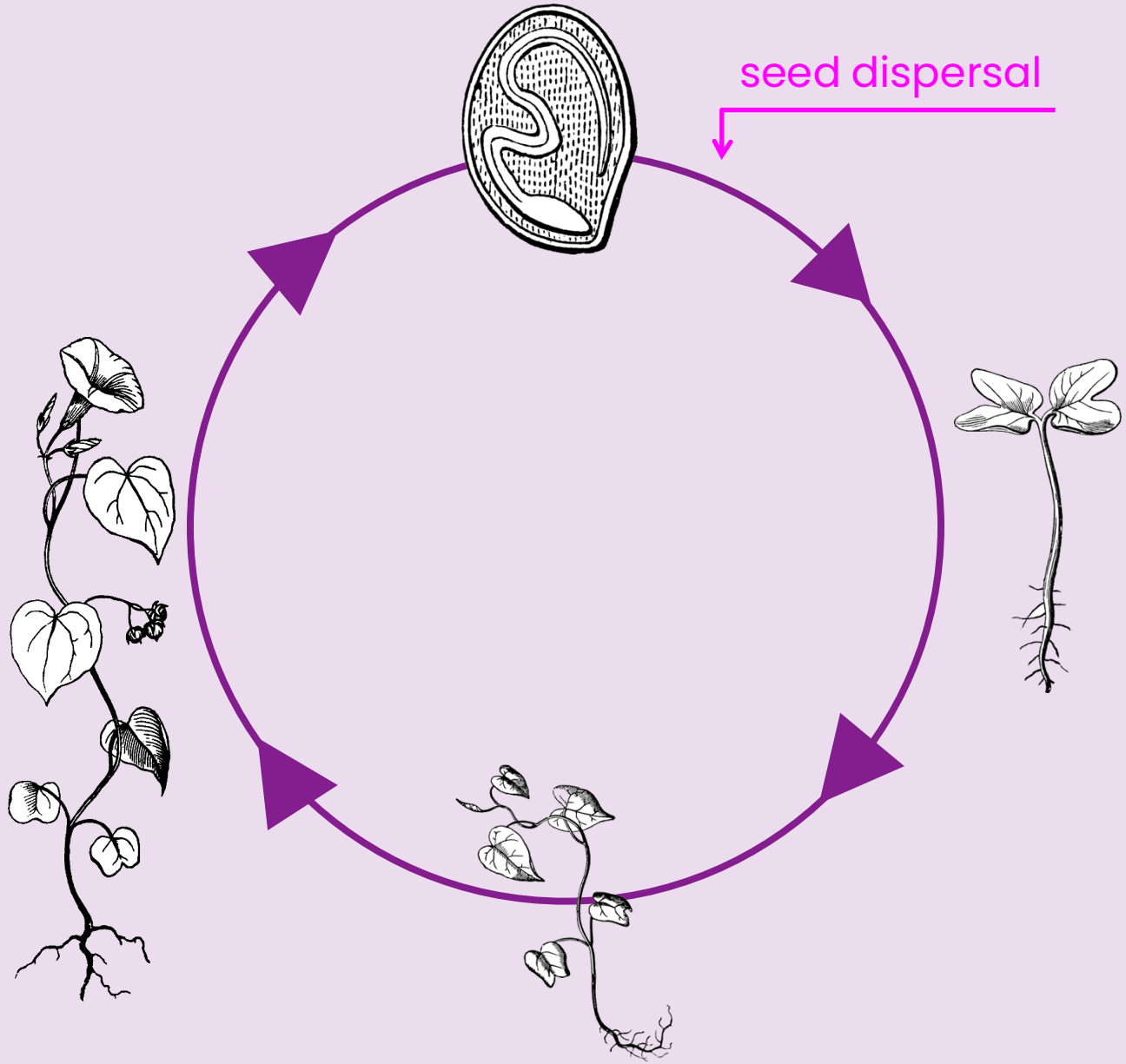
Wildflower Life Cycle

Unit 2 Activity 1





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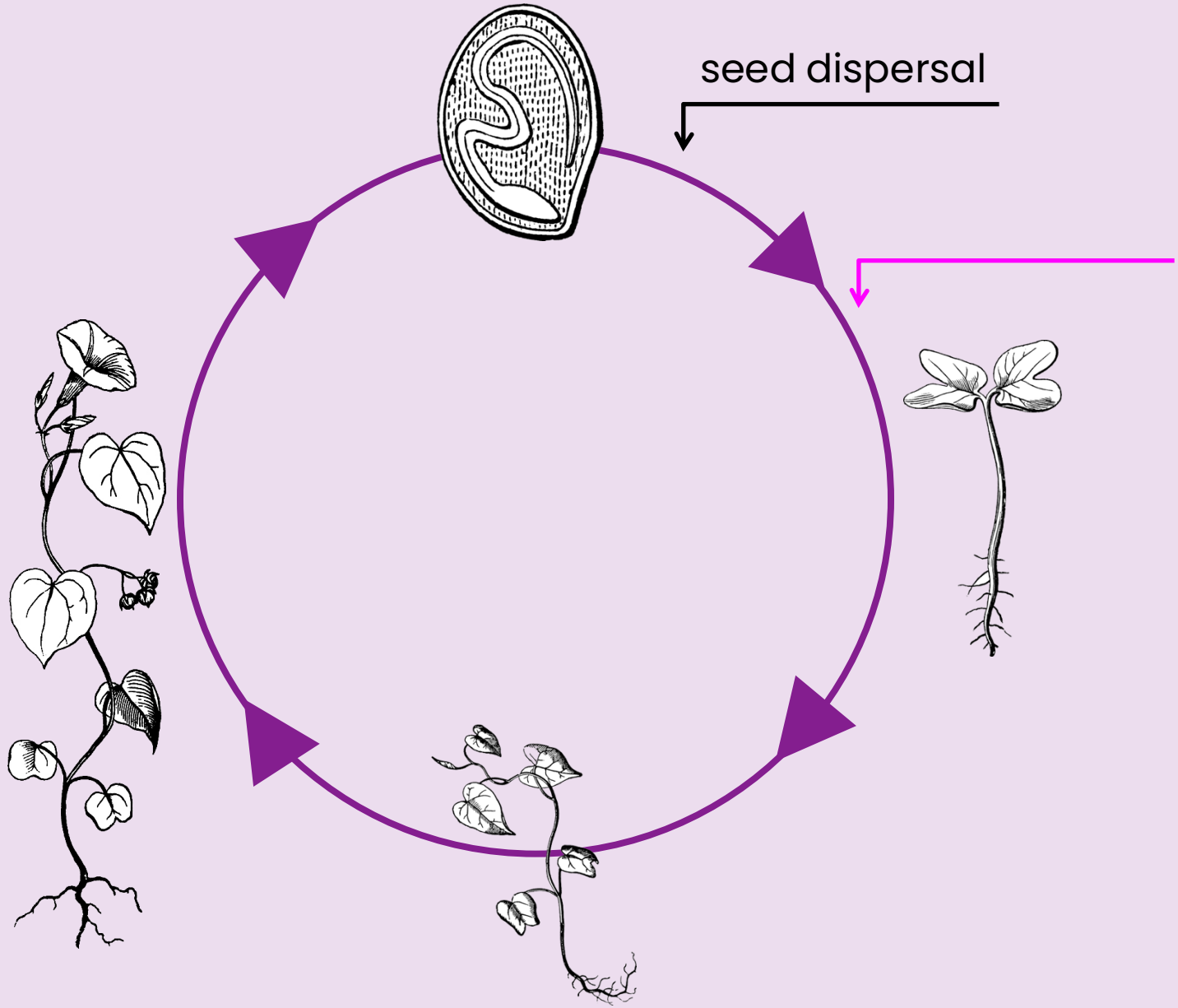

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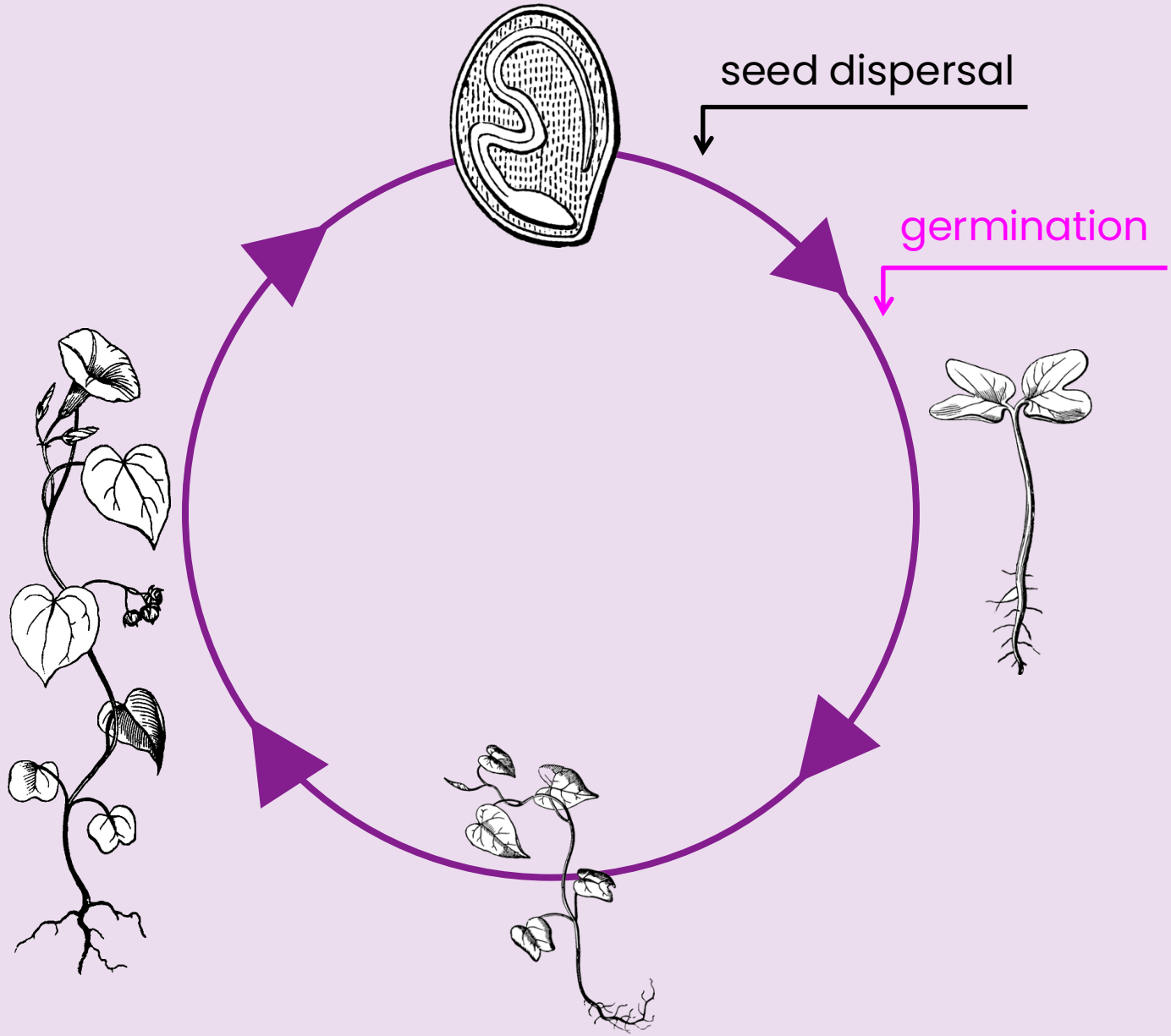

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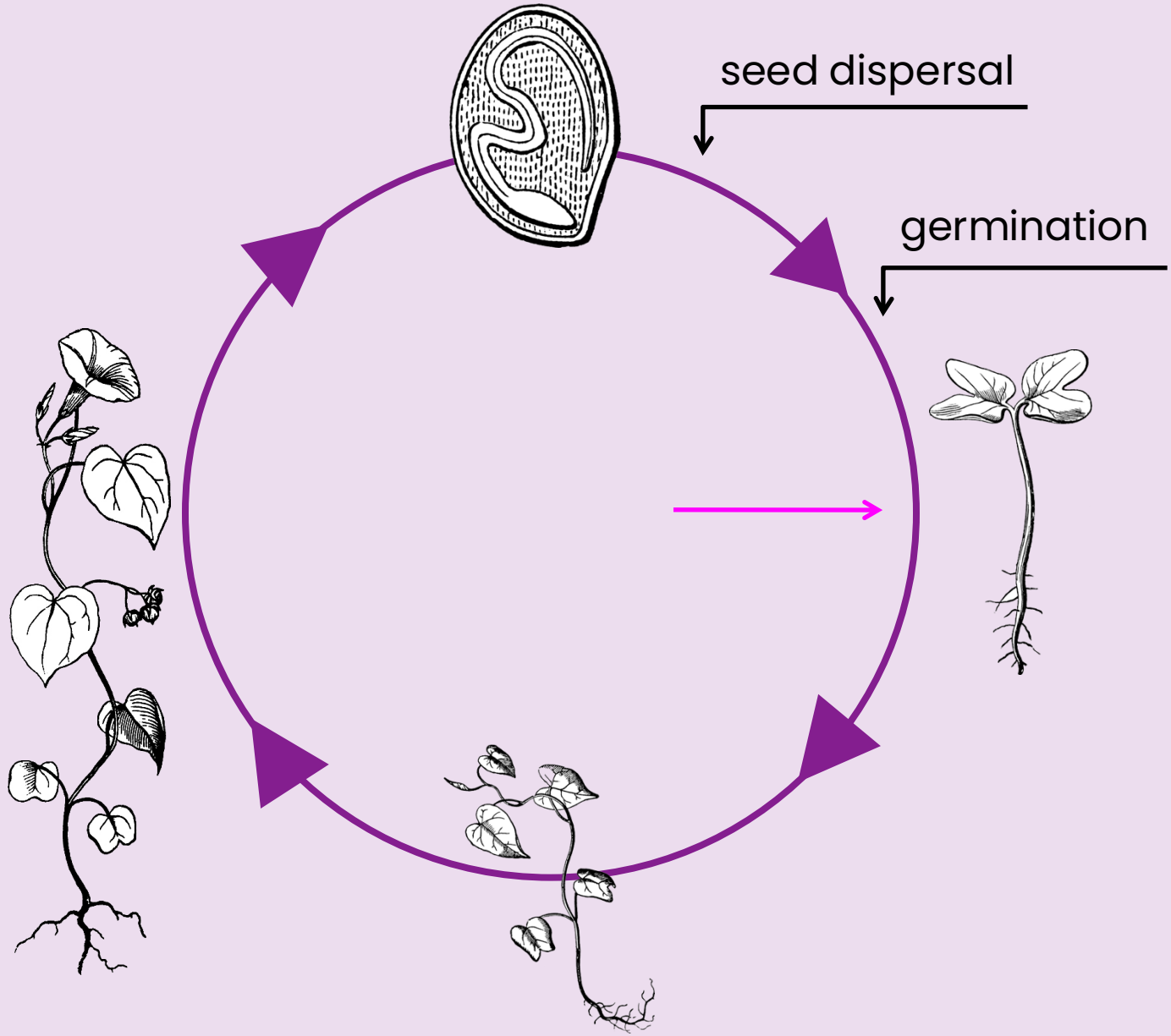

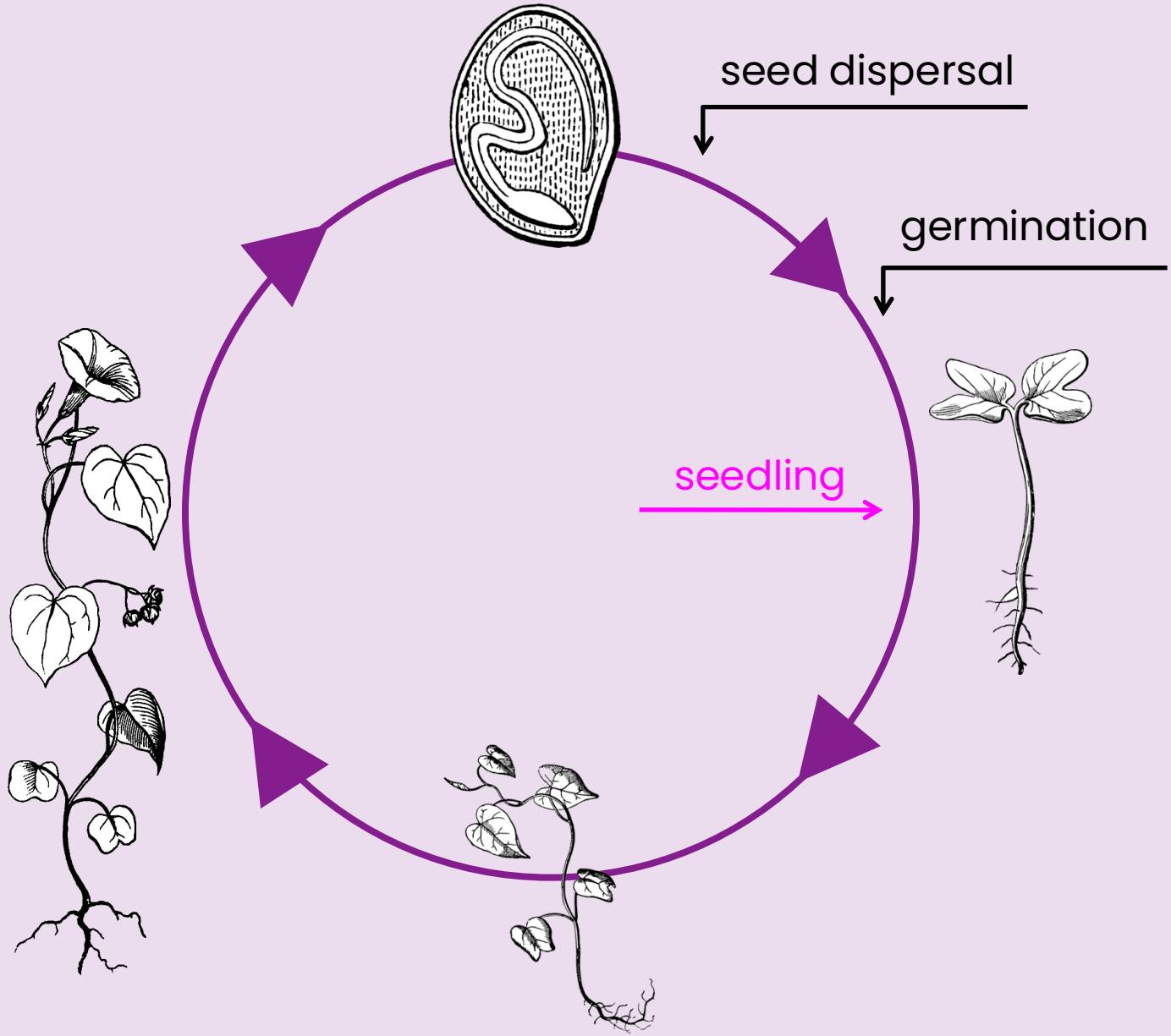

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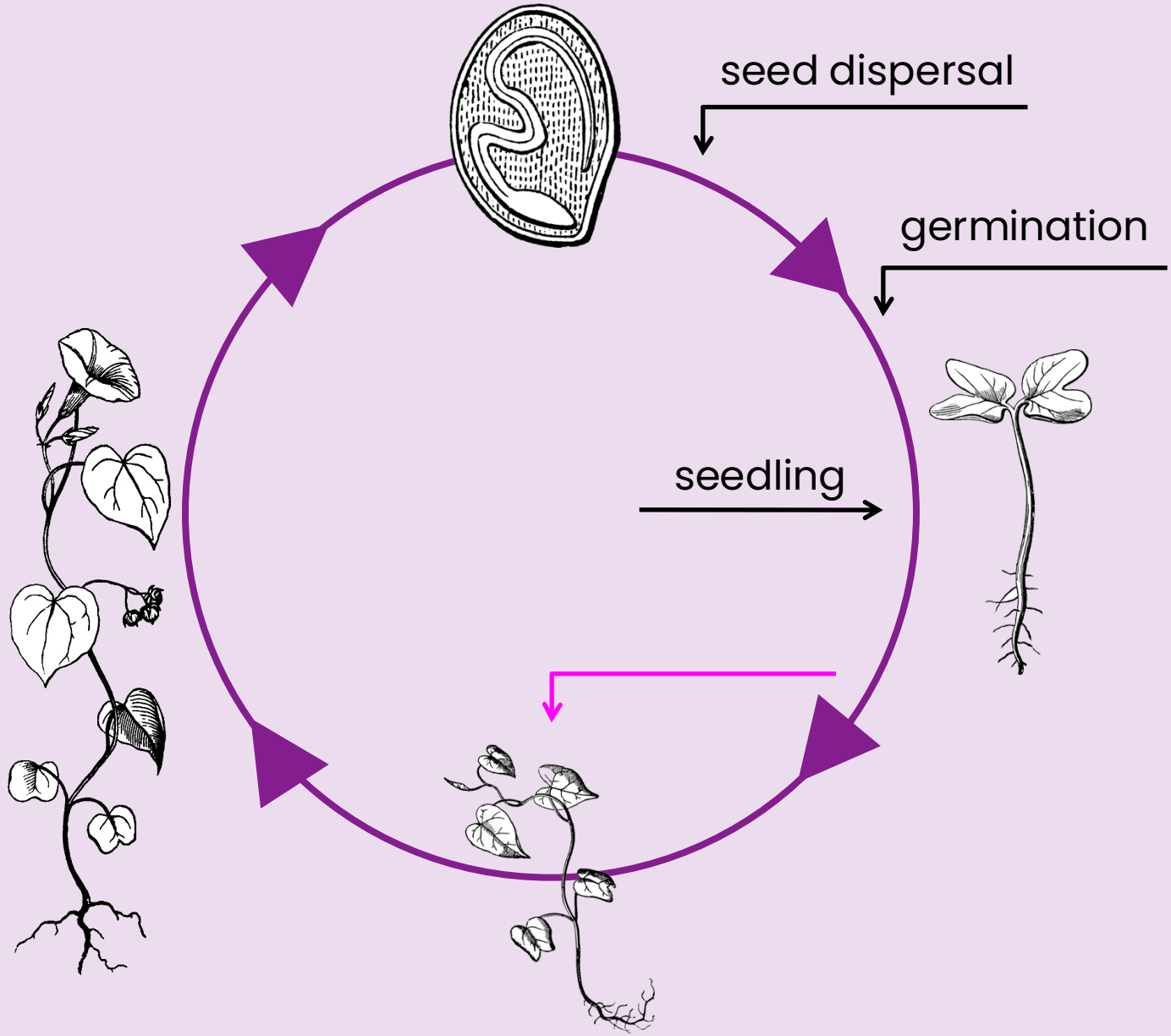
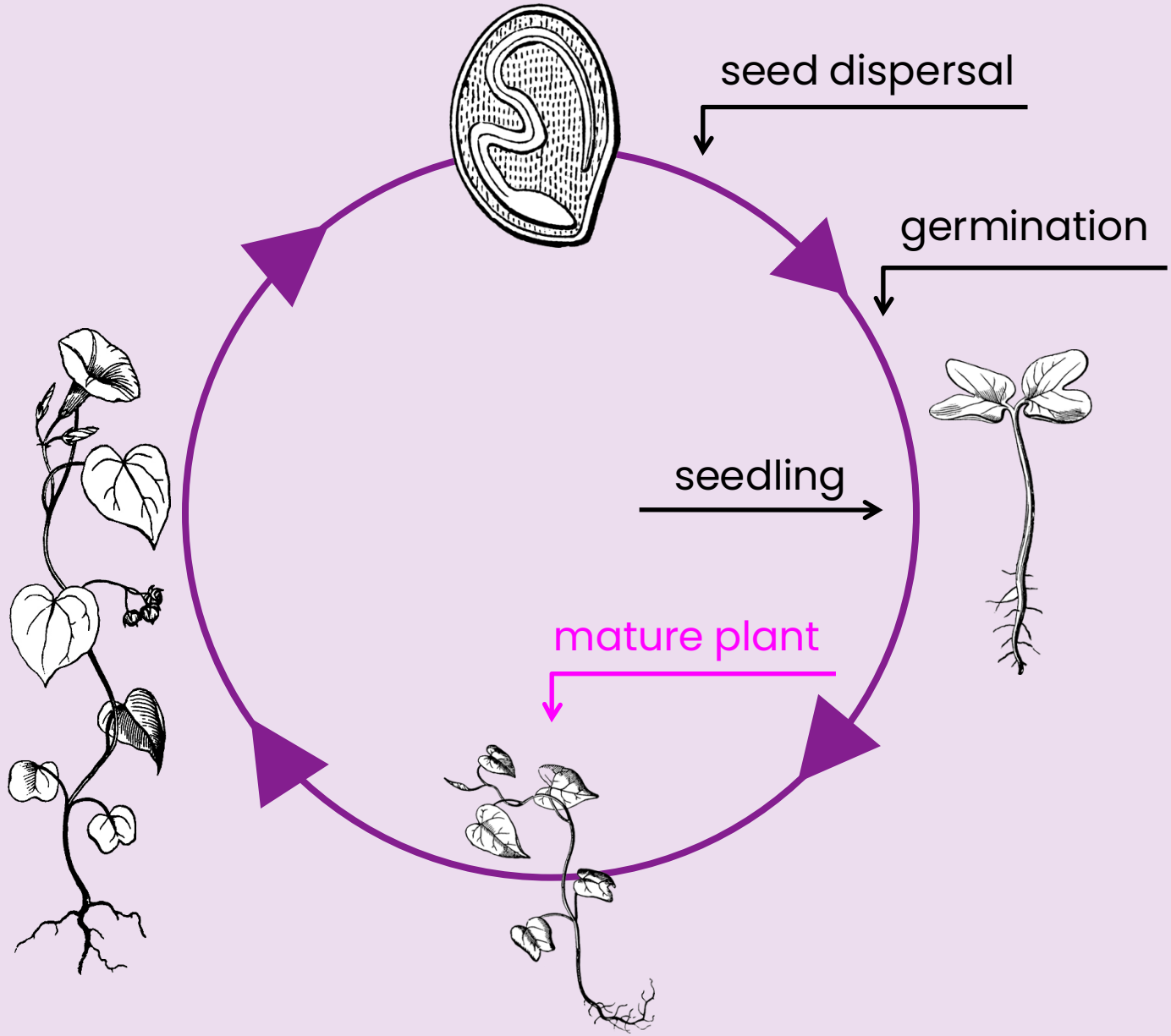
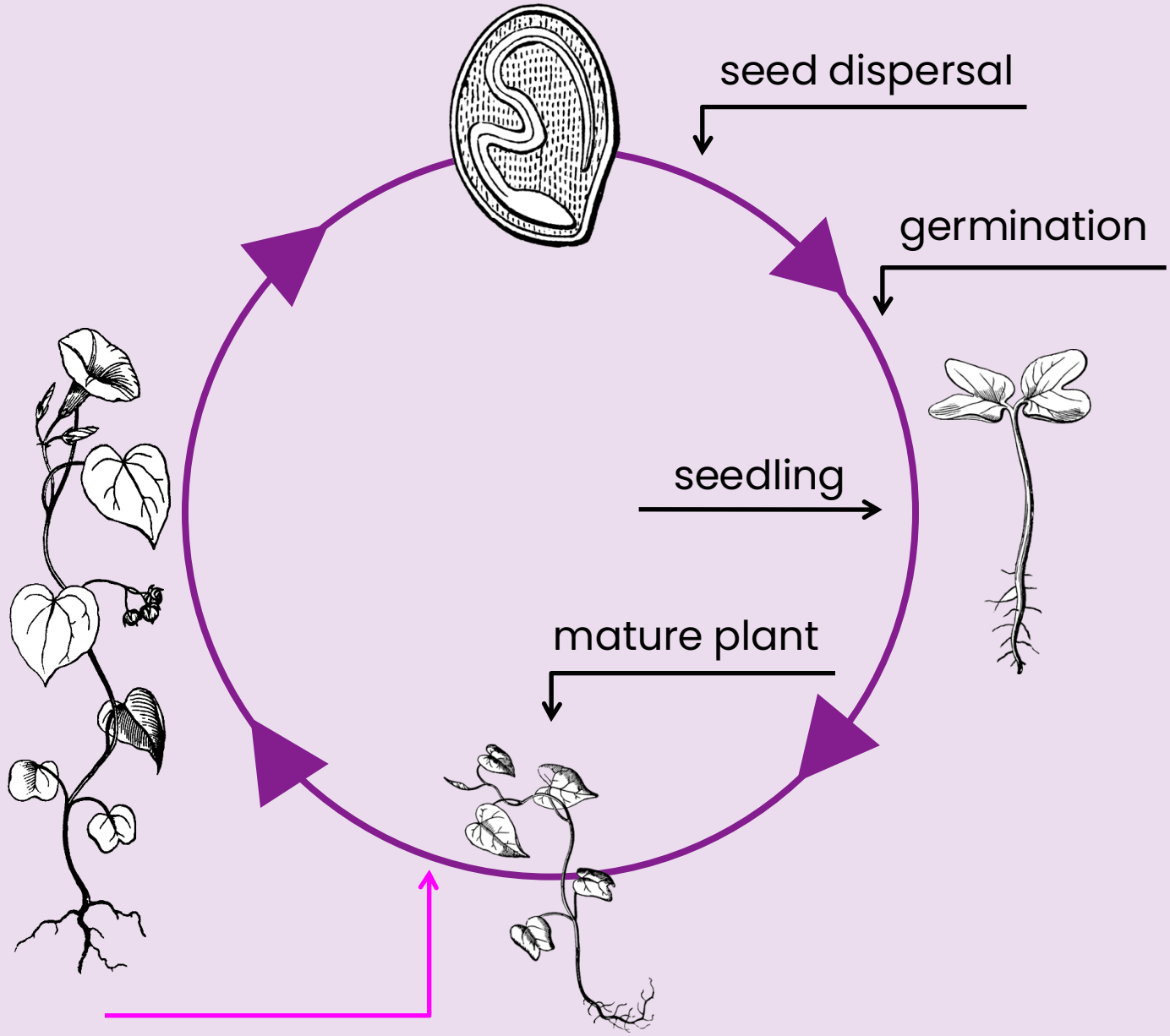
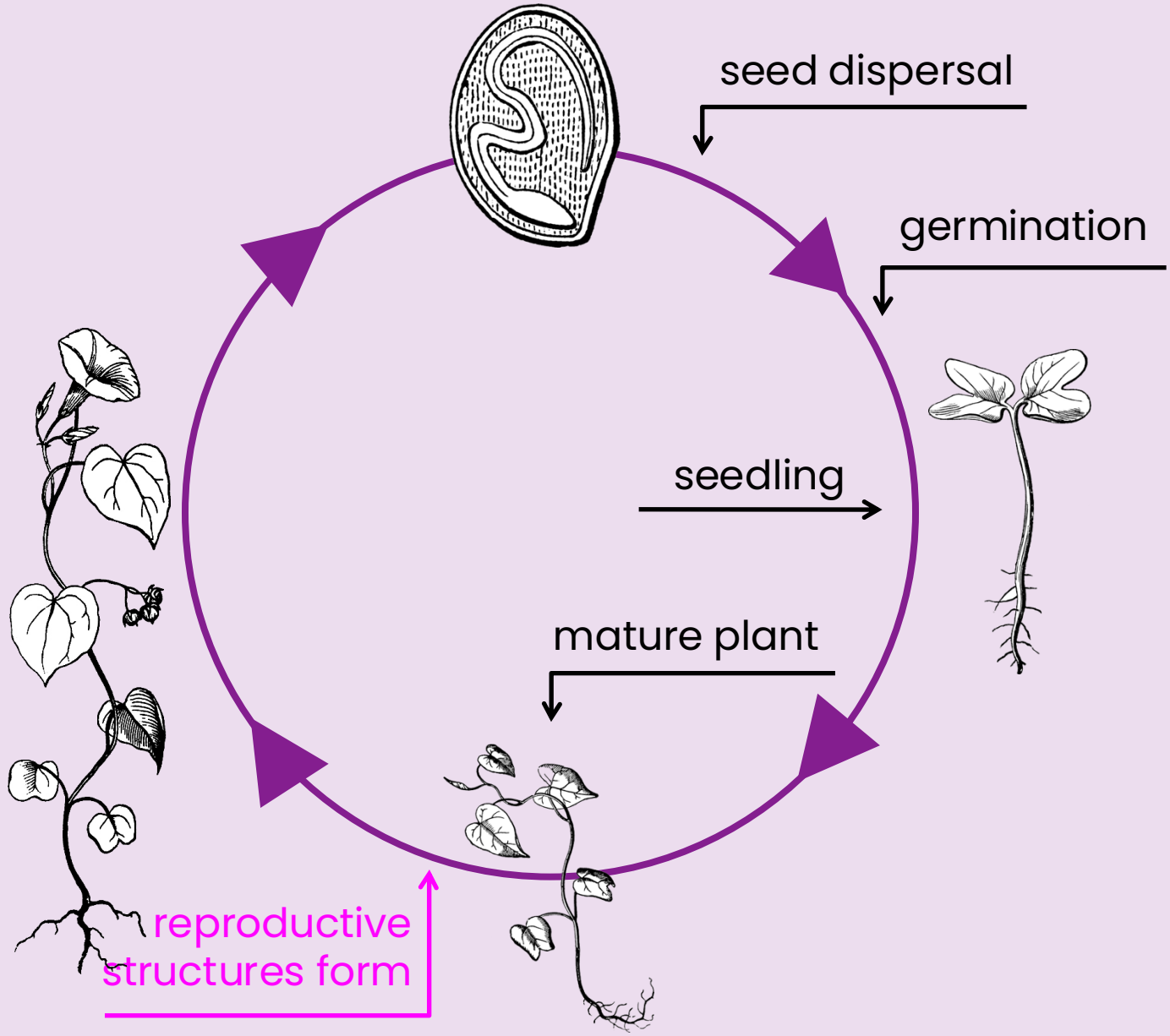
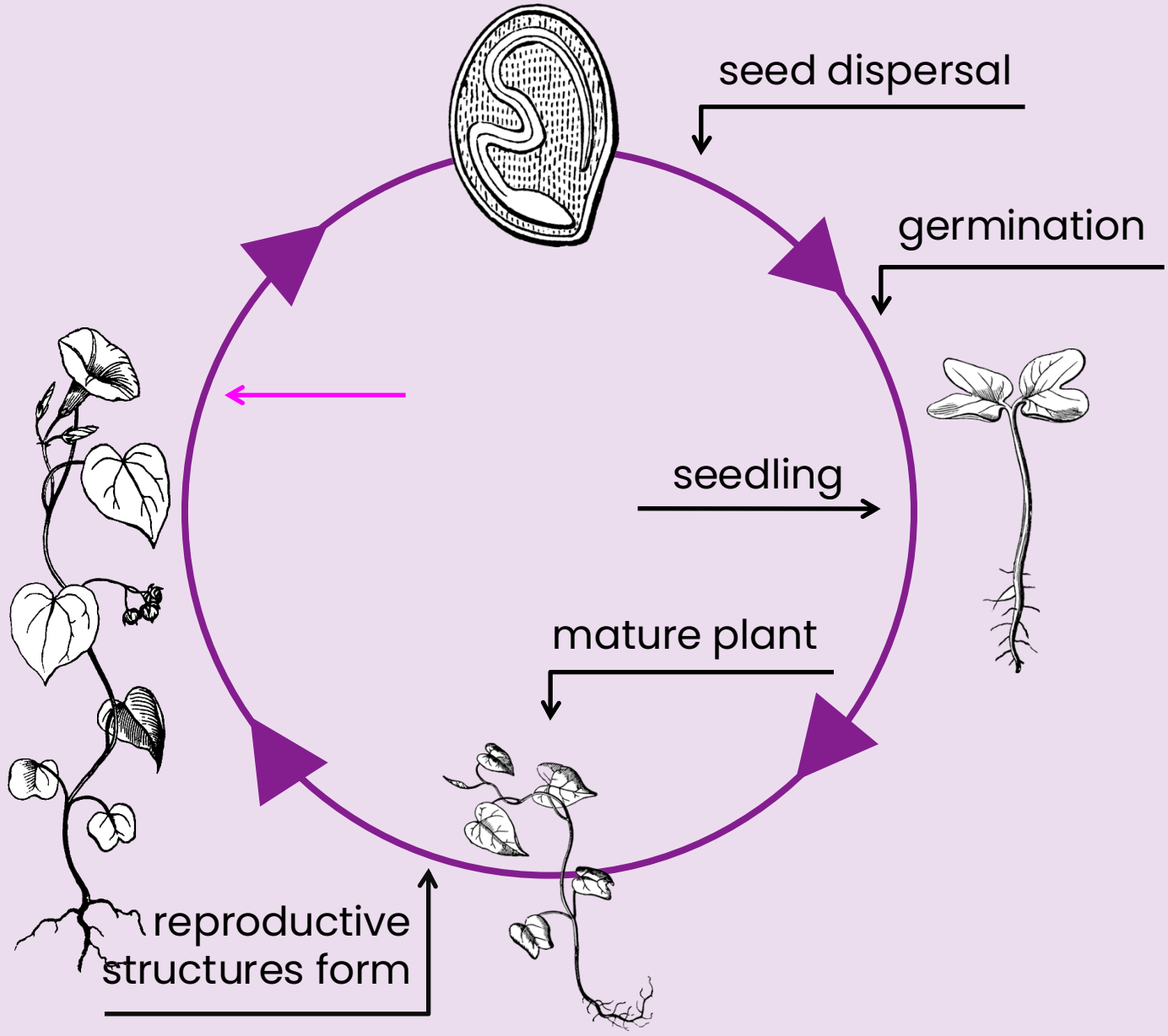
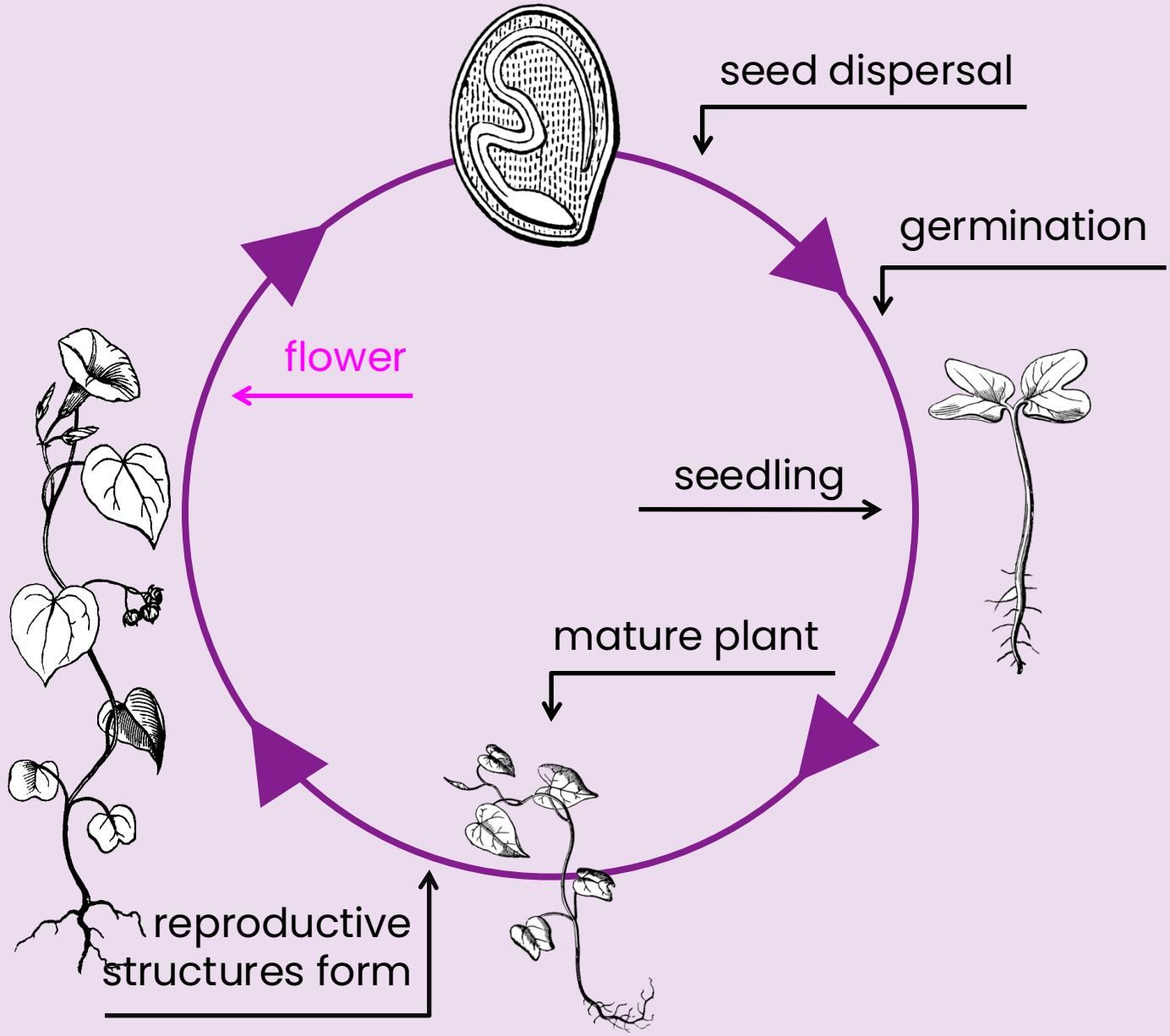


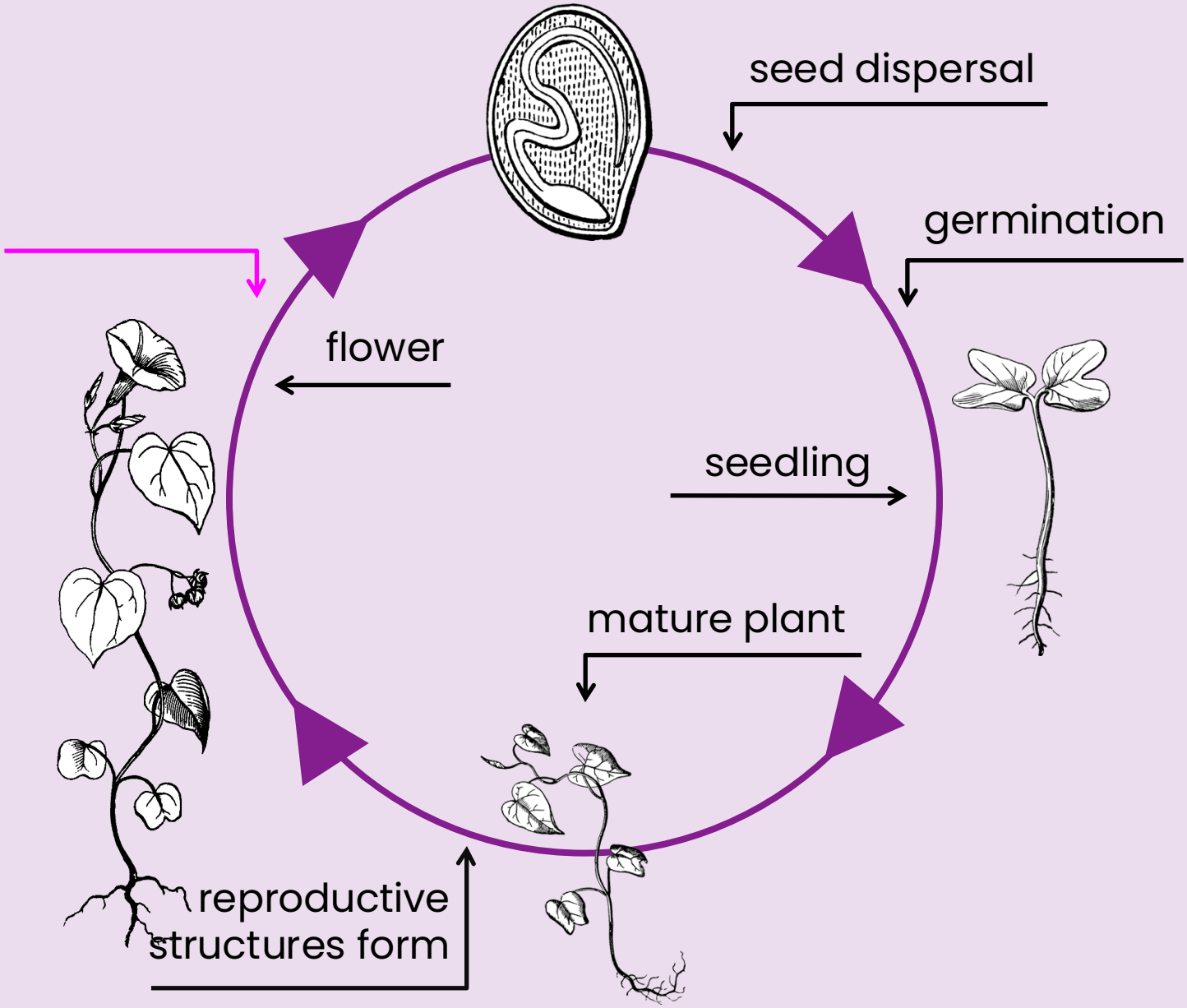


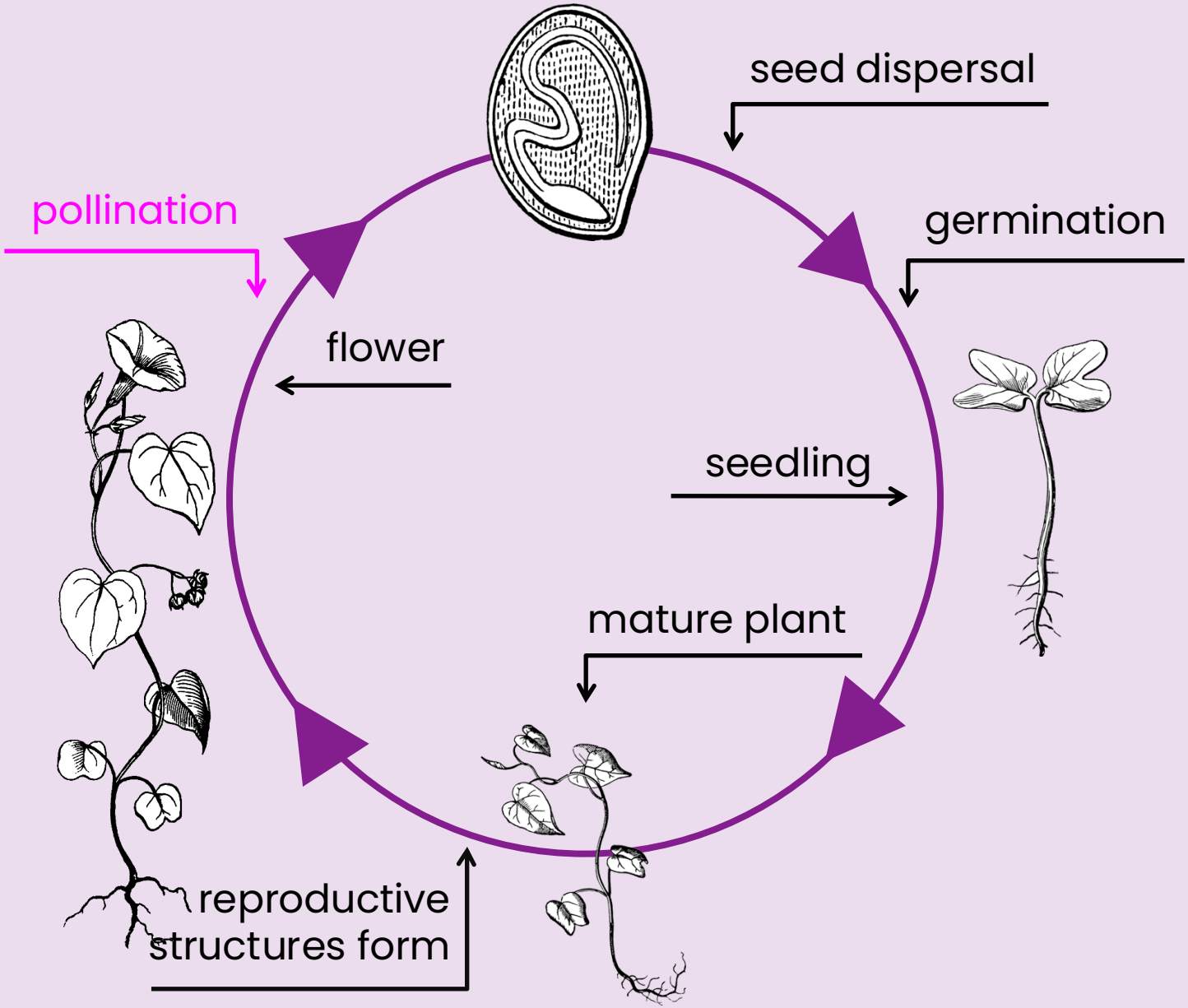


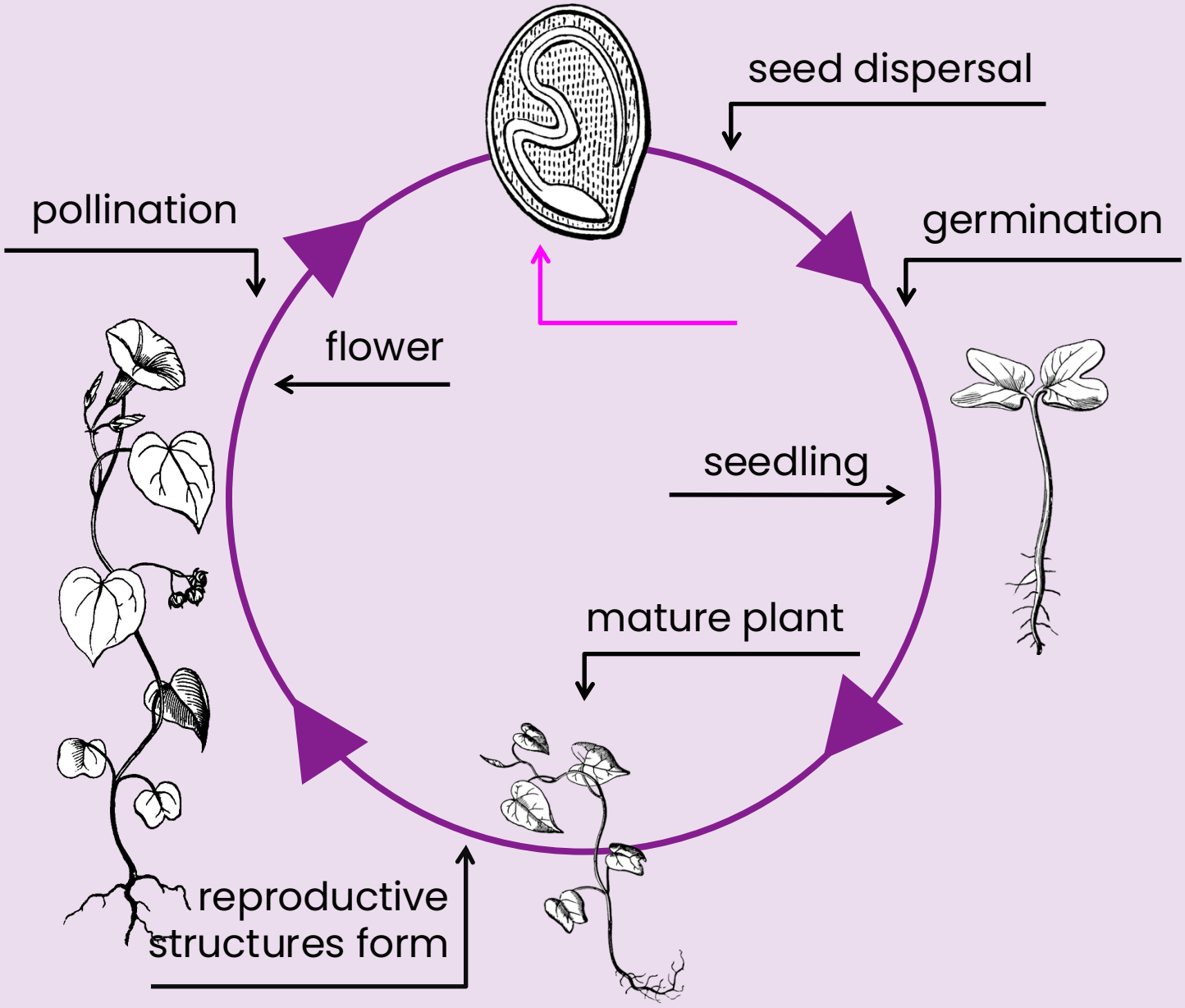


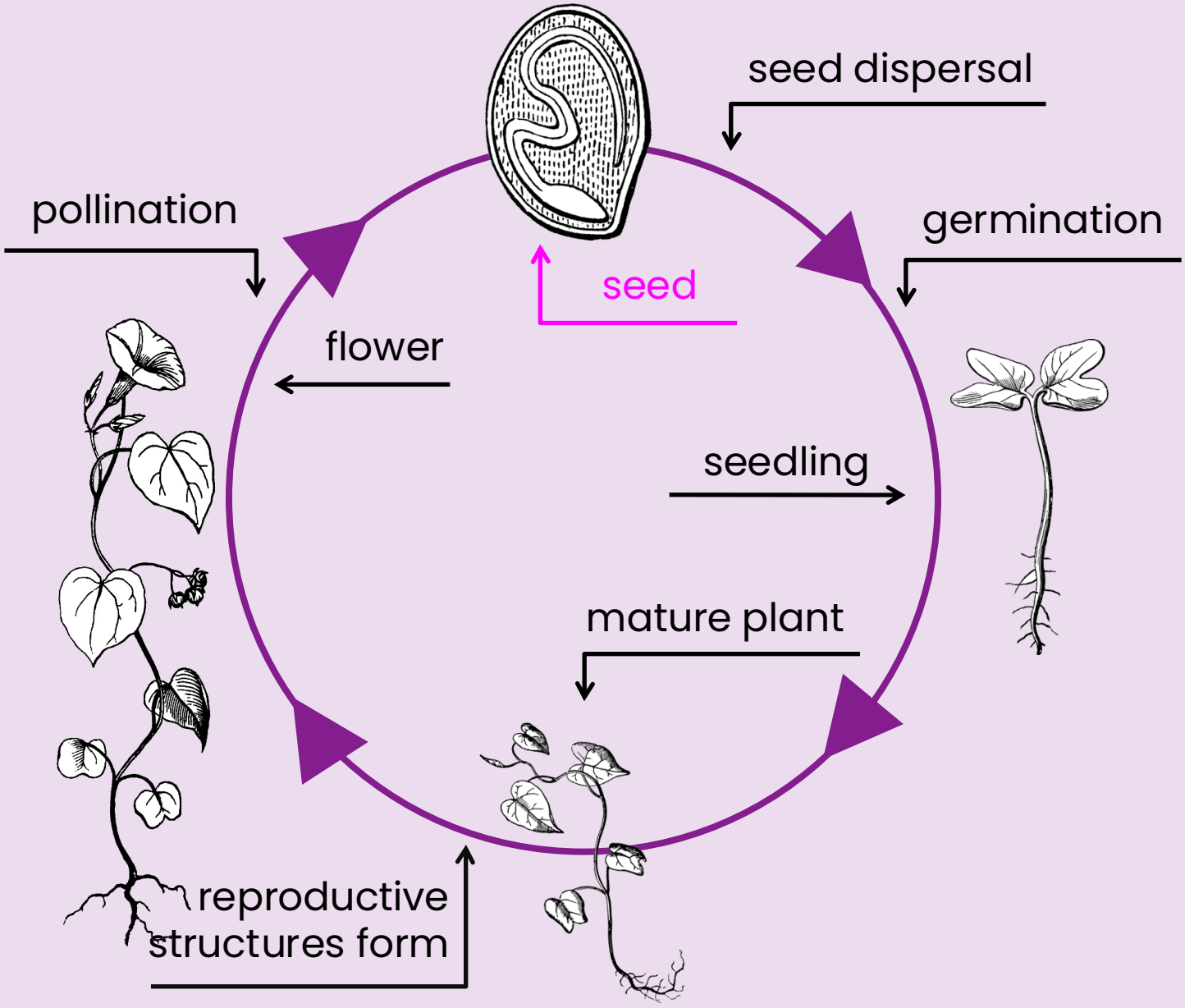


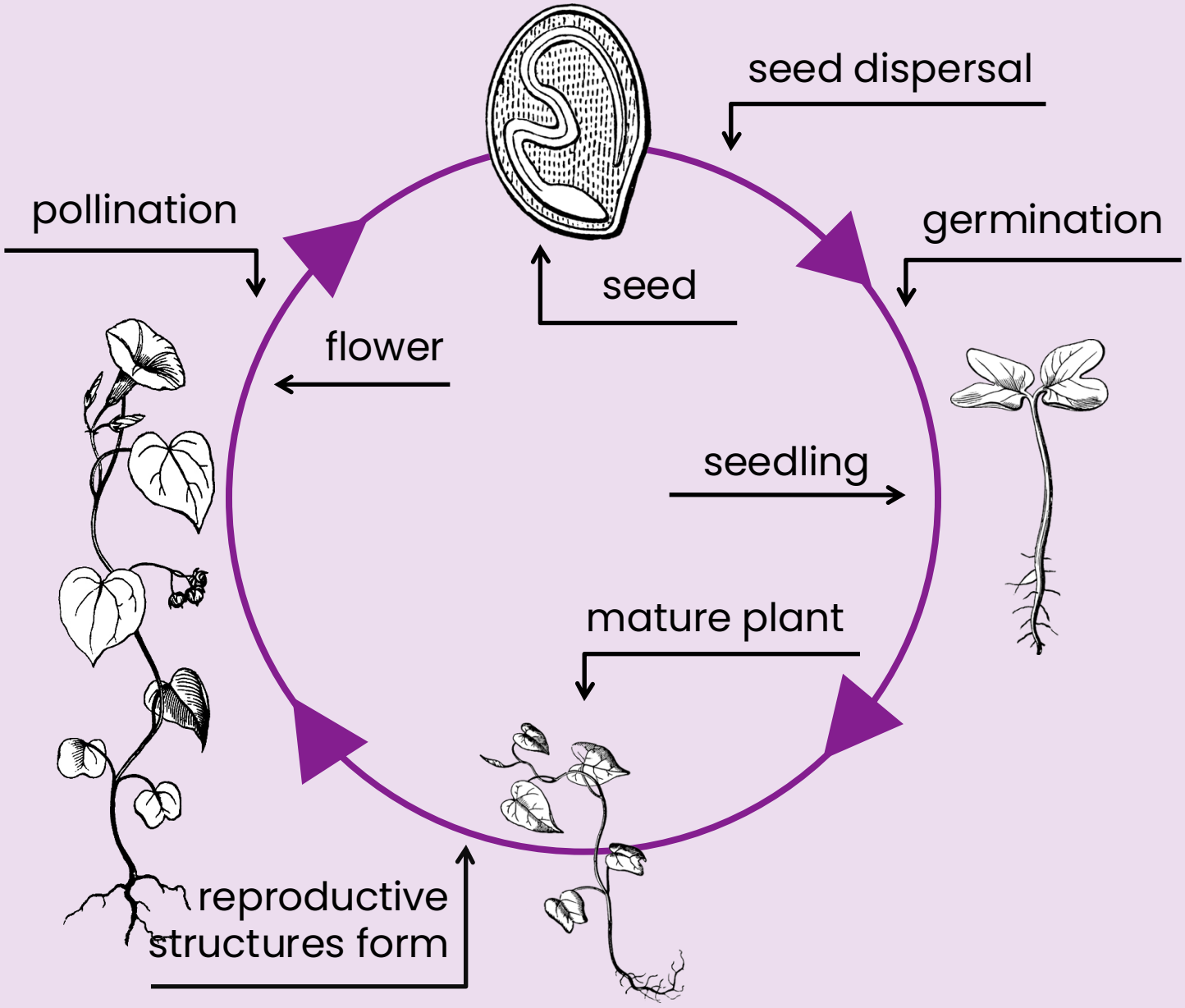








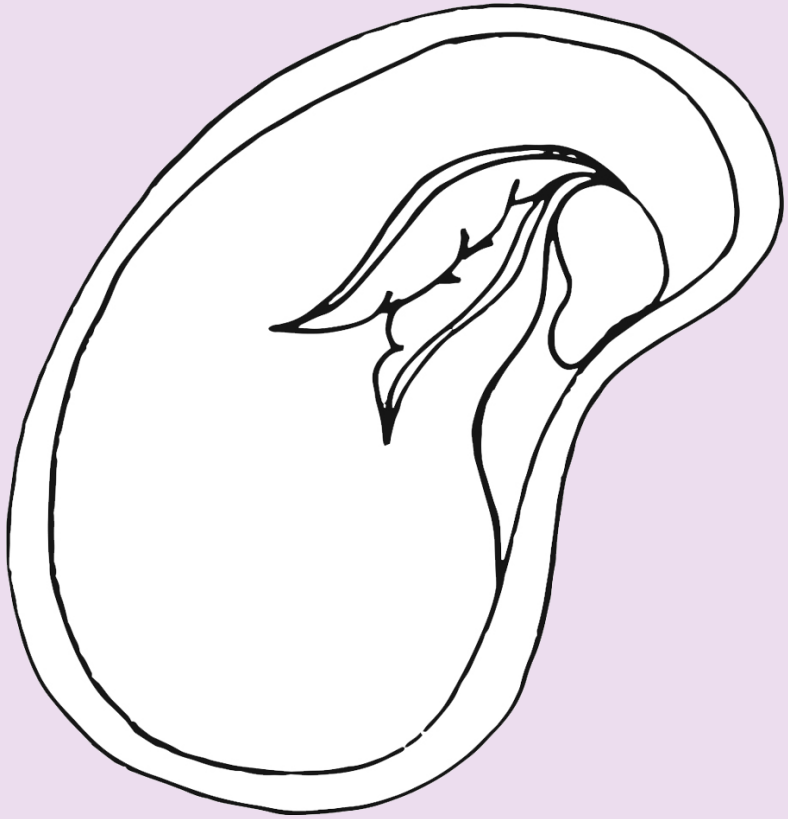




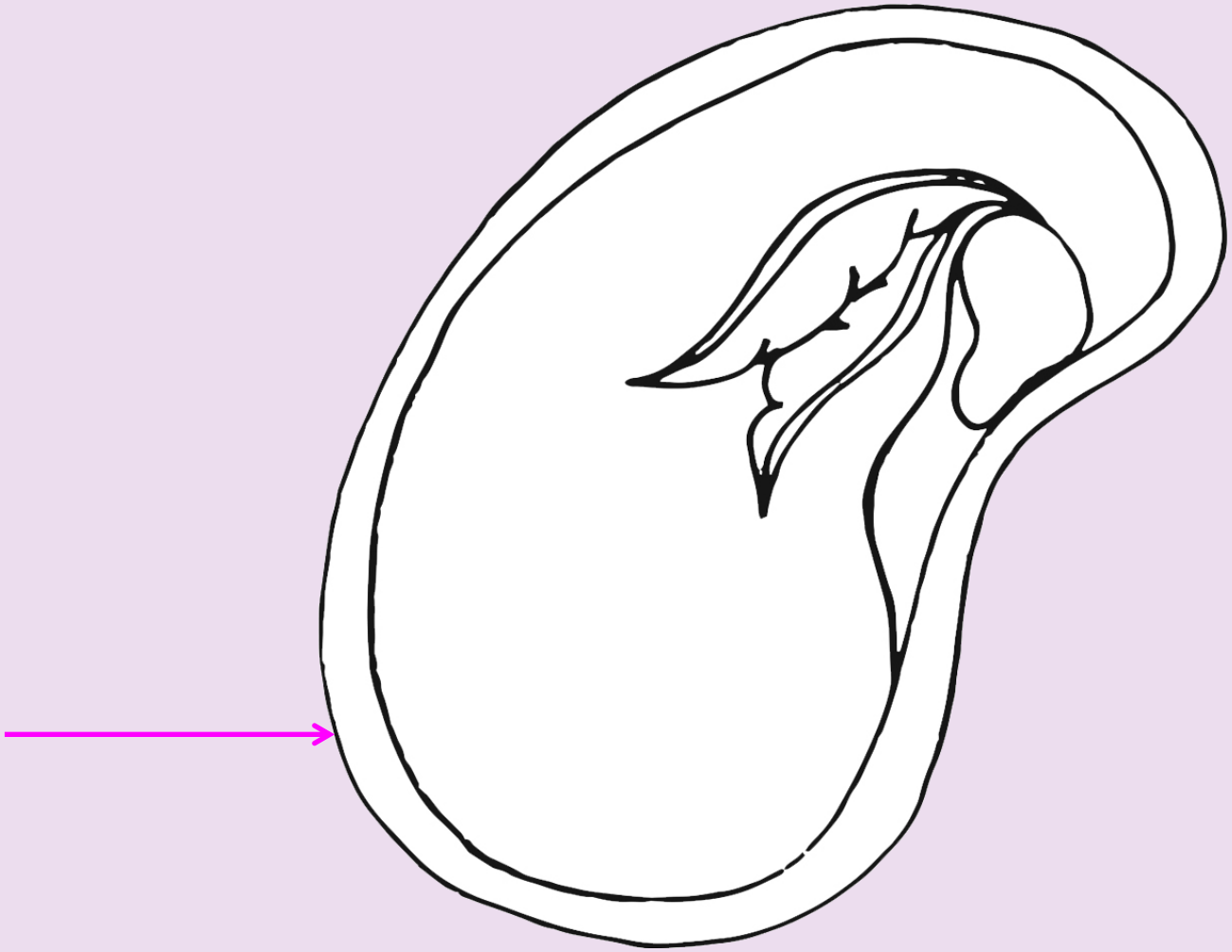
FLORIDA Wildflower FOUNDATION

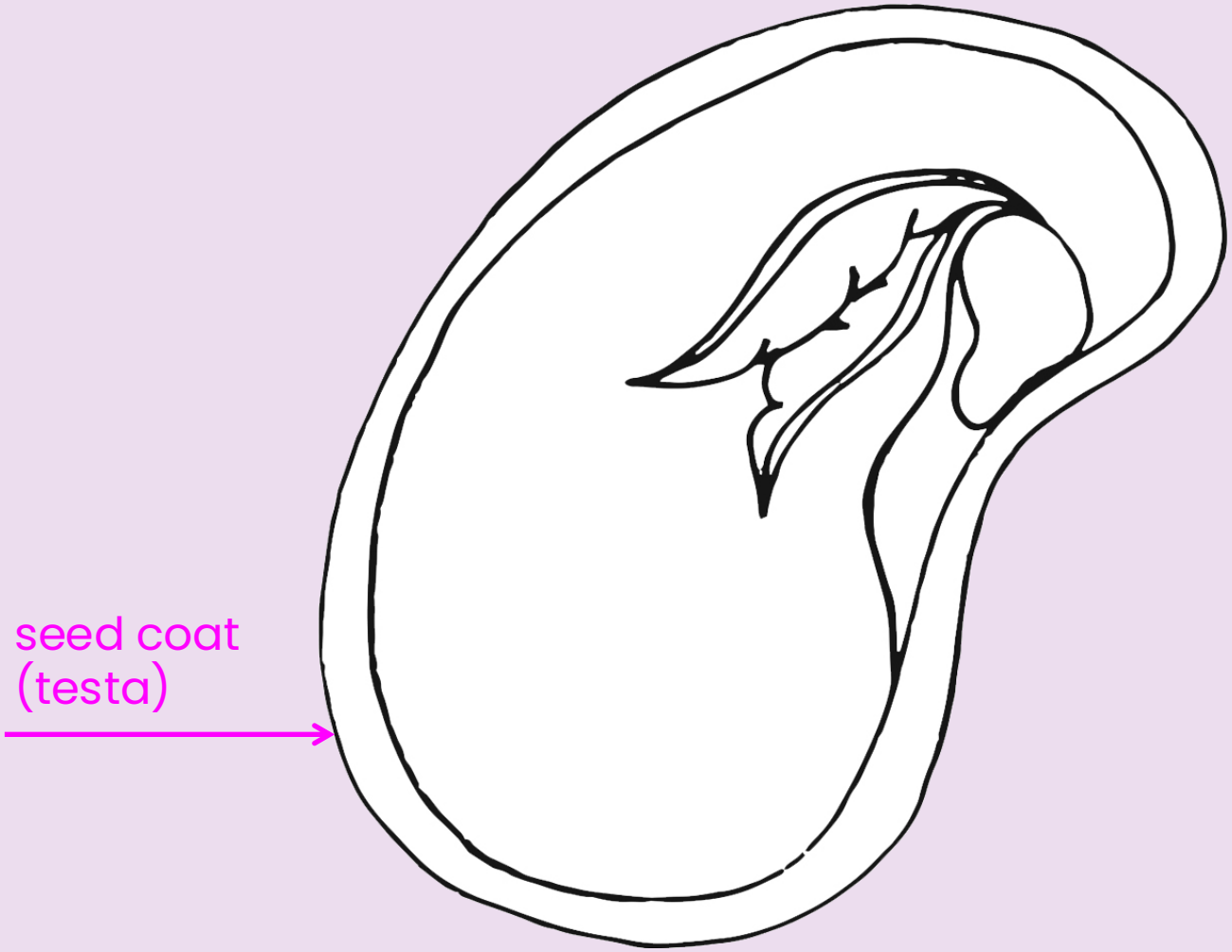
Parts of a Seed

Within each seed is almost everything needed to make a new plant.



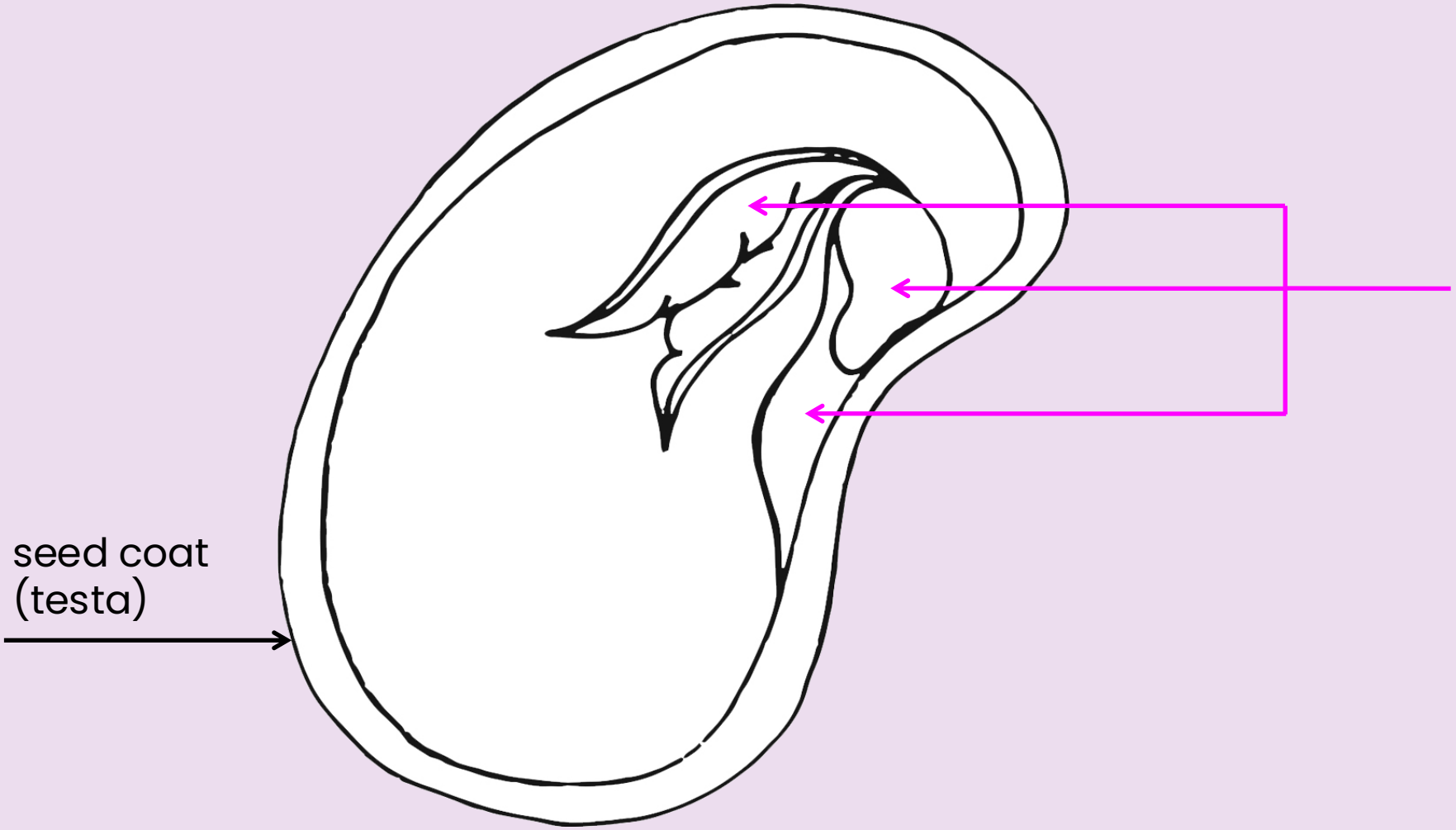
Clipart courtesy FCIT (etc.usf.edu/clipart)

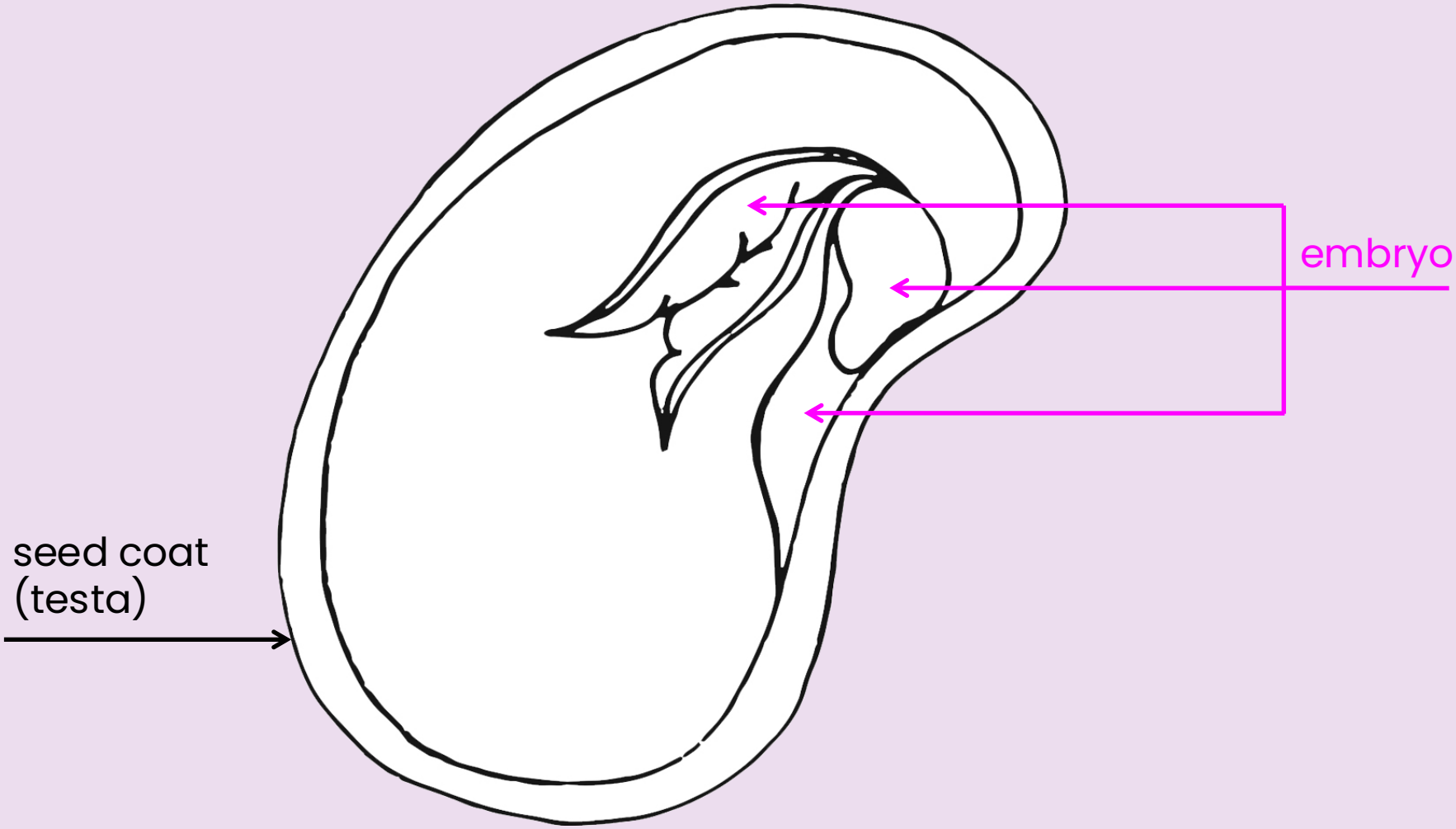




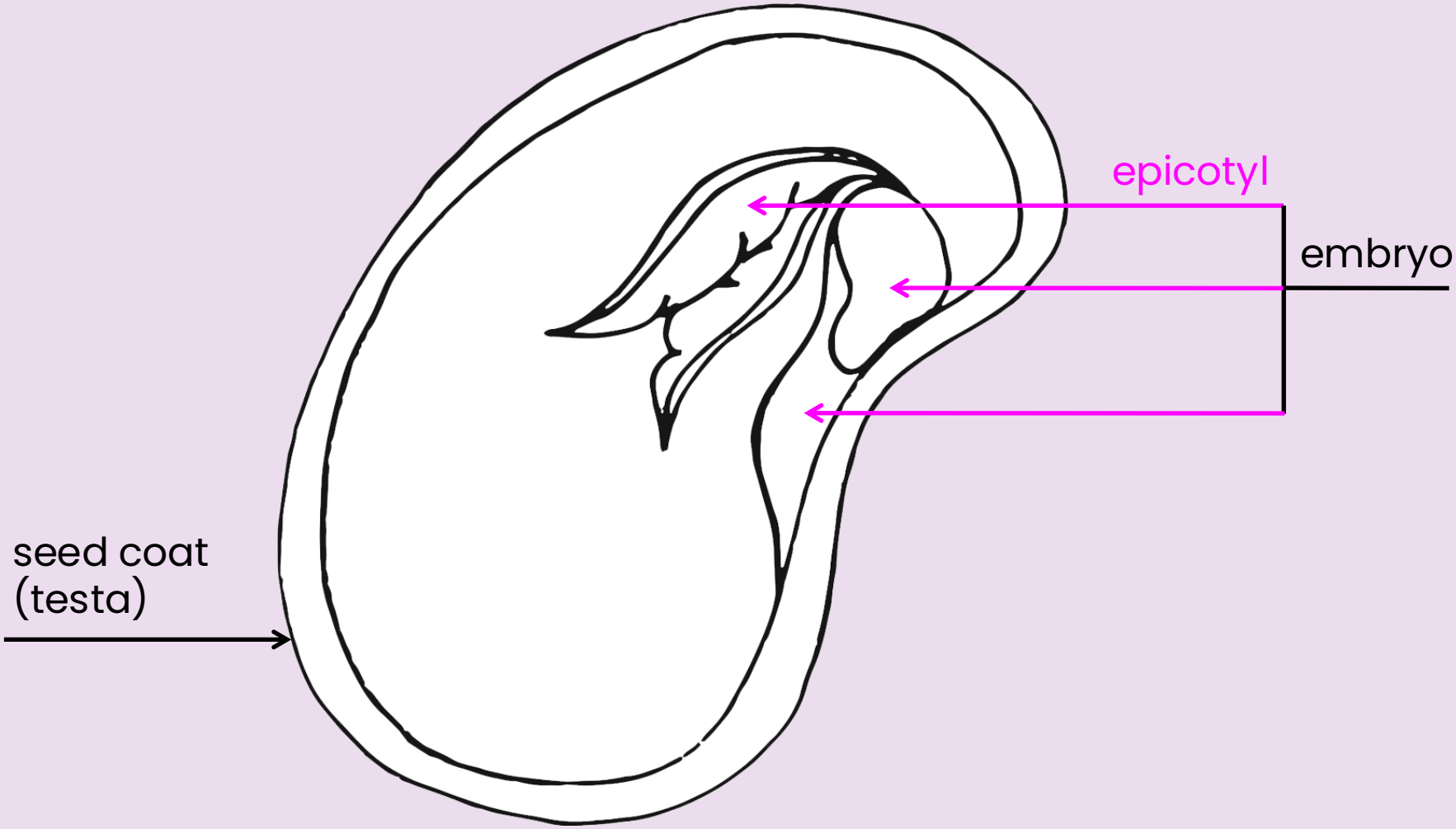
The seed coat is the protective outer layer of a seed.

It is also called a testa.

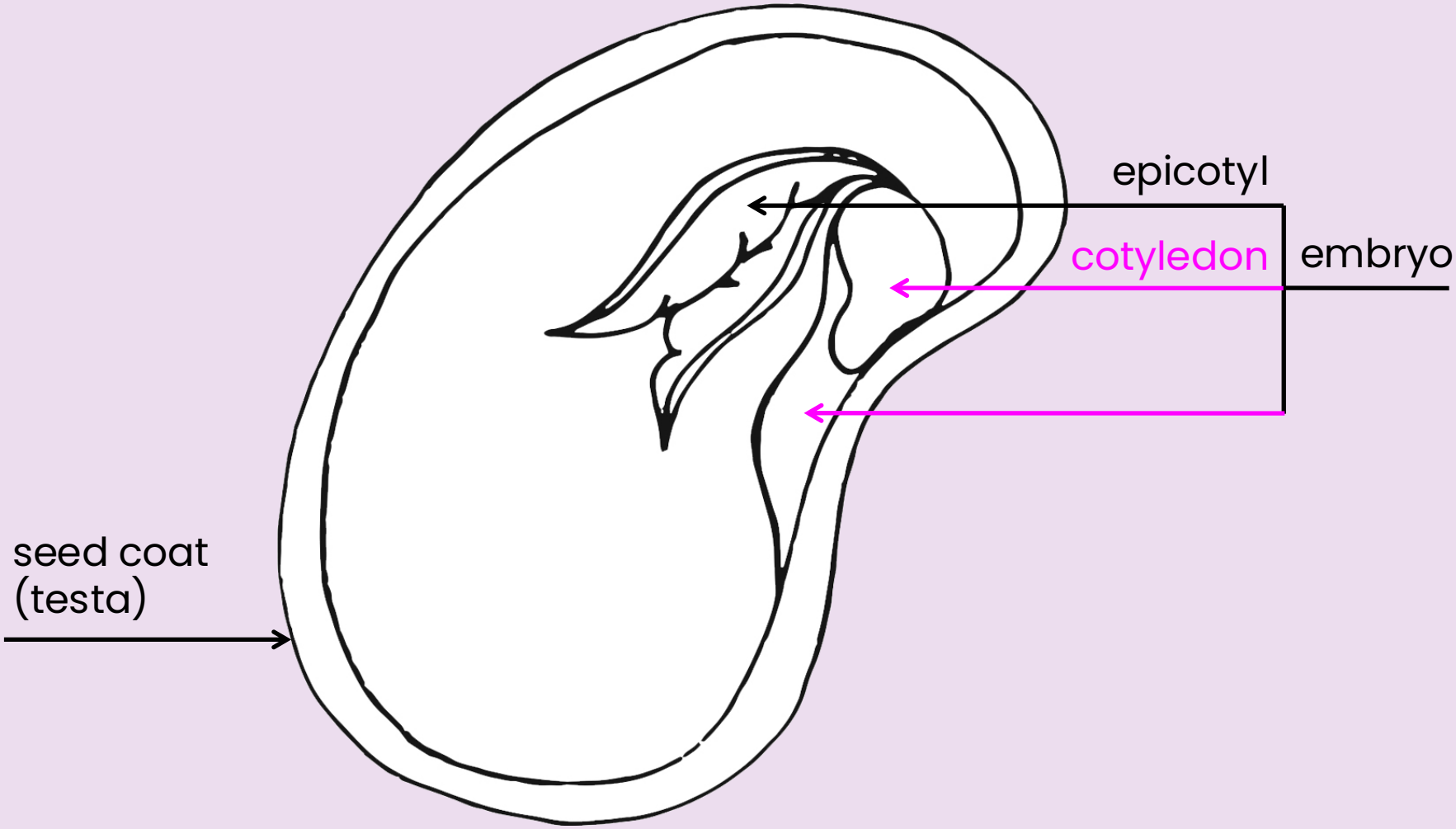




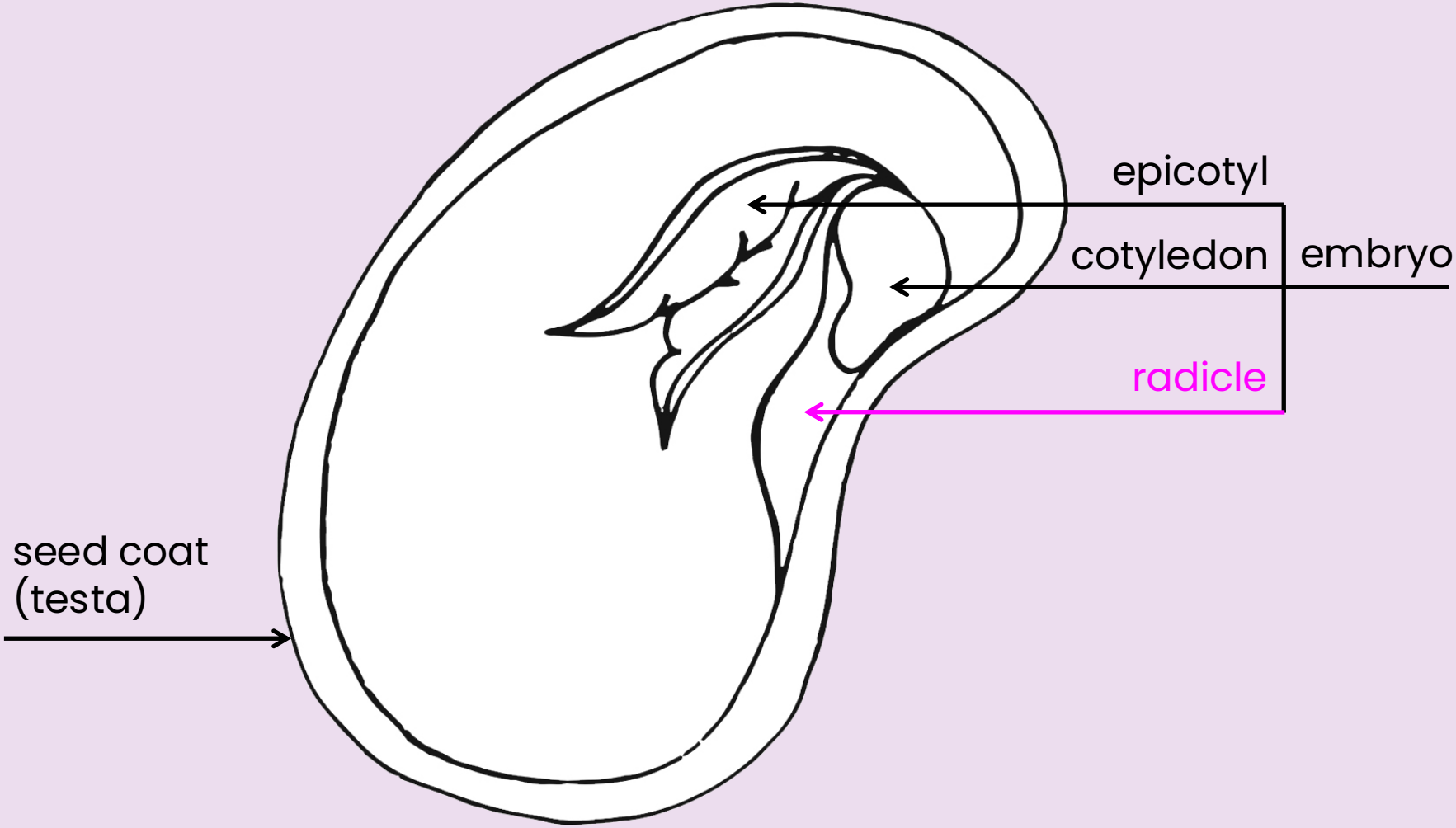
The embryo is the part of the seed that contains all the parts necessary to develop into a new plant.



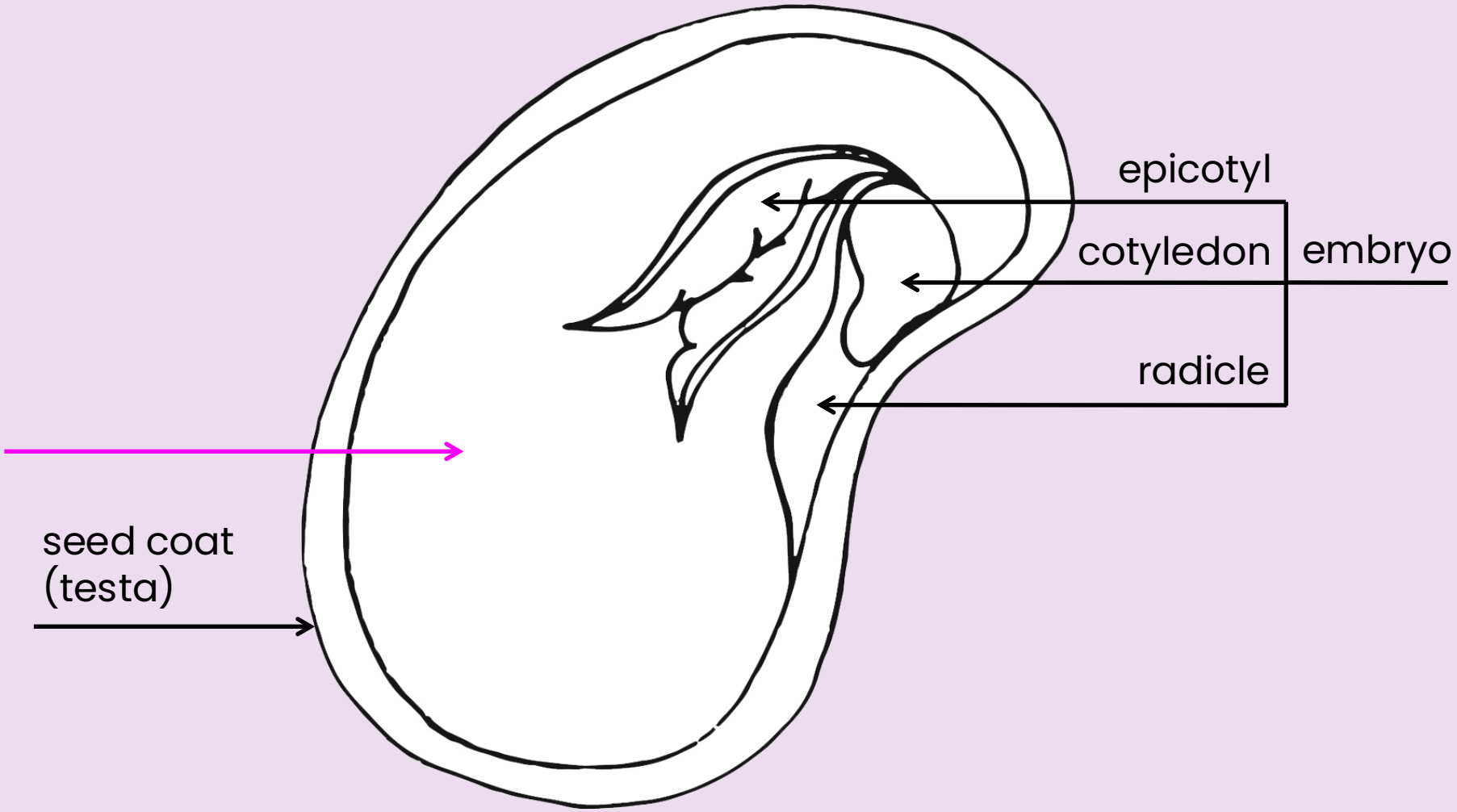
The epicotyl is the part of the embryo that becomes the shoot or stem.

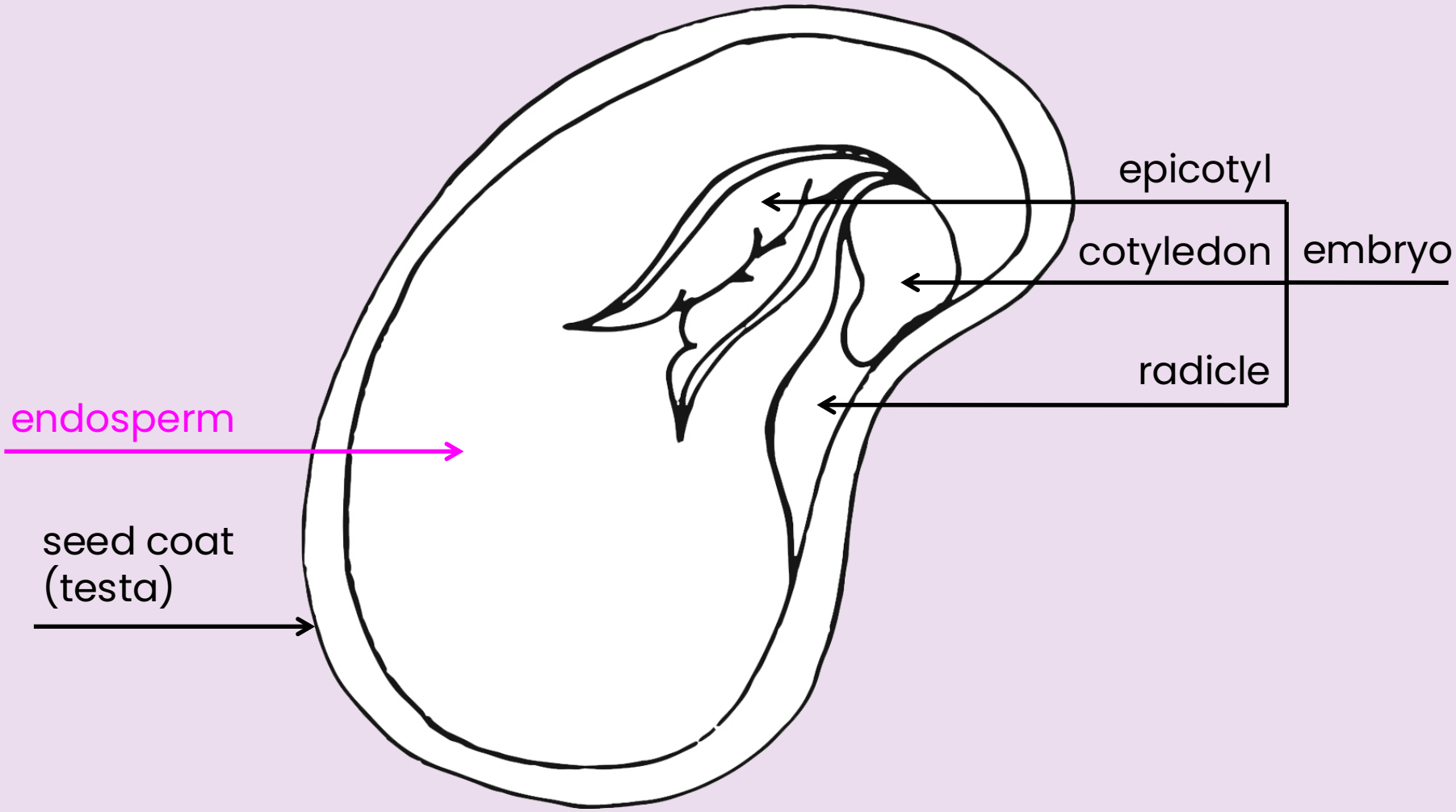


The cotyledon is also known as the seed leaf and is part of the embryo.

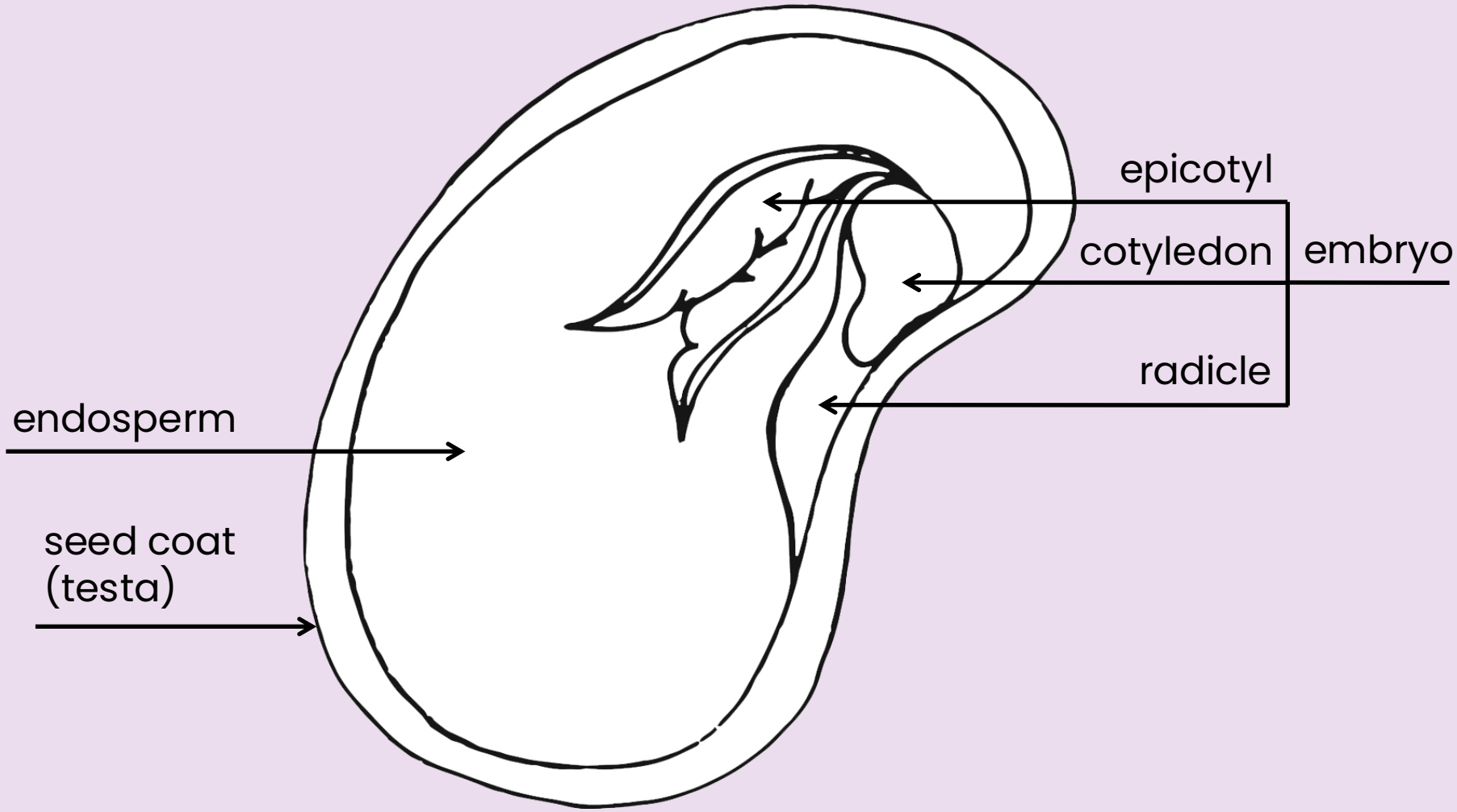


The radicle is the part of the embryo that becomes the roots.



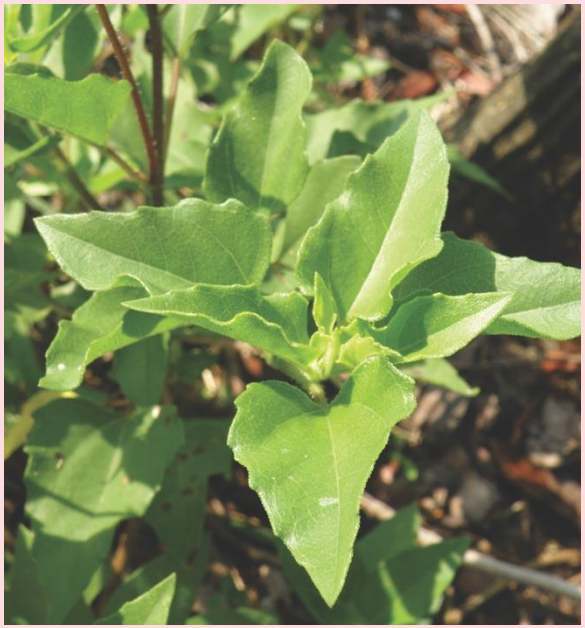


The endosperm is the part of the seed that contains the nutrients needed by the embryo to develop into a new plant.



FLORIDA Wildflower FOUNDATION

Which Yellow Flower Are You?



1.

Photos by Bob Peterson, Keith Bradley, Stacey Matrazzo

2.

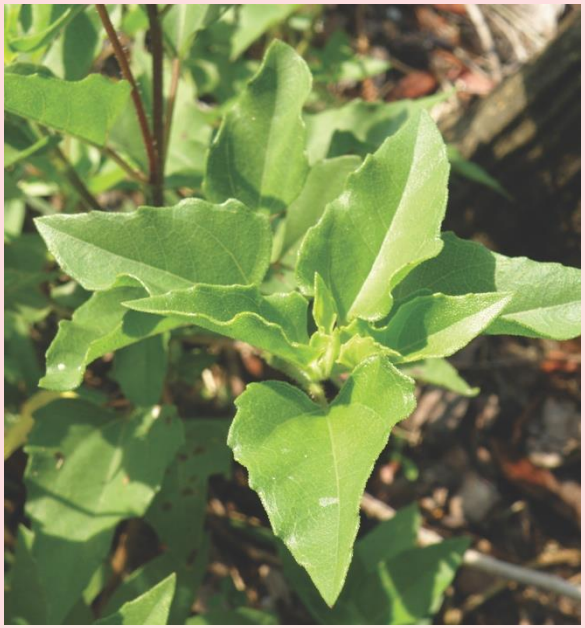
Photos by Emily Bell

3.

Photo by Bob Peterson, Mary Keim

4.

Photo by Alan Cressler, Mary Keim, Jenny Evans



1. Dune sunflower (*Helianthus debilis*)

Photos by Bob Peterson, Keith Bradley, Stacey Matrazzo

2. Partridgepea (*Chamaecrista fasciculata*)

Photos by Emily Bell

3. Pricklypear cactus (*Opuntia austrina*)

Photo by Bob Peterson, Mary Keim

4. Yellow canna (*Canna flaccida*)

Photo by Alan Cressler, Mary Keim, Jenny Evans