BUTTERFLY LAB

PAINTED LADY BUTTERFLIES: Everything Explained

TEACHER'S GUIDE

CELEBRATE PLANET EARTH

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BUTTERFLY LAB

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Background Information

Explain: Painted Lady Butterflies

Find additional curriculum materials at: CelebratePlanetEarth.org/Learning

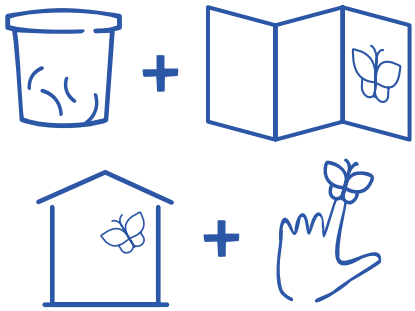
Lessons about sprouting sunflowers, scientific illustration, a word wall, counting mats and much more.

BRING YOUR CLASSROOM TO LIFE!

BASIC BUTTERFLY KIT *Current Prices Are Online*

EVERYTHING YOU NEED!

- 3-5 Painted Lady Butterfly caterpillars in a clear cup with food & a ventilated lid
- Easy cardboard house for your butterflies
- Colorful poster about life cycles & care info
- Shipped March through October



CATERPILLAR CUP *Current Prices Are Online*

- 3-5 Painted Lady Butterfly caterpillars in a clear cup with plenty of food, a paper cover for forming chrysalises & a ventilated lid
- Care instructions included
- Shipped March through October

BUTTERFLIES & SUNFLOWERS KIT

BASIC BUTTERFLY KIT & SUNFLOWER ALL STAR KIT

An unforgettable, hands-on learning experience. Children nurture tiny caterpillars and sprout seeds. They care for beautiful butterflies and grow pretty sunflowers.

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For questions, email orders@CelebratePlanetEarth.org

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Acknowledgements

Celebrate Planet Earth is grateful for the insights and recommendations of **Judy Chaddick**, science teacher emeritus of the Espanola Valley Public Schools, who helped make all of the Butterfly Labs easy, educational and fun.

Deanne Velasquez, a seasoned kindergarten teacher with the Santa Fe Public Schools, brings years of experience with young students learning hands-on science. Her deep knowledge of children's education plays a vital role in the success of the Butterfly Lab.

Celebrate Planet Earth grows children who love & protect the Earth, our home.

Since 1989, more than 15 million children have delighted in raising butterflies, growing sunflowers, learning about the natural world & supporting conservation. Our work empowers students to initiate environmentally responsible actions in school & at home.

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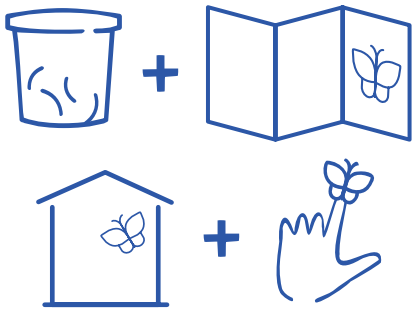

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Butterfly Care

Getting Started

Hooray! You've received a cup of Painted Lady caterpillars!
The caterpillars will be 1/4 to 1/2 inch long. They will become active and start growing in 2-3 days.

Remember to **BE GENTLE** when you handle the cup of caterpillars. Do not remove the plastic lid. It has air-holes. As caterpillars, they only need air and the food in the bottom of the cup.

Place your cup of caterpillars in a warm spot, out of direct sunlight.

> **ON THE FIRST DAY:**
> **Using a marker or pen, draw one caterpillar's length on the outside of your plastic cup. When your caterpillars are full-grown, you'll be amazed to see how small they once were!**

Make a Butterfly House *or use the Butterfly House in the Basic Butterfly Kit*

Your chrysalises will need protection while they change into butterflies. Make a butterfly house using a cardboard or plastic box. After the chrysalises are in the house, cover the top with plastic wrap. See instructions at CelebratePlanetEarth.org/learning

Chrysalis to Butterfly

When the caterpillars are fully grown, they crawl to the top of the cup. They hang upside down & change into chrysalises.

Once they've all changed, wait two days & then transfer them to the butterfly house. Remove the plastic lid from the cup. Peel back the paper layer & lift it off the cup. Your chrysalises should stay attached to the paper & hang down. If one drops off of the paper, place it on the floor of your house, next to a wall.

Using a piece of tape, hang the paper layer on a wall inside the butterfly house.

Butterflies will emerge from chrysalises in 7 to 10 days. It will take them an hour or two to dry their wings. You may keep your butterflies in their house for 1-2 days. Once they begin to fly around their house, they are ready to go free.

It's time to release your butterflies outside! Let them go on a warm, sunny day. The butterflies need to find flower nectar for energy. They will help pollinate trees, flowers & vegetables. They will create a new generation of butterflies.

Questions? Contact us at kids@CelebratePlanetEarth.org

BUTTERFLY LAB

Observing the Caterpillar Cup

The caterpillar cup is a clear, 10-ounce, plastic cup. It is covered with a white plastic lid with tiny holes for ventilation. Under the lid is a cloth or paper cover that the caterpillars attach themselves to when they pupate.

DO NOT OPEN THE CUP!
The food will dry out quickly and become inedible. When all of the caterpillars form chrysalises, you can take off the lid and gently remove the cloth with all of the chrysalises attached. Tape the cloth inside the butterfly house.

At the bottom of the cup is a mixture of ground-up malva leaves, a caterpillar favorite, for the larvae to eat. There is enough food for the caterpillars to grow until they pupate.

There are 4-6 tiny Painted Lady caterpillars inside the cup, 1/4-1/2 inch long. They get more active and start eating in 1-2 days.

Caterpillars need 4 things to survive:

- **AIR** through the ventilation holes in the lid
- **FOOD and WATER** from the leaf mixture at the bottom
- **SUNLIGHT** through the clear cup

BUTTERFLY LAB

Caring for Caterpillars, Caring for the Earth

Young children understand what it means to be a good friend. Talk with them about being a good friend. Write their suggestions on the board. How do you treat good friends? Can caterpillars and other animals be our friends? Look at how much the Earth gives us. Can the Earth be our friend? How would the Earth like to be treated? What can we do to help them?

Caring for living things in the classroom is a wonderful opportunity to learn that:

- **all living things have needs**
- **children can understand the needs of other living things**
- **children can take action & help with the needs of others**

1 - All living things have needs.
Every child understands their own need for food, shelter and care. And every living thing also has needs. We are all connected.

2 - Students can understand the needs of other living things.
Caring for living things teaches your students that we all have unique needs. Not everyone's needs are the same. What is good for a child might not be good for a plant. The care of a seedling is different than the care of an insect.

3 - They can take action & help with the needs of others.
Students want to interact and be involved with the living things around them. Checking to see if plants need water or if the caterpillars are becoming chrysalises builds a child's confidence and understanding. They learn about responding to what is needed and offering to help.

Teaching Students How to Care for Caterpillars
Observing caterpillars in your classroom is a great way to teach children about the pollinators that we depend on for food. Day by day, they observe how the caterpillars grow and change. They can see them eating their food. It is practical experience in understanding the needs of others and learning how to help.

Sending *My Butterfly Journal* home at the end of the school year gives the children an opportunity to share what they learned with their families. Being responsible to care for plants and pollinators is a good 'job' even for young children.

Fun Facts about Painted Lady Butterflies

The Painted Lady Butterfly or *Vanessa cardui* is one of the most common butterfly species in the world. They are found on every continent except Antarctica and South America. They thrive throughout the United States, Canada, and Mexico.

Order: **Lepidoptera**
Family: **Nymphalidae**
Genus: ***Vanessa***
Species: ***Vanessa cardui*** (binomial name)

Impress your students! Share one fun fact a day as you progress through the unit.

Caterpillars

- The little balls that appear all over the cup are caterpillar poop. They are called frass.
- A caterpillar grows so fast, its cuticle or skin becomes too tight. So it sheds the cuticle. This is called molting. Molting of the cuticle usually happens about 4-5 times. You may see small black balls in the cup.
- Caterpillar webbing is sticky and dense. It helps caterpillars hang onto leaves.
- A caterpillar may have as many as 4,000 muscles in its body. The caterpillar's head has 248 individual muscles, and about 70 muscles control each body segment.
- A caterpillar will increase its body mass a 1,000 times or more before pupating.
- A caterpillar's first meal is usually its protein rich eggshell.

Chrysalises

- Some butterflies overwinter inside the chrysalis and then emerge in the spring.
- The hard shell of the chrysalis is an exoskeleton.
- The exoskeleton is made of chitin, a hard substance similar to fingernails.

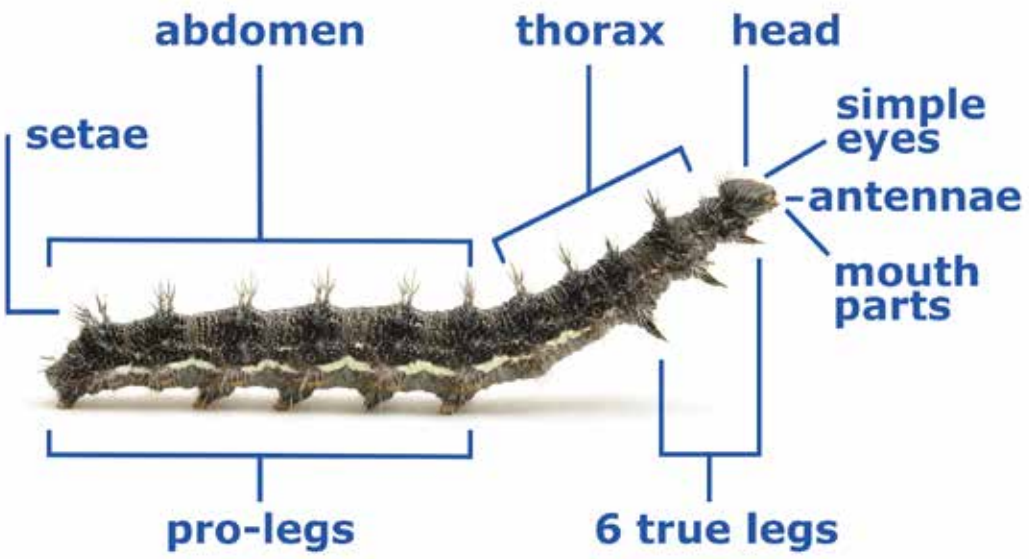
Fun Facts *continued*

Butterflies

- Meconium is a reddish, waste liquid that drips after a butterfly emerges. It is not blood.
- After emerging, its wings are soft and wrinkled. A butterfly straightens its wings by pumping hemolymph (a fluid similar to blood) into its veins.
- A butterfly must assemble the 2 parts of its proboscis as soon as it emerges.
- A butterfly uses its forewings to lift it into flight and its hindwings for speed and quick turning to evade predators.
- Butterflies often have brightly coloured wings with unique patterns made up of tiny scales.
- Butterfly wings are actually transparent. The colors and patterns we see are made by the reflection of the tiny scales covering them.
- Males drink from mud puddles to extract minerals that aren't available in flowers. This behavior is known as puddling.
- Female butterflies lay many eggs to insure that even a few of these eggs will survive.
- There are about 24,000 species of butterflies. The moths are even more numerous: about 140,000 species of them were counted all over the world.

Everything Explained

Caterpillar Body Parts



caterpillar or larva

Larva–the second stage of metamorphosis, another term for caterpillar

Head–the head includes a brain, a mouth, 2 antenna and 12 eyes called ocelli

Thorax–the thorax is the midsection where the legs are attached

Abdomen–the abdomen contains the heart, digestive system and other organs

True Legs–all insects have 6 true legs with tiny claws attached to the thorax

Pro-legs–located on the abdomen, pro-legs help the caterpillar move and climb

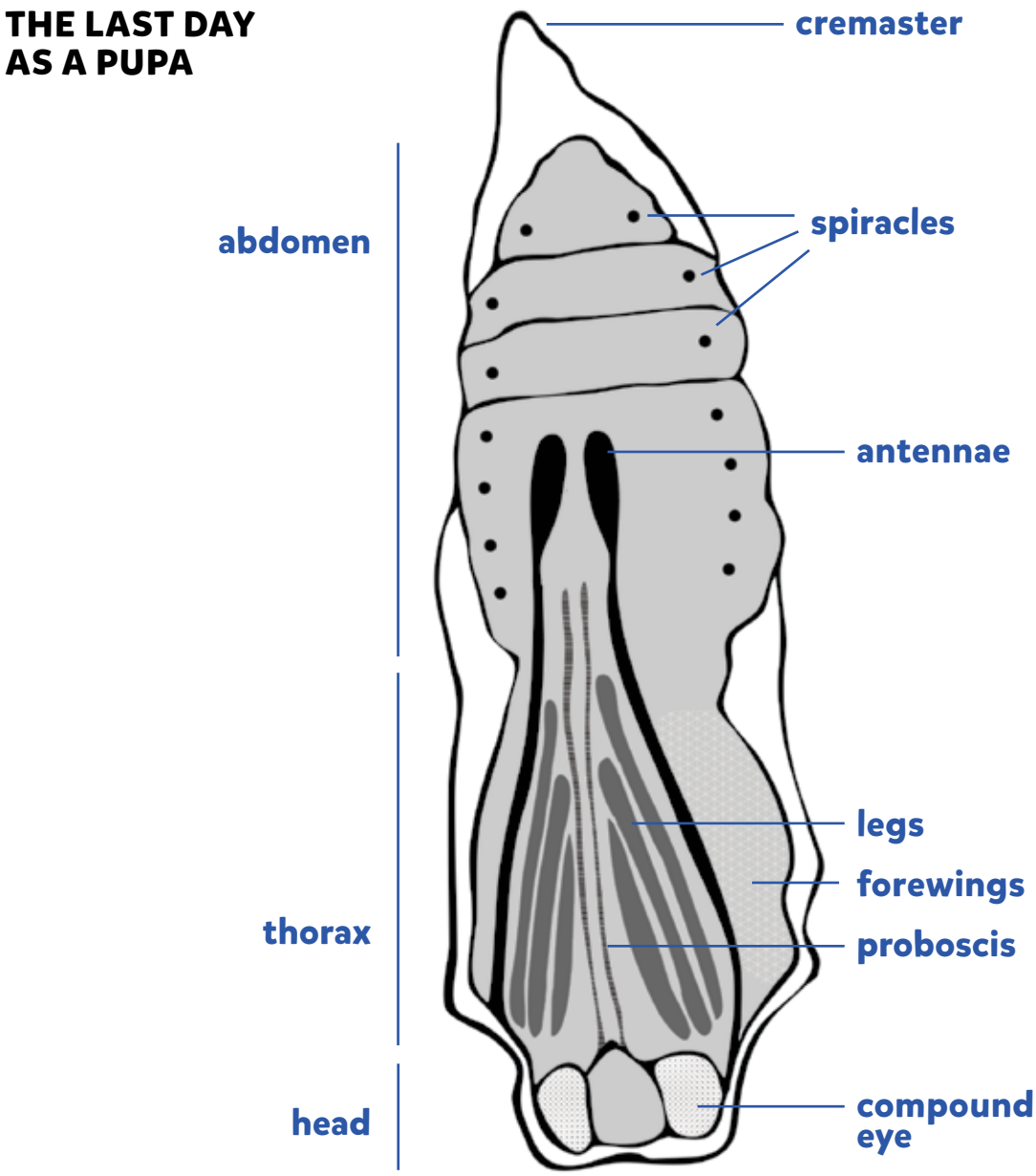
Antennae–near the mouth parts, antennae help caterpillars smell and find food

Mouth parts–on front of the head, a caterpillar has mouth parts or mandibles to tear and grind leaves

Simple eyes–a caterpillar has 12 simple eyes, 6 on each side of its head, that show light and dark

Setae–a stiff hair or bristle

Chrysalis Body Parts



Cremaster *(kri-mas-ter)*—a set of hooks on the end of the abdomen that attaches the pupa to a silk pad

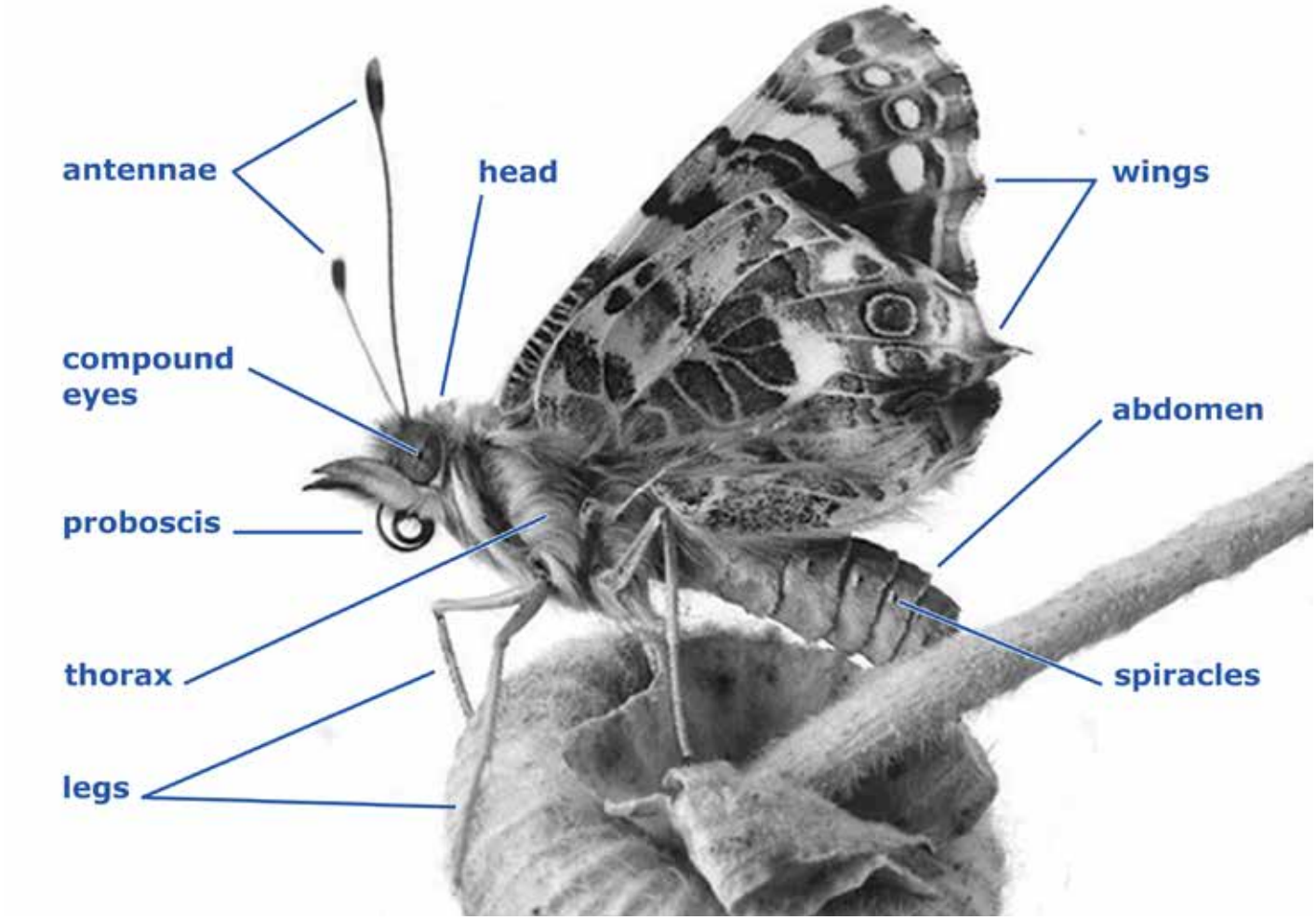
Proboscis *(pro-bos-kis)*—a feeding tube that works like a drinking straw

Chrysalis—a pupa, especially of a butterfly or the hardened case of a pupa

Pupa—the third stage within a hardened case of those insects which undergo complete metamorphosis

Cocoon—a protective case of silk or fibrous material spun to cover the pupa

Butterfly Body Parts



Antennae–on the butterfly's head, used to taste the air and help with balance

Compound eyes–thousands of tiny lenses help the butterfly see in all directions

Proboscis–the butterfly tongue, which works like a drinking straw

Thorax–the midsection of the butterfly with 3 pairs of legs & 2 pairs of wings

Legs–the butterfly has 6 legs, in 3 pairs, attached to its thorax

Head–the head includes the proboscis, 2 antennae and 2 compound eyes

Wings–2 pairs of wings, forewings & hindwings, on the thorax allow the butterfly to fly

Abdomen–this part of the butterfly includes the stomach, heart and other organs

Spiracles–a breathing hole, an opening through which air passes in the exoskeleton

Butterflies Have Super Power Senses

Butterflies and humans are not like each other. But we do have some things in common. We have the same senses like sight, sound, taste, smell and touch. But we use our senses differently. The senses of a butterfly are like super powers—Super Power Senses. Let's explore how the senses of a butterfly help it to survive in its environment.

Sight is a super sense for butterflies. They have two large **compound eyes**. These eyes contain hundreds of lenses. The many lenses form a single image. Compound eyes see a very wide area. They are able to detect movements quickly. This helps them to avoid predators. Butterflies can see special colors that humans cannot see. These special colors guide them to the flowers with their favorite nectar. Butterflies also have two simple eyes, called **ocelli**. These eyes cannot focus on objects. They can only detect light and dark.

Butterflies do not have ears. They do not hear sounds the way we do. They "feel" **sound vibrations** through a special sense organ. It is located under their wings. This helps them to avoid danger, especially at night.

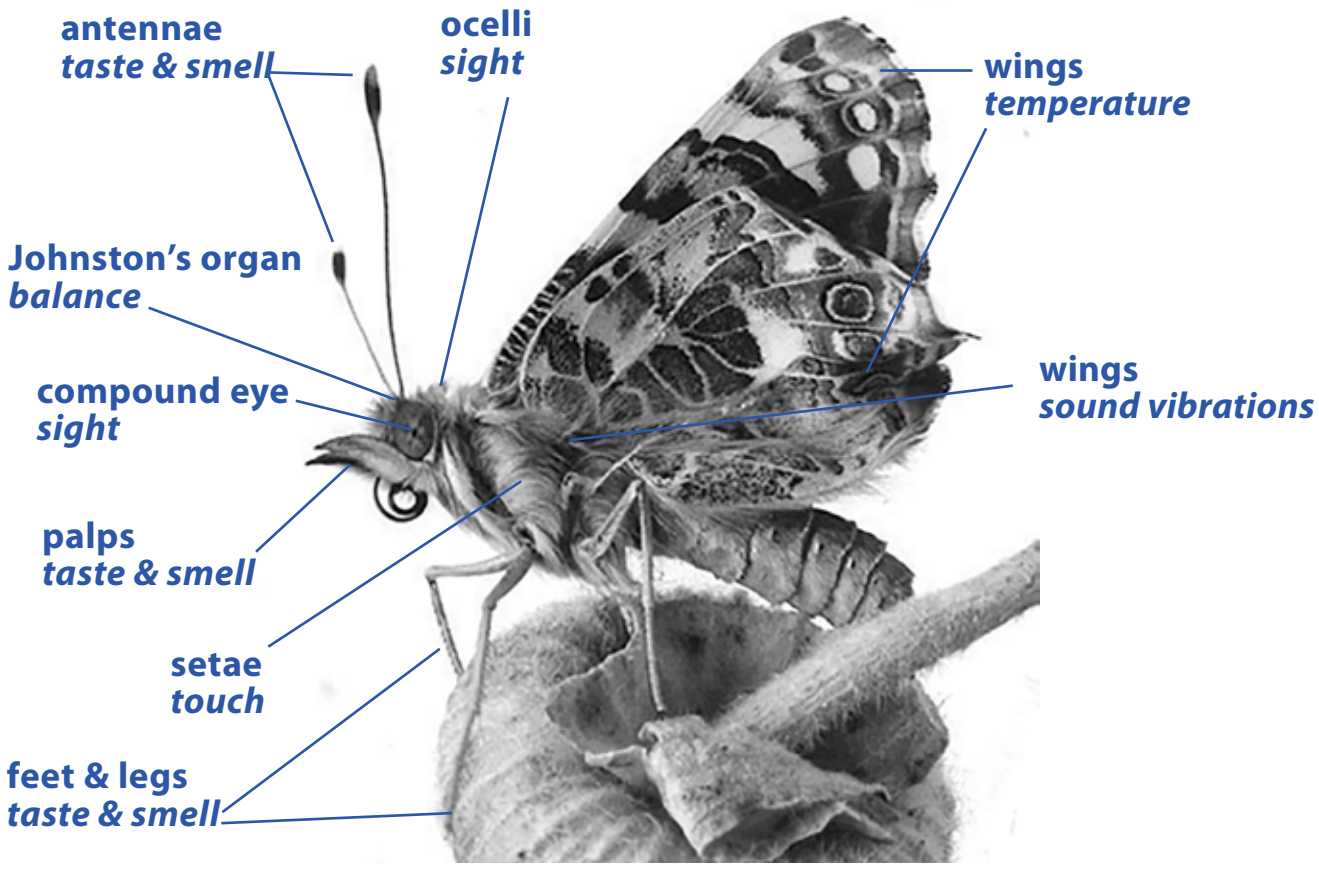
Butterflies eat with a **proboscis**. It works like a straw. Butterflies suck nectar from flowers and drink water. So can butterflies taste? Oh yes, they taste and smell with their feet, legs, **palps** and antennae. Isn't that strange? Their sense organs are nerve cells with **receptors** that take messages to the brain. They are like the receptors in our nose and on our tongue. Butterflies depend on their senses of taste and smell to find their favorite foods. Many caterpillars are picky eaters. They only eat one type of leaves. The female butterfly must use her super senses to find the right plant to lay her eggs on.

Butterflies have a super sense of touch. Their entire bodies are covered with tiny sensory hairs called **setae**. The setae are attached to nerve cells. The nerve cells send information to the brain when something is touched. At the base of the antennae is the **Johnston's organ**. It helps the butterfly to keep its balance when flying.

Butterflies are cold-blooded. They only live where it is warm enough. If butterflies are too cold, then they can't fly. If they get too hot, they become **dehydrated** and die. When they need to warm up, butterflies bask in the sunlight. Some butterflies shiver their wings to raise their body temperature. The most common way of cooling is to crawl into the shade.

The butterfly's super power senses are very powerful and help it to survive in its environment. Would you like to have compound eyes? Or be able to taste with your hands and feet? How would butterfly super power senses change your life?

Butterfly Sensory Organs



Antennae–on the butterfly's head, used to taste the air and help with balance

Compound eyes–thousands of tiny lenses see in all directions

Feet & legs–a butterfly can taste and smell nectar with its feet and legs

Johnston's organ–at the base of the antennae, helps the butterfly balance and orient in flight

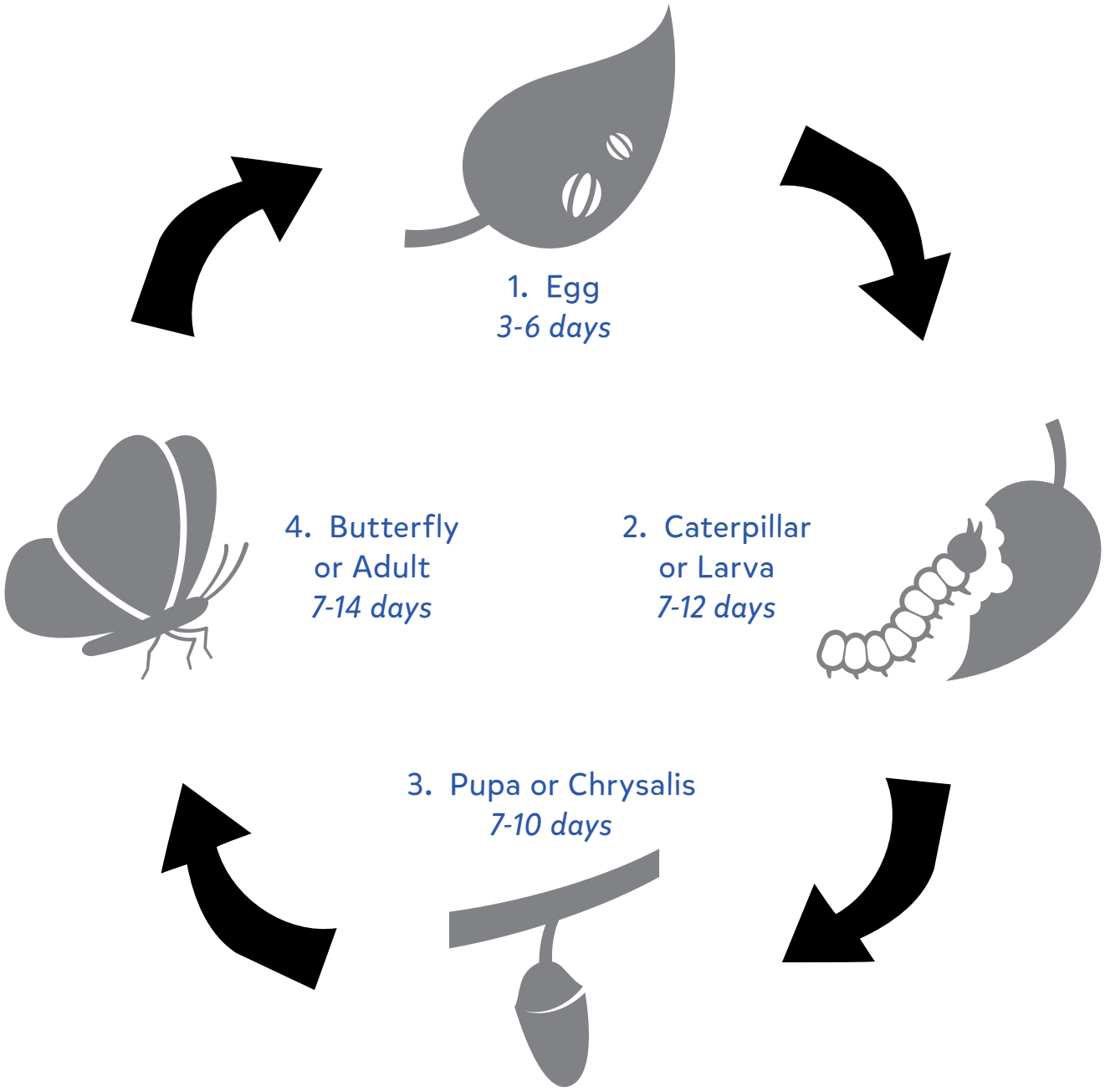
Ocelli–simple eyes that perceive light and dark

Palps–attached to the insect's mouth and used for smell and to handle food

Setae–bristle-like hairs that are sensitive to touch

Wings–wings sense sound vibrations & regulate its temperature

Painted Lady Butterfly Life Cycle



Painted Lady Butterfly Life Cycle

There are four stages in the life cycle of the Painted Lady Butterfly.

1. Egg (3-6 days)

Female butterflies lay their eggs on plants that Painted Lady caterpillars like to eat, like thistle or hollyhock. The eggs are the size of a pin head, each one containing a caterpillar beginning to grow.

2. Larva or Caterpillar (7-12 days)

The hungry caterpillar uses its strong jaws to eat leaves and grows quickly. As it grows, the caterpillar's skin or exoskeleton gets tighter. A caterpillar sheds its skin four times before it's fully grown.

3. Pupa or Chrysalis (7-10 days)

With a silk thread that comes out of a spinneret just below its mouth, the caterpillar spins a silk pad, attaches its abdomen, and hangs from this pad. Soon, the caterpillars' skin splits open, from head to abdomen, revealing a dull, brownish case underneath – the pupa or chrysalis.

What happens inside the chrysalis? Inside the larva becomes completely liquid and reforms itself into a butterfly. The butterfly pushes from inside until the case splits open, and it slowly struggles out.

4. Butterfly or Adult (7-14 days)

When the butterfly first emerges from the chrysalis, its wings are soft and crumpled. The butterfly rests, and then slowly pumps fluid into its its wings.

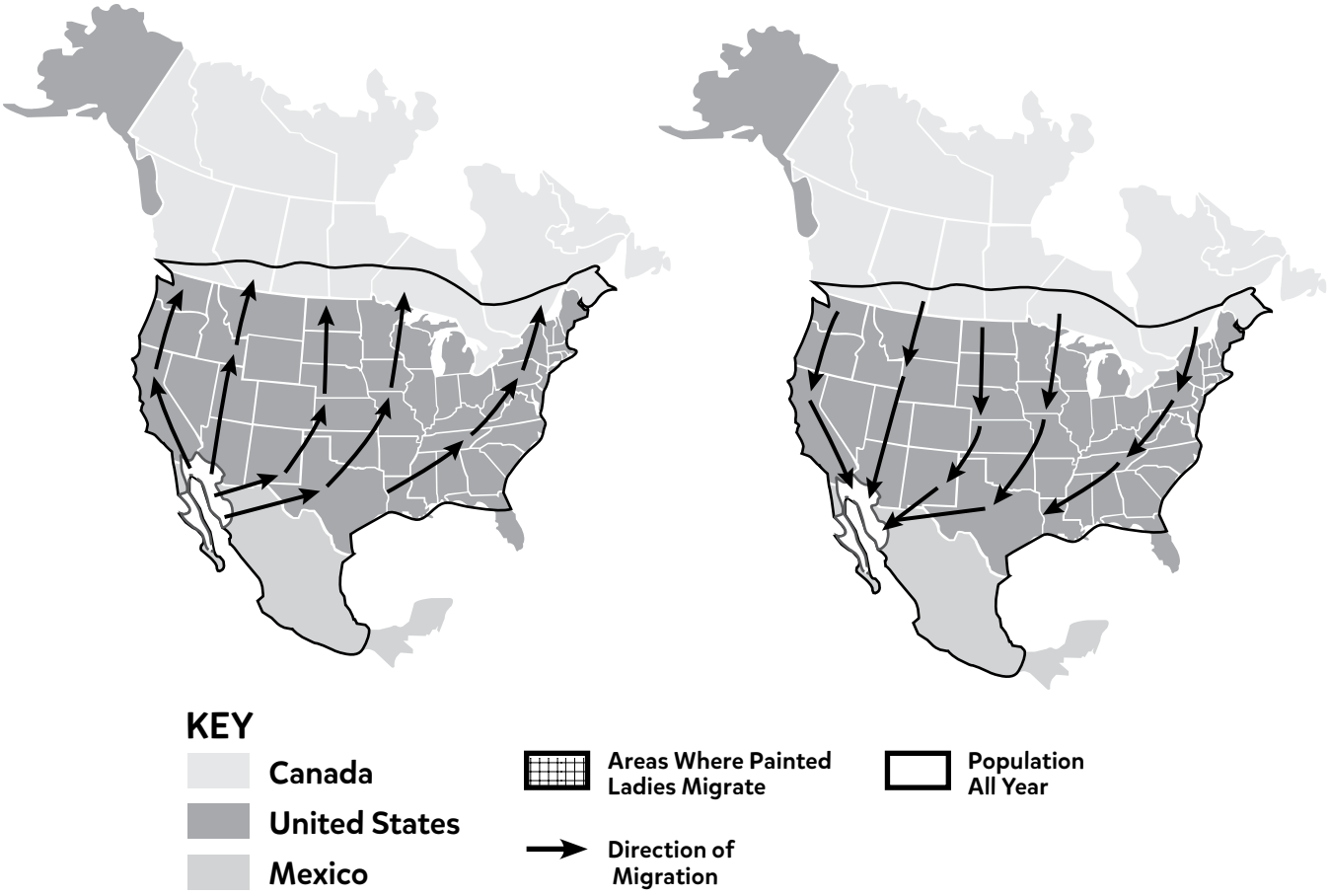
After a few hours, the butterfly will be ready to fly. The Painted Lady Butterfly has a 7-14 day life span. During that time, its main goal is to reproduce and lay eggs so the cycle can begin again!

Where Do Painted Ladies Live?

Source:
https://www.butterfliesandmoths.org/species/Vanessa-cardui/
http://www.butterflymigration.org/

Everything Explained

Do Painted Ladies Migrate?



Painted Lady butterflies have impressive migrations in North America. They also migrate between Europe and central Africa, and between northern and southern Asia. The Painted Lady migrates northward in the spring as flowers are blooming and southward in the autumn. Sometimes a large group of painted ladies flies at high altitudes, and other times, low to the ground, searching for nectar and host plants. The butterflies live year round in northwest Mexico.

Unlike many other migratory species, they do not migrate every year. Scientists think that their migrations might be linked to weather patterns like El Niño. With abundant rainfall, a lot of host plants grow all over North America and the butterflies spread out to find them.

It takes 5-6 generations for the painted lady's round trip journey from Mexico to Canada and back. That's 4,000-5,000 miles roundtrip. They fly up to 12 hours per day.

Source: https://vanessa.ent.iastate.edu/el-ni%C3%B1o-and-painted-lady-migrations
https://www.inaturalist.org/projects/butterflymigration-vanessa-cardui

Everything Explained

Host Plants & Nectar Plants

What are butterfly host plants?

Butterflies and plants have an essential relationship.

Butterfly host plants provide female butterflies with the perfect place to lay their eggs. Female butterflies can fly for miles in search of host plants to lay their eggs on.

After the eggs hatch, caterpillars want to eat, eat, eat! They eat the leaves of the host plant.

Different host plants attract different species of butterflies. And each species of butterfly are only found where those host plants grow. Host plants can be wildflowers, herbs, shrubs or trees.

For example, the host plants of the monarch butterfly are several types of milkweed that grow in Canada, USA, and Mexico.

The host plants of the mourning cloak butterfly are elms, cottonwoods and willow trees.

The favorite host plant of the Painted Lady Butterfly is the thistle. There are 60 species of thistles native to North America. Painted Lady caterpillars feed on over 300 host plants including thistle, mallows, sunflowers, hollyhock, and asters. Found all over the world, the host plants grow in gardens, roadsides, open fields and sunny meadows. Some host plants contain toxins that make the Painted Lady caterpillars taste bad to predators.

Tall Thistle - by Eric Hunt - Own work, CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/deed.en

Everything Explained

Host Plants & Nectar Plants

These are some of the ways that plants and animals are interconnected and depend on each other for survival.

IMPORTANT: The use of pesticides and herbicides, as well as mowing down host and nectar plants in our highway roadsides, city parks, school yards, gardens and homes, has been killing butterflies, bees and other pollinators. Pesticides and herbicides also have a serious impact on the health of children and adults.

What are butterfly nectar plants?

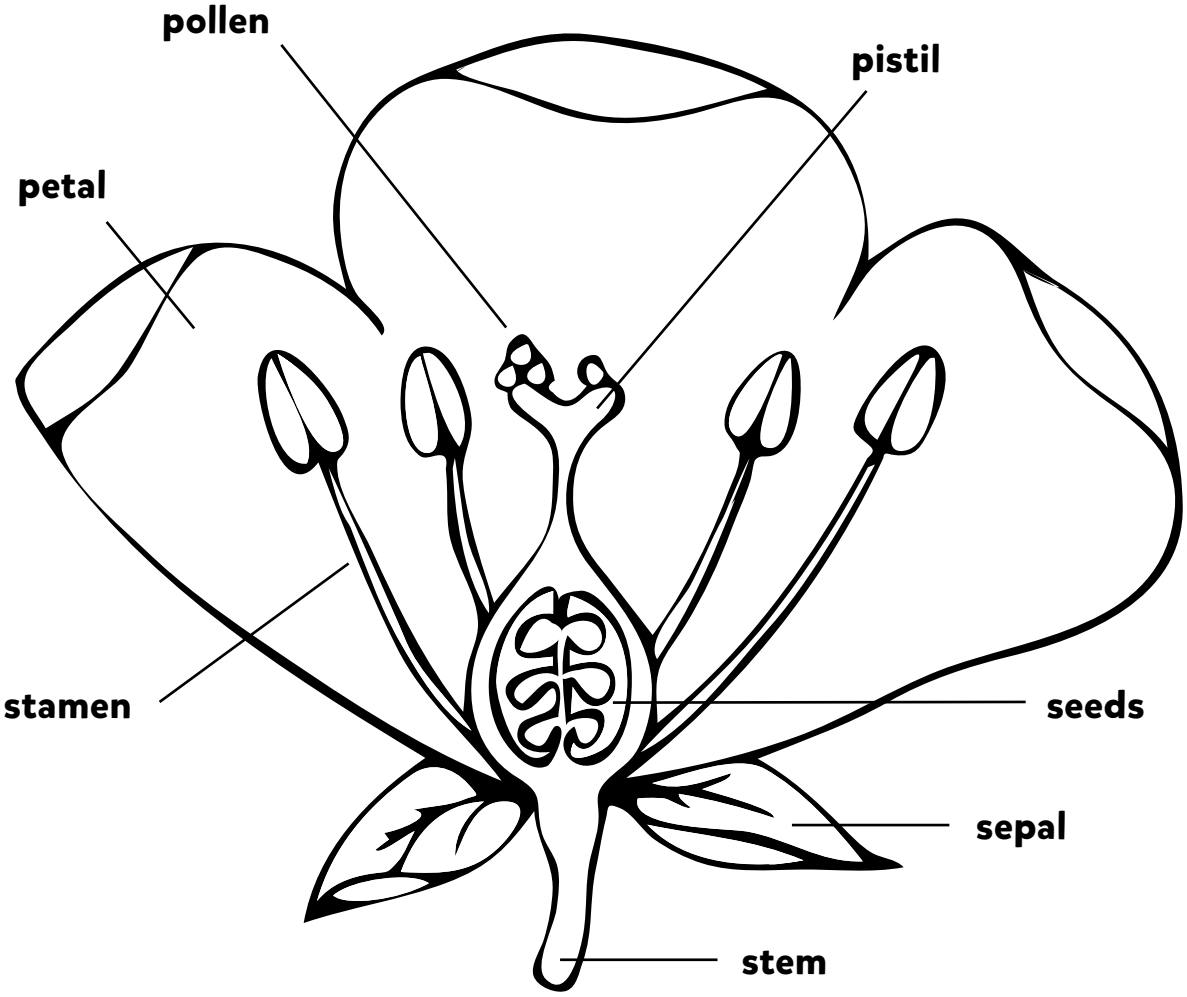
Flowering plants, shrubs and trees are all butterfly nectar plants. Nectar is a sweet liquid produced by flowering plants. Nectar attracts butterflies, hummingbirds, bats, and other pollinators. For butterflies, it is a good source of energy. Bees collect nectar to turn into honey. Nectar is also rich in vitamins and salts which insects need.

Nectar is important for pollination. The nectar attracts a butterfly or other pollinator. While feeding on nectar, pollen sticks to the butterfly. Some of the pollen is transferred ato the next flower. The butterfly just wants a meal, but is also helping the plant create seeds.

Hollyhock - by Ashish Thorat - Own work, CC BY-SA 4.0, https://creativecommons.org/licenses/by-sa/4.0/deed.en

Sunflower - by Firoooz - Own work, GFDL 1.2, https://creativecommons.org/licenses/by-nc/3.0/

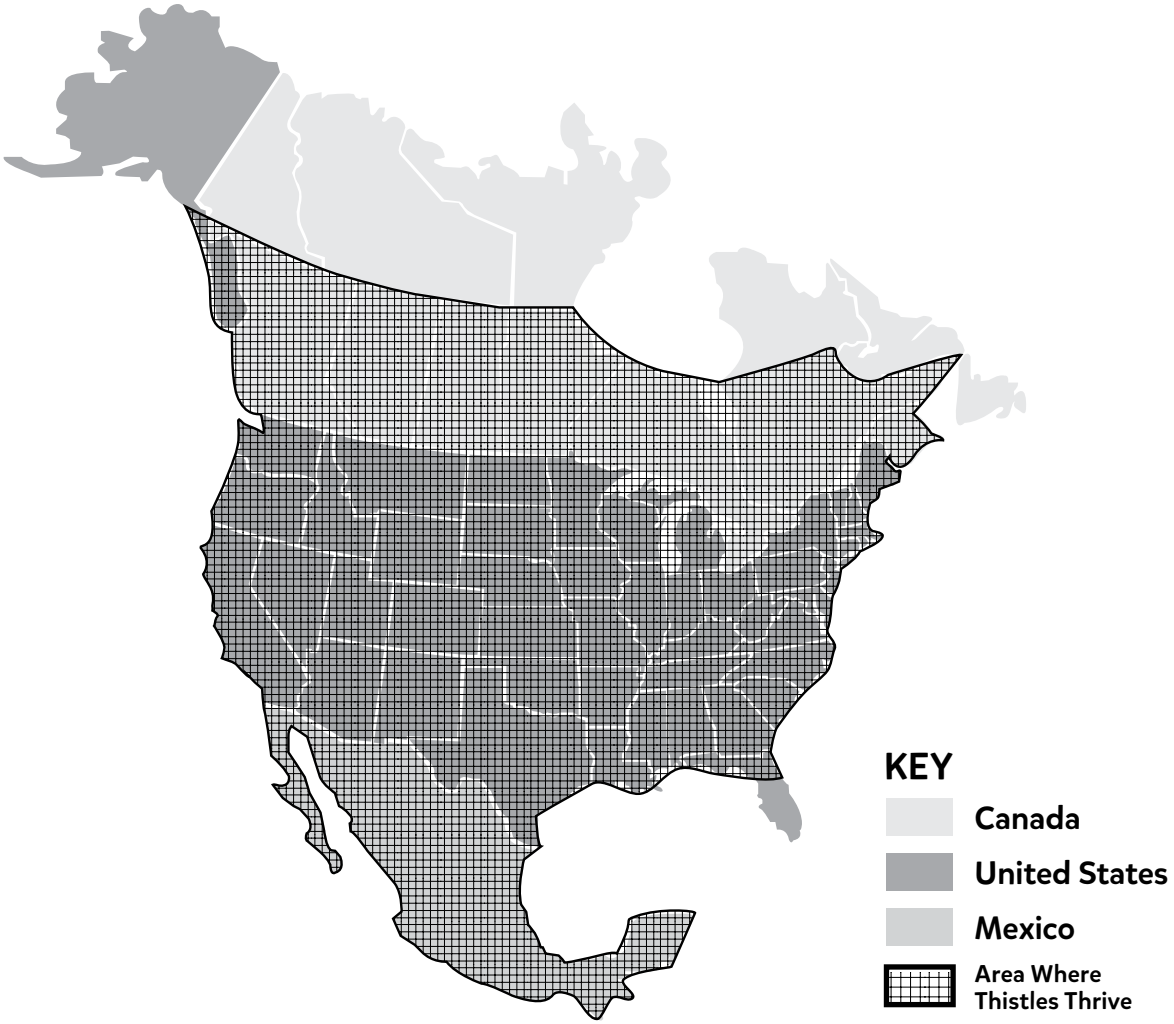
Parts of a Flower



fertilize–to make a flower able to produce seeds;
to make an egg able to grow and develop
fragrance–a pleasant smell
organ–a part of the body that has a particular function
petal–one of the colorful parts of a flower surrounding the pistil & stamens
pistil–seed-bearing female organ of a flower
pollen–a fine yellow powder released from the stamens
seed–a small, hard part of a plant from which a new plant can grow
sepal–green leaf-like parts that surround and protect the flower bud
stamen–the pollen-producing male organ of a flower
stem–the main stalk of a plant

Everything Explained

Where Does Thistle Thrive?



Thistle is a favorite host plant for Painted Lady caterpillars. Thistle flowers are a favorite nectar source for Painted Lady butterflies, monarchs, skippers, swallowtails and fritillary butterflies. Thistles also provide important food for goldfinches and other thistle-feeding birds. Additionally, hummingbirds will feed on the nectar of the large-flowered species.

Thistle is the common name of a group of flowering plants that have leaves with sharp prickles along the edge. Prickles might also be all over the plant. These prickles protect the plant from being eaten by herbivores. Thistles are native plants in North America, Europe, Asia and northern Africa.

Source: https://www.fs.fed.us/wildflowers/plant-of-the-week/Cirsium-discolor.shtml
https://www.fs.fed.us/wildflowers/plant-of-the-week/cirsium_undulatum.shtml

How Can We Take Action to Help Butterflies?

- **Plant native plants that butterflies and caterpillars want to eat!**
  Butterflies and caterpillars love to eat, but can be picky. Imagine you went to a grocery store and all they had was one kind of food! Plant different kinds of plants and flowers to give them options. Ask students and learn together: *What plants are native to our area that would be yummy to our new friends? Where could we plant them?*

- **Make a space for butterflies to rest!**
  Butterflies are so busy they need a safe and sunny spot to warm their wings to fly. Collect flat stones and place them in your garden for butterflies to rest in the sun.

- **Butterflies like puddles?!**
  Butterflies like to hang out together and "puddle": they drink water and eat vitamins from damp puddles. Get a shallow pan and put coarse sand and stones and put it in the soil. Add a little water to keep the sand moist so butterflies can socialize and eat important vitamins!

- **Keep learning, asking questions and observing!** When we know more, we can do more to help our planet. After you release the butterflies, there's still so much more to explore and learn about. Find more books at the library, ask adults questions, and go on a walk to find butterflies, caterpillars and flowers.

- **Teach others!**
  Now that you've learned so much about caterpillars and butterflies, share something you learned each day with someone new at home or at school. You could share artwork you made, tell them something cool about caterpillars and butterflies, teach them a song, or read a book together. The more we all know, the better we can treat our planet.