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Science Lesson 1: Exploring the Relationships between Animals and Plants

*Adapted from "Discovering the Partnership Between Plants and Insects"
from the North American Pollinator Protection Campaign*

Overview: Students observe animals interacting with plants in the schoolyard, collect data, and analyze their data, to develop hypotheses about plant/animal relationships.

Time: 45-60 min

Prep: survey schoolyard for good sites for observation

Materials: data collection and summary sheets (student version and class version)

Vocabulary: pollination, pollen, pollinator, anthers, stigma, predator, prey, herbivore

Engage prior knowledge: 0:00-0:05

Discussion:

- Who has a garden or farm at their home, or at a family member's home? Or has visited one? What animals have you seen visiting flowers? Can you identify any of them by name? Why do you think animals visit flowers? (Be open to a range of responses and ask students to explain their reasoning. For example, "I think hummingbirds are drinking nectar because I know they need a lot of energy for their flying." Or, "I think the beetles are tired because they land on flowers and don't move much.")
- Record relevant vocabulary words on the board as students use them: nectar, pollen, pollination, prey, predator, names of insects, etc. Help the students retrieve the words or offer synonyms if they are not sure of a word, but don't define the words or mention pollination unless they describe it.

Lesson: *Schoolyard Observation*

Introduction: 0:05-0:10

- Ask students, are all those animals doing the same thing? How could we figure out what they are doing when they visit flowers? Scientists who study animals spend a lot of time observing animals in their natural habitats to see patterns in their behavior.
- Tell students they are going to go outside to observe flowering plants and the animals that interact with them. They will work in pairs or small groups to observe an area for



10 minutes and document the animals they see and what they're doing. They will also draw and write about the flowers they observe.

- Share the data sheet and review the different categories. Tell students they do not need to write in complete sentences—they may need to write words quickly to capture the changing behavior of the animals they observe.
- Students can collect data as a pair or small group on one sheet or individually. If they work in a pair or group, have them take turns writing and drawing.
- Ask students, what are good practices for observing animals and plants? Write them on the board. Include:
 - Observe quietly—keep your body calm and voice low so you see more animals.
 - Give stinging insects space. If a wasp or bee flies near you, stay still, don't swat it. If you leave them to their work and don't interfere, they will ignore you.
 - Get close to observe flowers and insects, but don't pull off any living parts of the plant.

Outside Observation: 0:10-0:20

- Each pair or team chooses a 5 x 5 foot area with flowers to observe for 10 minutes (good options include flowering trees or bushes where students can get close to flowers, or small plants)
- Circulate to make sure students are recording observations as they go.
- Before returning to the classroom, debrief with a couple observations from pairs

Data gathering in classroom: 0:20-0:30

- Have each team record their observations on the class version of the data sheet (chart paper, smartboard or computer)
- As groups are waiting to record data, ask them, What did you observe? Invite them to look for patterns in their own data. Did they see many kinds of animals on flowers, or just a few? Did they see animals doing the same behaviors, or did they see a wide range of behaviors? Did they see more activity on some flowers than others?



- Ask pairs/groups to write two sentences summarizing patterns in their observations. Offer sentence stems: We observed _____. We noticed _____.
- Ask them to make hypotheses about what they observed. For example, “We think the reason we saw several butterflies on the yellow flowers and none on the white flowers is...”
- Ask them to come up with 2 questions they have about something they observed.

Reflection: 0:30-0:40

- Look at the class data together. Do you see patterns? Have each group share their summary sentences. Are you hearing any patterns from the different group observations?
- Affirm their accurate observations of plants and different animal pollinators: wasps, bees, flies, beetles, hummingbirds, bats, moths, and butterflies are visiting flowers to collect nectar and/or pollen. Ask them if they could see pollen on any of the animals. Along the way, they carry pollen from flower to flower.
- Also affirm accurate observations of other plant/animal relationships:
 - Predator-prey relationships: some insects, like ladybugs, may be on flowers looking for aphids, which suck sap out of plants.
 - Food relationship (insect herbivores): Insects like grasshoppers may be looking to eat the flower/plant, not its nectar or pollen, and they do not help with pollination.
- Have them share their hypotheses and questions with the class. Record on a chart or in a document for future exploration.

Pollination Review and Reflection: 0:40-0:50

- Affirm any accurate student comments about pollination and review basic principles of pollination:



- Animals like wasps, hummingbirds, flies, bats, beetles, moths, and butterflies go to flowers to eat nectar. As they move from one flower to another they collect pollen and then leave pollen behind, which may pollinate the flower.
- Bees are often the best pollinators because they go to flowers to purposefully collect pollen as well as to eat nectar.
- Pollination is the movement of pollen from the anthers (male part) of one flower to the stigma (female part) of another flower.
- This allows the plant to create a seed (to reproduce). Most flowers are pollinated by animals, and some are pollinated by wind.
- Ask students, what would happen if either the flowers or the animals were removed from this ecosystem? (Take a few ideas.) Introduce the term *interdependent*: the flowers and animals are dependent *on each other*. If one part of an ecosystem is removed or changed, all the connected parts are affected. Tell students, This year you'll be observing how plants change throughout the seasons. How do you think plant changes impact animals? For example, what if there were a warm spring, and the flowers opened earlier than normal? What might happen to animals that visit flowers to collect nectar or pollen?



Next Generation Science Standards (NGSS)

Disciplinary Core Ideas (DCIs)

5th Grade:

5-LS2 Ecosystems: Interactions, Energy, and Dynamics

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. *A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.* Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

3-LS1 From Molecules to Organisms: Structures and Processes

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

Middle School:

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. *[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]*

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. *[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]*

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)



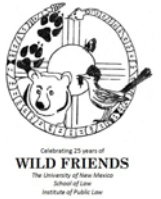
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. *Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.* (MS-LS2-2)

MS-LS1 From Molecules to Organisms: Structures and Processes

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. *[Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury].*

LS1.B: Growth and Development of Organisms

- Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)



Science and Engineering Practices (SEPs)

4th Grade:

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence, data, and/or a model. (4-LS1-1)

5th Grade:

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events. (5-LS2-1)

Middle School:

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.



Crosscutting Concepts

4th + 5th Grade:

Systems and System Models

- A system can be described in terms of its components and their interactions. (4-LS1-1),(4-LS1-2)

Middle School:

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)

Animal and Plant Observation Class Data Sheet

	Animal (Dot● = 1 individual)	Behavior (1-2 words)	Flower Name (if you don't know it, leave blank)	Flower Shape (draw)
Bee				
Butterfly				
Bird				
Beetle				
Other/I don't know				

Name _____ Date _____

Animal and Plant Observation Sheet

Animal Name (if you don't know it, describe it)	Behavior (flying, crawling, fighting, drinking nectar, where they are on flower, are there more than one, etc.)	Flower Name (if you don't know it, leave blank)	Flower Shape (describe or draw)	Flower Colors	Flower Scent

Summary Sentences: Look for patterns in your data. What do you notice?

Sentence stems: We observed _____. We noticed _____

Hypothesis: What ideas do you have about the patterns you observed?

Sentence stems: We think _____ because _____.

Questions: What do you want to find out?



Science Lesson 2: What's Important about Pollinators?

Adapted from "A Closer Look at Flowers" and "What's the Buzz about Bees" lessons from NSTA

Overview: Students study pollinator syndromes, examine flowers up close, and predict pollinators for their flowers.

Time: 60 min

Pre-teach: Tell students pollinators and flowers have a kind of "code" called a *pollinator syndrome* that describes which pollinators are attracted to which flowers. Have students read the chart "Pollinator Syndromes." Then ask them to look for examples of the pollinator syndromes while they watch the 4-minute video "[The Beauty of Pollination.](#)"

Prep: Get flowers to examine (one per student—*see note below*).

Materials: chart "Pollinator Syndromes" (one per student), worksheet "What's Important about Pollinators" (one per student), hand lenses, fresh flowers (at least one per student)

***How to get flowers:** a week or two before the lesson call local grocery stores or florists and ask them to set aside flowers they can't sell for you to pick up a day or so before your lesson. (You will need at least one intact flower per student). The best flowers are large ones with easily identifiable parts, like lilies, *Alstroemeria* (also called Peruvian lily), tulips, daffodils, or gladiolus. (Daisies and many other flowers have reproductive structures that are hard to see, however you may want to get a few of those flowers for students to compare). You can also invite students to bring flowers from home gardens.

Vocabulary: pollination, pollen, pollinator, anthers, stigma, pistil, stamen, pollinator syndrome

Engage prior knowledge: 0:00-0:05

- What examples of *pollinator syndromes*, or the connection between a flower's characteristics and the pollinator who visits it, did you observe in the video? (If students get stuck, here are some examples from the video: bats visiting white flowers that open at night, hummingbirds visiting orange tubular flowers, and bees visiting blue and yellow



flowers. Students could also share their own observations of pollinator syndromes at home or school gardens, for example if they have seen hummingbirds visiting orange trumpet vine flowers, moths visiting white flowers at night, etc.)

Lesson: 0:10-0:50

- Now that you know more about the secret flower code, today you will be examining flowers up close, learning about the parts of a flower, and then making a hypothesis about which pollinator would visit your flower.
- Have students sit in groups so they can share their observations, but give each their own flower. In addition to the flowers for each student, it is interesting for students to have a couple of different flower varieties at their table to compare/contrast.

(These steps are also outlined in the student worksheets)

1. **Examine flower:** First invite students to spend a few minutes just looking at their flower, smelling it, using a hand lens to examine details, and sharing what they observe with a partner. (Remind them to handle it gently so it will last throughout the class period.)
2. **Sketch flower:** Next have students sketch their flower. They may need to remove petals to see a cross-section and the reproductive structures inside. Remind them to use the whole space, or even an additional sheet of paper, and draw their flower large enough that they can include small details. The flower diagram on the back of their worksheet will help them label the reproductive structures.
3. **Document characteristics:** Next have students describe the characteristics of their flower related to its pollinator syndrome or “flower code.” They can use the “Pollinator Syndromes” chart to help identify the characteristics.
4. **Hypothesize:** In conclusion, students write their hypothesis about what pollinator would visit their flower and explain their thinking.

Reflection/Discussion: 0:50-0:60



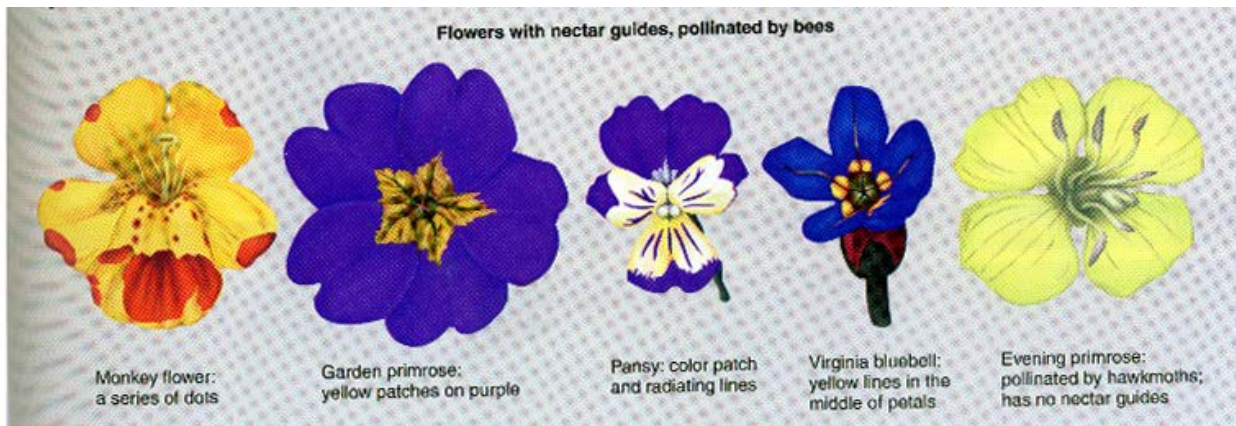
- Invite students to share their flower characteristics and hypotheses for pollinators with a partner or their table group. Have a few students share with the whole class. Keep track of any questions or topics for further study that come up during the discussion.

Name _____ Date _____

Student Worksheet: What's Important about Pollinators?

Examine your flower carefully. Does it have a scent? What does it feel like? Does it look like a flower you've seen before? What parts of the flower can you identify? Use your hand lens to get a closer look. Tell a partner a couple things you notice about it.

Look for patterns on your flower. **Nectar guides** are colorful patterns or spots on flower petals that guide a pollinator into the portion of the flower where the nectar can be found.



Now look for the **anthers**, which have the powdery pollen, and the **stigma**, the sticky part that the pollen attaches to. Imagine a bee, butterfly, or other pollinator landing on your flower and dropping off pollen it has picked up from another flower, as well as picking up new pollen.



Sketch your flower, and include all the parts you can see. Use all the space in the box so you can show detail! If you cannot see the inner parts of the flower, carefully remove a couple petals.

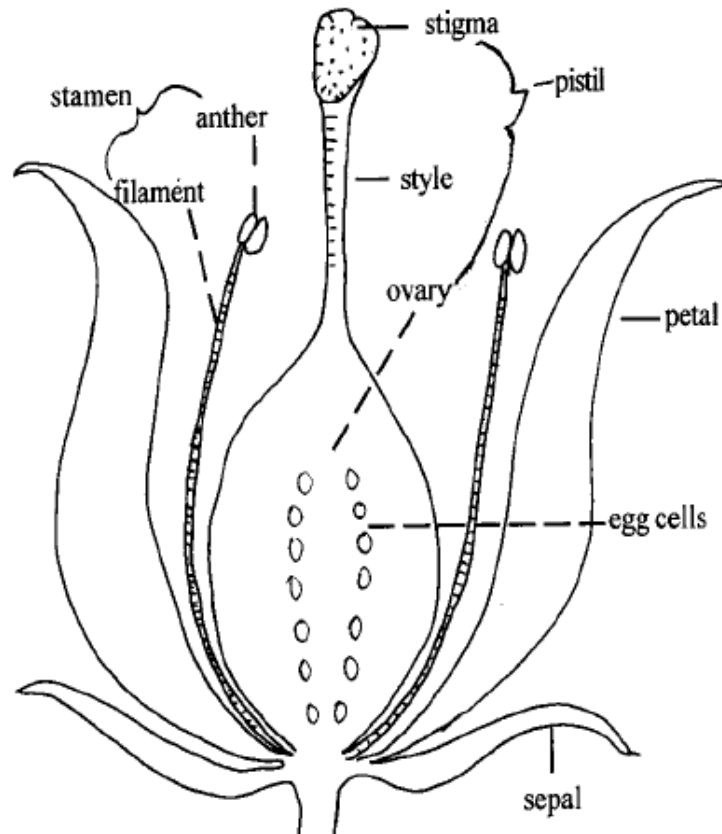
Label your flower. Use the diagram on the back of this page.

Include: petals sepals pistil stamen stigma anthers pollen ovary

A large, empty rectangular box with a thin black border, intended for the student to draw and label a flower.

Flower

diagram



Male reproductive parts: **stamen**

- Anther: holds pollen
- Filament: supports anther

Female reproductive parts: **pistil**

- Stigma: sticky part that attracts pollen
- Style: supports stigma
- Ovary: contains egg



Write down the characteristics of your flower:

Color(s) _____

Markings _____

Nectar guides? Yes/No Describe _____

Odor/scent _____

Shape _____

Size _____

Hypothesis: Use your pollinator syndrome chart. What pollinator do you think would be attracted to your flower? Explain your thinking.

Wild Friends 2018-2019



Full video links:

The Beauty of Pollination: <https://video.disney.com/watch/the-beauty-of-pollination-wings-of-life-4da84833e06fd54fff590f49>



Next Generation Science Standards (NGSS)

Disciplinary Core Ideas (DCIs)

4th and 5th Grades:

LS1 From Molecules to Organisms: Structures and Processes

Performance Expectations:

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

Disciplinary Core Ideas:

3-LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

4-LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Middle School:

LS1 From Molecules to Organisms: Structures and Processes

Performance Expectations:

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could



include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]

Disciplinary Core Ideas:

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- Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)

LS2: Ecosystems: Interactions, Energy, and Dynamics

Performance Expectations:

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

Disciplinary Core Ideas:

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)



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Crosscutting Concepts

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Systems and System Models

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Middle School:

Patterns

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Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)



Pollinator Syndromes

“Pollinator Syndromes” describe flower characteristics, or traits, that may appeal to a particular type of pollinator. Such characteristics can be used to predict the type of pollinator that will aid the flower in successful reproduction. A combination of color, odor, quantity of nectar, location and type of pollen, and flower structure can each affect a potential pollinator’s ability to locate a flower and its food resources.









Type of Pollinator								
Trait	Bat	Bee	Beetle	Bird	Butterfly	Fly	Moth	Wind
Color	White, green or purple	Bright white, yellow, blue, or UV	White or green	Scarlet, orange, red or white	Bright red and purple	Pale, or dark brown, purple	Pale red, purple, pink or white	Pale green, brown, or colorless
Nectar guides	None	Present	None	None	Present	None	None	None
Odor	Strong and musty; emitted at night	Fresh, mild, pleasant	None to strongly fruity or foul	None	Faint but fresh	Putrid	Strong sweet; emitted at night	None
Nectar	Abundant; somewhat hidden	Usually present	Sometimes present	Ample; deeply hidden	Ample; deeply hidden	Usually absent	Ample; deeply hidden	None
Pollen	Ample	Limited; often sticky, scented	Ample	Limited	Limited	Limited	Limited	Abundant; small, smooth
Flower Shape	Bowl shaped; closed during day	Shallow; with landing platform; tubular	Large and bowl-shaped	Large, funnel-like; strong perch support	Narrow tube with spur; wide landing pad	Shallow; funnel-like or complex with trap	Regular; tubular without a lip	Regular and small
								

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Resources for 2018-2019 lessons

Teachers: These are suggested resources to help you when teaching science and civics this year. Some are appropriate for students to view or read on their own, while some will need teacher direction.

Wild Friends Videos

Introduction to Wild Friends (5 min):

<https://www.youtube.com/watch?v=l9lyYoZptEM&feature=youtu.be>

Meet the Legislature 2018 (14 min):

<https://www.youtube.com/watch?v=D2CnXnek0r0&feature=youtu.be>

Science Resources

Pollination:

“The Beauty of Pollination” by Disney’s Wings of Life: no narration, students can observe lots of different pollinators and some other plant-animal interactions like herbivores and plants:

<https://video.disney.com/watch/the-beauty-of-pollination-wings-of-life-4da84833e06fd54fff590f49>

Video on blue orchard bees and their life cycle, also applicable to some other native bees:

<https://www.youtube.com/watch?v=oPbH1YhsdP8>

Older video with good overview of flower reproduction, uses term “sex life”, good visuals of pollination process (4 min):

<https://nm.pbslearningmedia.org/resource/oer08.sci.life.stru.flowers/the-reproductive-role-of-flowers/#.W1IJqtVKipo>

A video report on desert plants and superblooms (but no details on pollination):

<https://www.sciencefriday.com/educational-resources/flower-anatomy/>

Video on buzz pollination, a special technique pollinators like bumble bees use, and is also used with cultivated bees in agriculture:

<https://video.nationalgeographic.com/video/til/160628-sciex-til-clay-bolt-bumblebees-buzz?source=searchvideo>



Hummingbirds:

<https://video.nationalgeographic.com/video/untamed/magnificent-hummingbirds?source=searchvideo> (1:31 min, no narration, amazing detail of pollen)

No-narration, super slo-mo video of hummingbirds drinking, shaking water off, etc. (2 min):

<https://video.nationalgeographic.com/video/magazine/170706-hummingbirds-anand-varma-slow-motion>

Moths:

Photos showing the diversity of moths around the world:

<https://news.nationalgeographic.com/2015/07/150718-moth-adaptation-camouflage-caterpillar-pictures/>

Citizen science:

Great PBS video about using Nature's Notebook (the same program we are using with Wild Friends!), and what phenology is. The video documents a group of middle school girls gathering data throughout the year (*starts at 1:47, if short on time just watch until 7:47, if you have time to watch until 25:10, it's a great overview of the year-long process and data collection methods!*):

<http://pbskids.org/video/scigirls/2365471131>

Science news websites for students:

<https://www.sciencenewsforstudents.org/>

<https://www.dogonews.com/category/science>

<https://www.tweentribune.com/topic/science/>



Additional Resources on Pollinators (from Civics Lesson 4):

Websites:

Overview of pollinators and their importance: <http://pollinator.org/pollinators>

Bumblebees: <http://xerces.org/learn-about-bumble-bees/>

Native bees: “Pocket Guide to the Native Bees of New Mexico”

https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/nmpmcb10942.pdf

Butterflies and moths:

Species in New Mexico <https://www.butterfliesandmoths.org/checklists> (you can search by region, state, or county)

Yucca moths: https://www.fs.fed.us/wildflowers/pollinators/pollinator-of-the-month/yucca_moths.shtml

Bats:

Bats species in New Mexico: <http://www.emnrd.state.nm.us/MMD/AML/AML-Wildlife.html>

The importance of bats: <http://www.batcon.org/why-bats/bats-are/bats-are-important>

Fast facts about pollinating bats: <http://www.batcon.org/resources/media-education/news-room/the-echo/918-not-just-the-birds-and-bees-6-fast-facts-about-pollinating-bats>

Hummingbirds:

In New Mexico https://en.wikipedia.org/wiki/List_of_birds_of_New_Mexico

General info on hummingbirds: <http://pollinator.org/learning-center/hummingbirds>

Birds: Cornell University’s www.allaboutbirds.org has many articles about hummingbirds

Plants for pollinators: Guides with info about different pollinators’ needs as well as pollinator syndromes (searchable by zip code): <http://pollinator.org/guides>

Books:

Bats of the Western United States, 1998.

Birds of New Mexico Field Guide, 2003, by Stan Tekiela

Attracting Native Pollinators: Protecting North America’s Bees and Butterflies, 2011, by The Xerces Society



Civics Resources

Website with interactive civics games and activities for students: <https://www.icivics.org/>

Three branches of government:

How a bill becomes law: the classic Schoolhouse Rock "I'm Just a Bill" (I apologize in advance for getting this song in your head...!): <https://www.youtube.com/watch?v=FFroMQIKiag>

PBS NewsHour lesson on the three branches with current event videos:

<http://www.pbs.org/newshour/extra/lessons-plans/lesson-plan-civic-engagement-and-ways-for-students-to-get-involved/>

The Constitution:

Pretty wonky, but C-SPAN has lots of video clips of judges, historians, and congresspeople speaking about parts of the Constitution:

<https://www.c-span.org/classroom/constitutionClips/>

A great video overview of the history that led to the creation of the Constitution (from 11:50-12:50 is a brief bit on the creation of the three branches of government, but the rest provides good context!) (1 hour total):

<http://www.annenbergclassroom.org/page/key-constitutional-concepts>

New Mexico Legislature:

Video introduction to the legislature (click on "Legislature tour") (4:30):

<https://www.nmlegis.gov/Visitors>

Website for the NM legislature, where you can search for past bills, find your legislator, watch a webcast of committee meetings and floor votes, and more: <https://www.nmlegis.gov/>

Media literacy:

Explore how facebook influences political campaigns with a fake facebook post quiz:

<https://www.nytimes.com/interactive/2018/09/04/technology/facebook-influence-campaigns-quiz.html?action=click&module=Top%20Stories&pgtype=Homepage>

Articles with links on how to spot fake news (and other recommendations for teaching about media literacy):

<https://abqlibrary.org/FakeNews/Home>

Article with more advanced strategies for media literacy:

<https://webliteracy.pressbooks.com/chapter/four-strategies/>



Recommended Civics and Educational Organizations/Websites (with lots of resources: lessons, multimedia, etc.):

Facing History and Ourselves: <https://www.facinghistory.org/>

Teaching Tolerance: <https://www.tolerance.org/>

Annenberg Classroom: <http://www.annenbergclassroom.org/>