CURIOSITY AT HOME

GROWING TOGETHER: FLOWER CO-EVOLUTION

Many flowers are pollinated by one specific animal. Often, this animal has an unusual feature that makes it perfect for pollinating this flower! For example, hummingbirds have curved beaks that match the curve of flowers. Use these cards to build a fantastic flower, then imagine an animal to be its perfect pollinator.

Sundew (Carnivorous Plant)

Allium

English Daisy

MATERIALS

- Plant Trait Cards (listed below)
- Markers, crayons, or paints
- Paper
- Optional materials: tape, scissors, pipe cleaners, straws, glue, string, cardboard, felt — any craft supplies you have available
- Science notebook or paper
- Something to write with

PROCEDURE

- Print and cut out the cards below, or copy them on to 20 small cards. Sort them in to five piles based on their category.

COLOR Red	**SHAPE** a wide, flat, plate-shaped flower	**SIZE/STRUCTURE** A tree with flowers at the very top	**HABITAT** Snowy mountaintop	**MYSTERY TRAIT** The flowers only open at night
COLOR Blue	**SHAPE** a long, thin, pencil-shaped flower	**SIZE/STRUCTURE** An aquatic (water) plant with floating flowers	**HABITAT** Rocky desert	**MYSTERY TRAIT** So much nectar that it spills out when you bump it
COLOR Pink	**SHAPE** a baseball-sized bunch of tiny flowers	**SIZE/STRUCTURE** A grass that grows in bunches close together	**HABITAT** Muddy swamp	**MYSTERY TRAIT** The flower closes when there are loud noises
COLOR White	**SHAPE** a small flower inside a cup of large leaves	**SIZE/STRUCTURE** A vine that climbs up rocks and trees.	**HABITAT** City parks and front yards	**MYSTERY TRAIT** Sticky leaves that trap small insects

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- Pick one card of each category. This is the flower you will be creating a pollinator for.
- Draw your flower in your science notebook with markers, crayons, or paint. Include the habitat where it grows. Give your flower a name.
- Then, create a pollinator that visits this flower. Animals like slugs, honey possums, and lizards are pollinators too, so let your imagination run wild! Use the questions below to think about how this animal lives.
  - How big is your pollinator? Does sit on the flower, stand on the ground, or hover in midair?
  - What is your pollinator's mouth like? A beak, a snout, or something else?
  - How does your pollinator get around? Can it fly? Does it swim?
  - What senses does it use to locate the flower?
  - What adaptations, or special characteristics, does it have that helps it survive the same habitat as the flower?
- Draw your animal in your science notebook with crayons, markers or paint. Give your animal a species name.
- Optional: Build your flower and/or your animal with any crafting materials and recyclables you have!

EXPLORE MORE

Compare your flower to a simple flower that is pollinated by ten different kinds of insects. What would happen to your flower if your animal disappeared? What would happen to the simple flower if one of its pollinator species disappeared? Which flower would have larger consequences?

Ecologists, or scientists who study the ways the species interact, use the word "resilience" to describe how well a species can recover from a change in its environment. Which flower has greater resilience, the flower with ten pollinators or the flower with one pollinator?

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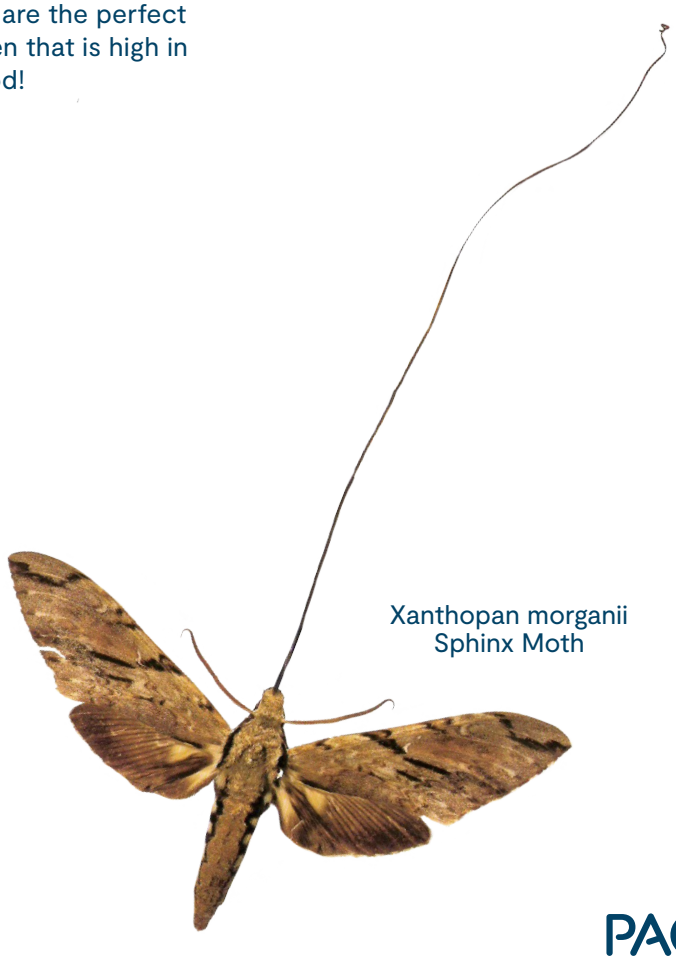
WHAT'S HAPPENING?

Predicting a never-before-seen animal from a flower is something that has really happened! In 1862, Charles Darwin was studying a flower with a 10-inch spur. He predicted that it was pollinated by a moth with a 10-inch tongue. Forty-one years later, a moth was discovered just like the one he predicted.

The flower and the moth came about through a process called co-evolution. Co-evolution happens when two organisms both get an advantage by being more specialized for each other's needs. The moth gets an advantage from its long tongue by being able to drink the flower's nectar. The flower gets an advantage from its long spur because the moth drinks from this flower specifically, and the flower is more likely to be pollinated. Since both organisms benefitted, generation after generation kept going down the same path! Co-evolution has occurred many times between flowers and pollinators. It's why flowers that are the perfect shape for bees to land on have pollen that is high in protein and makes excellent bee food!

Darwin's Orchid



Xanthopan morganii
Sphinx Moth

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K–2 GRADE EXPLORATION

- Show your invented plant to someone else in your home and have them imagine an animal to pollinate it. Did they imagine the same animal as you, or a different one?
- Compare your plant to a plant you find outside. Write two ways they are different and two ways they are the same in your science notebook.
- What body parts on your pollinator help it with getting nectar from the flower for food?
- What parts of your flower help it attract pollinators?

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3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Plants and animals have adaptations (specially evolved features) on their bodies that help them with survival, feeding, reproducing, or growing. What are some adaptations your pollinator has that will help it feed on the nectar from the plant? What adaptations does your plant have to attract pollinators?
- Scientists often sort organisms in to two categories: generalist and specialist. Generalists are species that can survive in a broad range of environments. Specialists need specific conditions in order to thrive. Is a co-evolved pair of species generalists or specialists? Explain your reasoning in your science notebook.
- Imagine that you're on an expedition into the wilderness and that you've just discovered the plant you made with your trait cards. Write a journal entry in your science notebook about the animal you predict will one day be found to match.

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6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- There are advantages and disadvantages to co-evolution. On one hand, a co-evolved pair benefits from being specially evolved to "work together". On the other hand, they are very vulnerable to harm if their co-evolved partner organism goes extinct. If you got to choose, would you rather be a pollinator that specialized by co-evolving, or one that feeds on nectar from a bunch of different plants but has to compete with other pollinator species? Write down your preference and your reason for choosing in your science notebook.
- An ecosystem has more than one plant and one animal in it. Building from the two organisms you made, create a whole imaginary food web with at least two other plants, one other herbivore, one carnivore, and one decomposer species. What eats what in your new ecosystem?