



# ACTIVITY BOOK





Meet a pollinator! Pollinators are animals that help many flowering plants produce their seeds. Their important work helps support the continued existence of millions of plant species, and in turn, most animal species, including humans. Learn about twelve fascinating pollinators through fun facts and activity pages.



### **ABOUT LITTLE SEEDS POLLINATOR PALS GRANT**

The Little Seeds Pollinator Pals Grant presented by Little Seeds and KidsGardening is designed to support youth garden programs interested in preserving and creating pollinator habitats to help rebuild declining pollinator populations. Programs are awarded \$500 to support the development of new pollinator gardens and the expansion of existing ones. Learn more at [KidsGardening.org/grant-opportunities/](https://KidsGardening.org/grant-opportunities/)



### **ABOUT LITTLE SEEDS**

Little Seeds is a furniture brand providing families with high-quality children's products with great style. Little Seeds is committed to protecting and preserving the environment for our children's future.

And it just starts with a little seed.

Just as a plant grows, so does your child's new Little Seeds furniture. Starting with changing tables that turn into dressers, and cribs that become beds, these juvenile collections are made to grow with your child, from nursery, to toddler, to teen. Learn more at [LittleSeedsKids.com](https://LittleSeedsKids.com).



### **ABOUT KIDSGARDENING**

For 40 years, KidsGardening has led the youth gardening movement by creating opportunities for kids to play, learn, and grow through gardening. The national nonprofit provides grant funding, inspiration, community connections, and original educational resources to reach more than 3.8 million kids each year. Learn more at [KidsGardening.org](https://KidsGardening.org).

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# MONARCH BUTTERFLY



Scientific Name: *Danaus plexippus*

Description: Monarch butterflies have two pairs of bright orange wings with a black border and white spots on the edges. They are about 4" wide and weigh less than half a gram.

## FUN FACTS



-  Monarchs migrate and fly long distances on a seasonal basis to find food, better conditions, and places to breed.
-  Some monarchs travel up to 100 miles a day during their 3,000 mile migration across North America.
-  It can take up to 5 generations to complete their journey. Individual butterflies live only about 2-6 weeks, except the last generation, which can live for up to 9 months.
-  Millions of butterflies arrive in México during the Día de los Muertos (Day of the Dead) celebrations around October 31.
-  Monarchs smell with their antennae and use sensory hairs on their legs and feet to taste.

## FAVORITE COLORS & PLANTS



Adult butterflies love native plants and are attracted to red, orange, yellow, pink, and purple flowers.

Monarchs lay their eggs on milkweed plants because their leaves are the caterpillars' only food source.



## HABITAT

Spring & Summer: Open fields and meadows where milkweed grows  
Winter: Mountains and forests



## HELP MONARCHS THRIVE



- Due to climate change and other habitat threats, there are not as many monarchs as there used to be.
- Help increase their numbers by growing native flowers and milkweed in your garden!



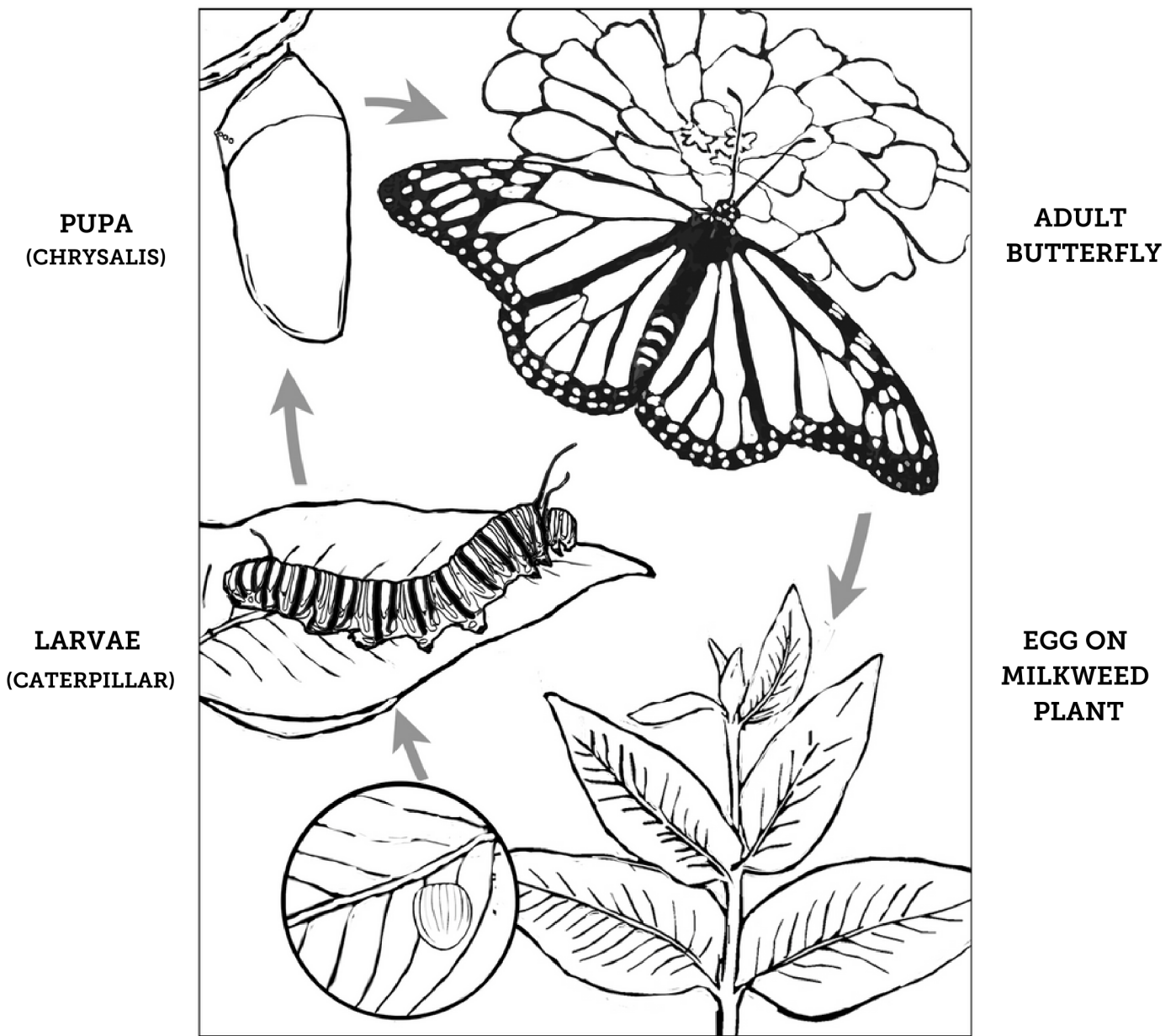


# MONARCH BUTTERFLY



Metamorphosis: a profound change in form from one stage to the next in the life history of an organism

## L I F E C Y C L E





# MONARCH BUTTERFLY



## Map Your Monarch Migration Route

Monarch butterflies fly north each spring and then fly south each fall. They overwinter in two different locations depending on where they fly during spring through fall. On the map, you will see a black line. Monarch butterflies that journey to the left of the dark line migrate to the overwintering site in California. Monarchs to the right of the line migrate to the overwintering site in Mexico.

Directions:

1. Find your current location on the map below and make a dot to mark it.
2. Next, imagine you are a monarch butterfly getting ready to migrate from your current location. Determine where you will overwinter based on the note above the map.
3. Draw a line to your overwintering site. It can be a straight line or squiggly.
4. Make a list of all the states you'll be flying through.





# LESSER LONG-NOSED BAT



Photo credit: ©MerlinTuttle.org



*Scientific Name: Leptonycteris curasoae yerbabuena*

**Description:** Lesser long-nosed bats are known for their "noseleaf," an upward-turned hook that points off the tip of their elongated muzzle. These bats have tan, rust, or cinnamon-colored bodies that are usually around 3" long, which is also about the same length as their tongues! They have gray wings and a wingspan of about 10". They weigh about 1 oz, have a short tail, and small ears.

Photo credit: J. Scott Altenbach

## FUN FACTS



- Like all bats, lesser long-nosed bats are nocturnal, meaning they are active at night.
- During the day, the bats sleep in warm caves that trap their body heat. At night, around midnight to 2am, they leave the roost to search for food.
- They live in extremely large colonies, with some having over 100,000 bats!
- Not only do these bats pollinate the flowers of desert cacti, they also help propagate them by consuming the fruits and spreading the seeds throughout their extensive habitat range.
- Using their long noses and tongues, they are able to reach deep into cacti blossoms for nectar. Their hairy heads are then covered with pollen, which is spread to other flowers as they continue feeding.
- Long-nosed bats have great memory and can keep track of which plants are about to flower, already knowing where to go on their next nighttime visit.
- From spring through fall, lesser long-nosed bats live in the southwestern U.S. However, they migrate using a 600 mile "nectar trail" to spend their winters in Mexico.

## FAVORITE PLANTS & COLORS

Lesser long-nosed bats eat the nectar and fruit from night-blooming desert cacti such as saguaro, organ pipe, and agave.

Desert blooms are white or light-colored, making them more visible at night. Cacti flowers also produce a strong fragrance that attracts the bats to pollinate them.



## HABITAT

Lesser long-nosed bats are found in dry or semi-arid regions and desert scrub habitats. Its migratory range includes Arizona, New Mexico, and throughout México, including the Sonoran Desert. They can also be found in dry, pine, or coniferous forests at high elevations.



Photo credit: ©MerlinTuttle.org

## HELP LONG-NOSED BATS THRIVE

- In 1988, the lesser long-nosed bat was added to the Endangered Species list when there were only around 1,000 left. However, as a result of improved roost site management and restoration of their food sources, this species of bat was removed from the list 30 years later and now has a population of around 200,000!
- To keep the lesser long-nosed bats thriving, it is important to preserve and protect their habitat and the plants that they feed on.

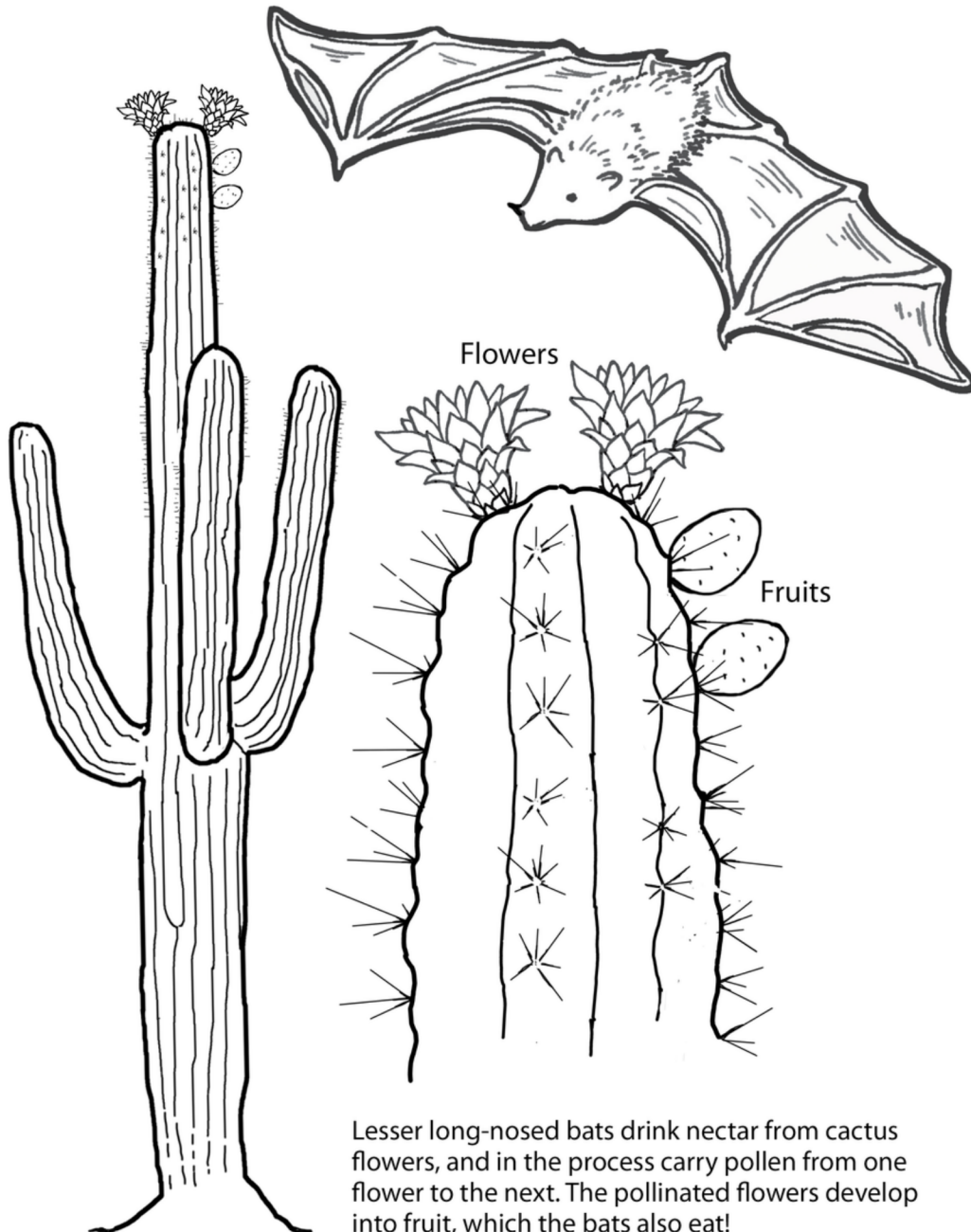


# LESSER LONG-NOSED BAT



## SAGUARO CACTUS

A favorite of the lesser long-nosed bat, the saguaro cactus is the largest cactus in the U.S. They are exclusively found in the Sonoran Desert and are covered with spines to protect them from predators as well as from the extreme weather. They can grow to be 60 feet tall and when fully hydrated (after rainfall), they can weigh 4,800 pounds! Saguaros can live for up to 200 years, while their flowers only bloom for 24 hours.



Lesser long-nosed bats drink nectar from cactus flowers, and in the process carry pollen from one flower to the next. The pollinated flowers develop into fruit, which the bats also eat!





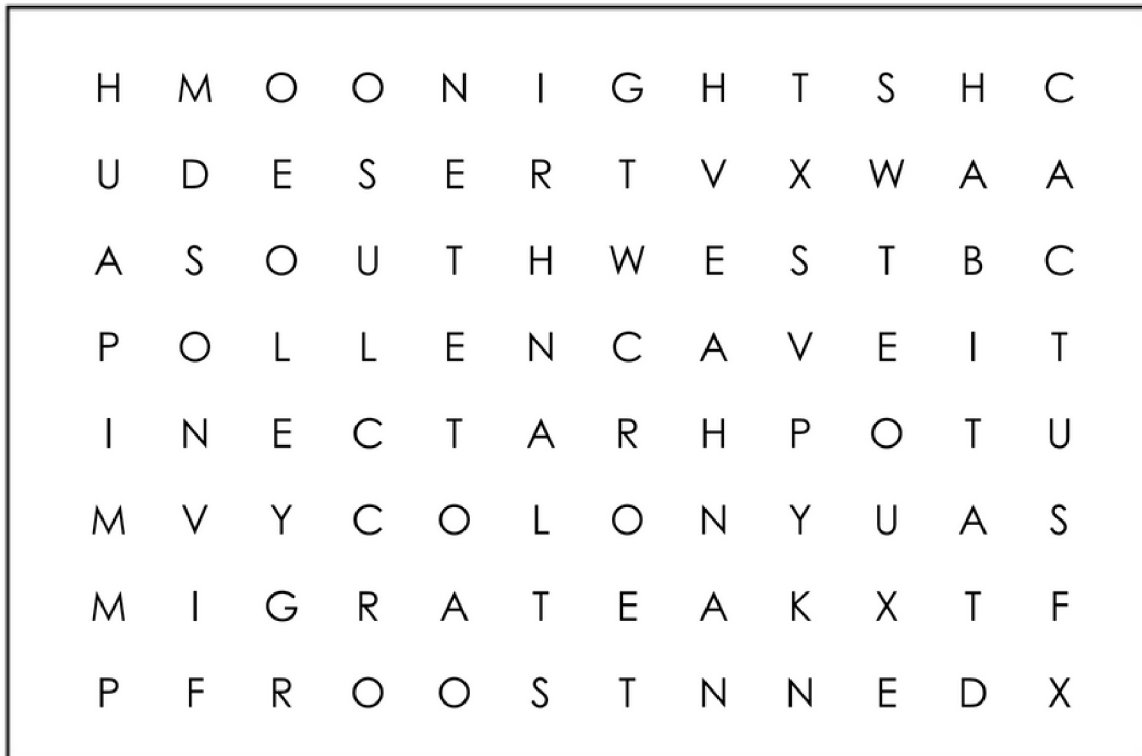


# LESSER LONG-NOSED BAT



## Word Search

Find 12 words related to these fascinating pollinators.



Find and circle the following words in the puzzle.

Note: The words may be horizontal or vertical.

DESERT

NIGHT

SOUTHWEST

CACTUS

CAVE

MIGRATE

NECTAR

COLONY

ROOST

MOON

POLLEN

HABITAT





# SPHINX MOTH



Other Common Names: Hawk or Hummingbird Moth

Scientific Family: *Sphingidae*

Description: Sphinx moths have long, pointed abdomens and plump bodies that are covered with long hairs. Their wingspan can range between 1.25" and 6" and their wings come in a wide variety of shapes and colors. They have a very long proboscis or "tongue" that they use to drink nectar. Sphinx moth caterpillars are often called hornworms, because they usually have a set of pointed "horns" on their rear end.

## FUN FACTS



It is estimated that there are over 1,200 species of Sphinx moth with only 125 living in North America.



The name "Sphinx" comes from the caterpillar's tendency to lift its head up when alarmed, resembling an Egyptian sphinx.



Like hummingbirds, sphinx moths are known for hovering over flowers and also have a tail that opens like a fan while they are collecting nectar. Some species can even move sideways or stop in midair.



Known for their hawk-like speed, sphinx moths can fly up to 30mph and are some of the fastest flying insects in the world.



Sphinx moths have the longest proboscis of any moth or butterfly. They can uncoil up to a length of 11 inches!

## FAVORITE PLANTS & COLORS

Sphinx moths pollinate at night and are attracted to white and pale-colored flowers, which glow when illuminated by the moon. They prefer nectar-rich, fragrant, and tube-shaped flowers such as:

bouncing bet, brugmansia, columbine, datura, evening primrose, four-o'clocks, honeysuckle, hosta, moonflower vine, nasturtium, night-blooming jasmine, jimson weed, larkspurs, petunia

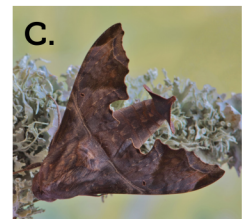
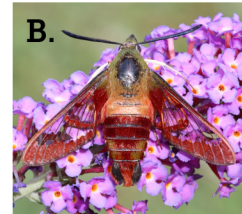
Each sphinx moth species has a specialized list of host plants and are often named after them (i.e. walnut sphinx moth). Other common plants eaten by sphinx caterpillars include:

apple, elm, grape, fuchsia, honeysuckle, poplar, purslane, tomato, snowberry, virgins creeper, willowweed, wild cherry

## HABITAT

Depending on the species, sphinx moths can be found in a diverse range of habitats across North America including woodlands, deserts, meadows, and marshes. The most important factor they look for are host plants to lay their eggs on.

### MATCH THE MOTHS



Match the name of each sphinx moth species based on their appearance.  
 Clearwing  
 Wooden  
 Mournful  
Check your answers on the coloring page!



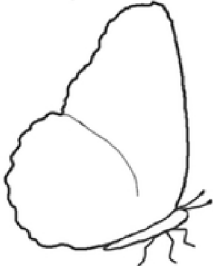
## HELP SPHINX MOTHS THRIVE

- Grow plants the moths like to feed or lay their eggs on.
- Cultivate a "moon garden" with flowers that bloom at night.
- Moths are attracted to light. To avoid distracting them from pollinating, turn off outside lights (especially those near flowers) at night time.
- Avoid using chemical sprays and pesticides in your garden.




# SPHINX MOTH



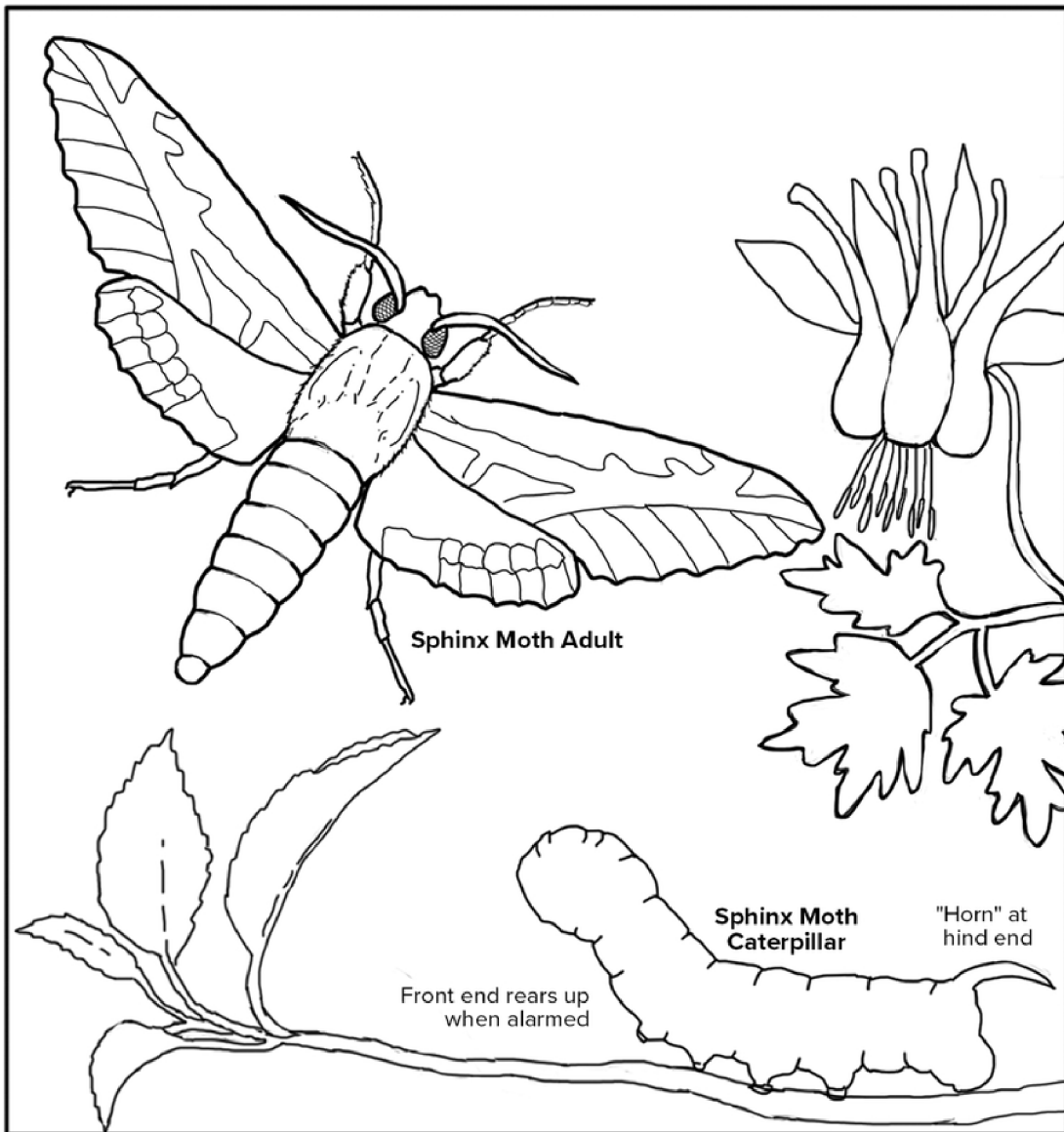


Butterfly

Differences Between Butterflies and Moths (in general; there are many exceptions!)		
Characteristic	Butterfly	Moth
When most active	Daytime	Evening/night
Wing position at rest	Upright over back	Spread out
Antennae	Thin, club-shaped tips	Feathery
Body	Slender, smooth	Stout, fuzzy



Moth



MATCH THE MOTHS answer key: A. Wooden B. Clearwing C. Mournful



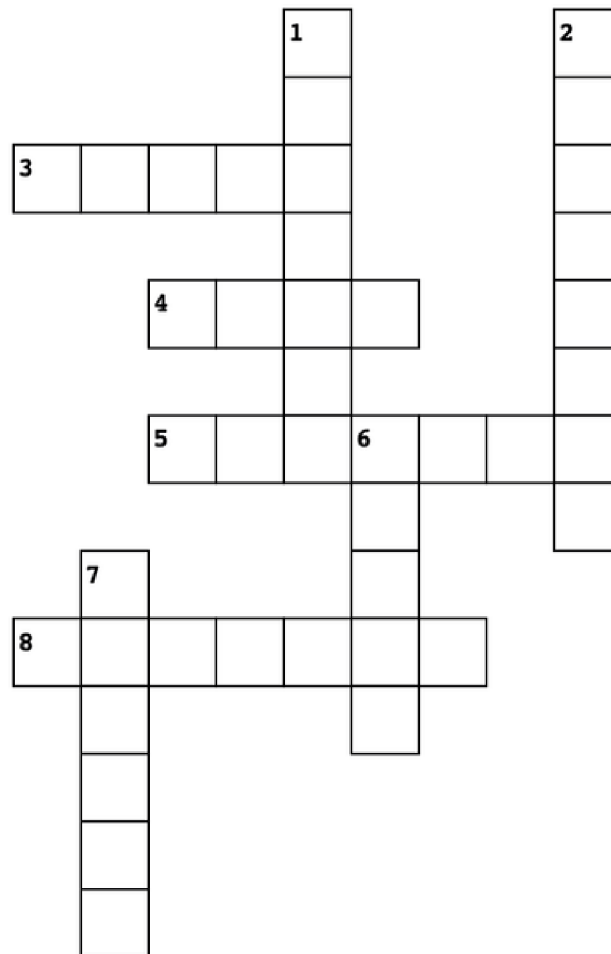


# SPHINX MOTH



## Differences between BUTTERFLIES and MOTHS

Use the information on the coloring page to fill in the crossword.



### Across

- 3. Moths have a stout, \_\_\_\_\_ body.
- 4. Butterfly antennae are \_\_\_\_\_ with a club-shaped tip.
- 5. Butterflies have a \_\_\_\_\_, smooth body.
- 8. Butterflies hold their wings in this position at rest.

### Down

- 1. Butterflies are most active at this time.
- 2. Moth antennae are \_\_\_\_\_.
- 6. Moths are most active during the evening and \_\_\_\_\_.
- 7. Moths hold their wings in a \_\_\_\_\_ out position at rest.

### ANSWERS

- 8. upright
- 5. slender
- 4. thin
- 3. fuzzy
- 1. daytime
- 2. feathery
- 6. night
- 7. spread





# BUMBLEBEE








Scientific Family Name: Apidae (bee) Genus: Bombus

**Description:** Bumblebees are the largest bee and range from 1.5 - 2.5 cm (about 0.6 to 1 inch) long. Their color is usually black with yellow or orange bands. They are round, fuzzy, and have short, stubby wings which they flap back and forth (rather than up and down). Bumblebees are generally very gentle; while only female bumblebees have stingers, they rarely sting unless they are disturbed. Unlike honeybees, they can sting repeatedly and do not die after they sting.

## FUN FACTS



-  There are over 250 species of bumblebees worldwide, 49 of which are native to the U.S.
-  Their colony size ranges from 50-400 bees. This is 1,000x smaller than honeybees, whose hives can contain up to 50,000 bees!
-  Only the queen bee survives through the winters. The worker bees' lifespan is only 28 days, making the colony "annual," or only surviving through one season.
-  During the winter, the queen bumblebee hibernates in the ground until spring arrives. She then spends the majority of a few weeks resting on the ground, in grasses and dead leaves, with intermittent short flights of 10-20 seconds until she can find a proper place to nest.
-  Bumblebees are one of the few insects that are able to generate body heat through thermoregulation. This means that they can fly in cooler temperatures as well as live at higher elevations and in more northern climates.

## HABITAT

The ideal bumblebee habitat must be fit for the queen to build her nest. Colonies are often found near or under the ground in places such as rock piles, cavities in tree stumps, or even abandoned mouse holes. Native bunch grasses can also provide nesting sites and protection for the queen to overwinter.

### WHICH BEE IS WHICH?



Match each bee:

- 1) Bumblebee \_\_\_\_\_
- 2) Mason bee \_\_\_\_\_
- 3) Honeybee \_\_\_\_\_

Check your answers on the coloring page!

## FAVORITE COLORS

Like all bees, bumblebee vision includes the ultraviolet spectrum. They cannot perceive infrared or red, but they do favor blue, purple, pink, and yellow.

## FAVORITE PLANTS

Bumblebees feed on nectar and pollen from a variety of flowers, blooming shrubs, native plants, or agricultural crops such as:

- Spring: comfrey, hellebore, poppies, columbine
- Early/late summer: coneflowers, sunflowers, black-eyed susans, bee balm, gentian
- Fall: salvia, wild geranium, anemone, basil

## HELP BUMBLEBEES THRIVE

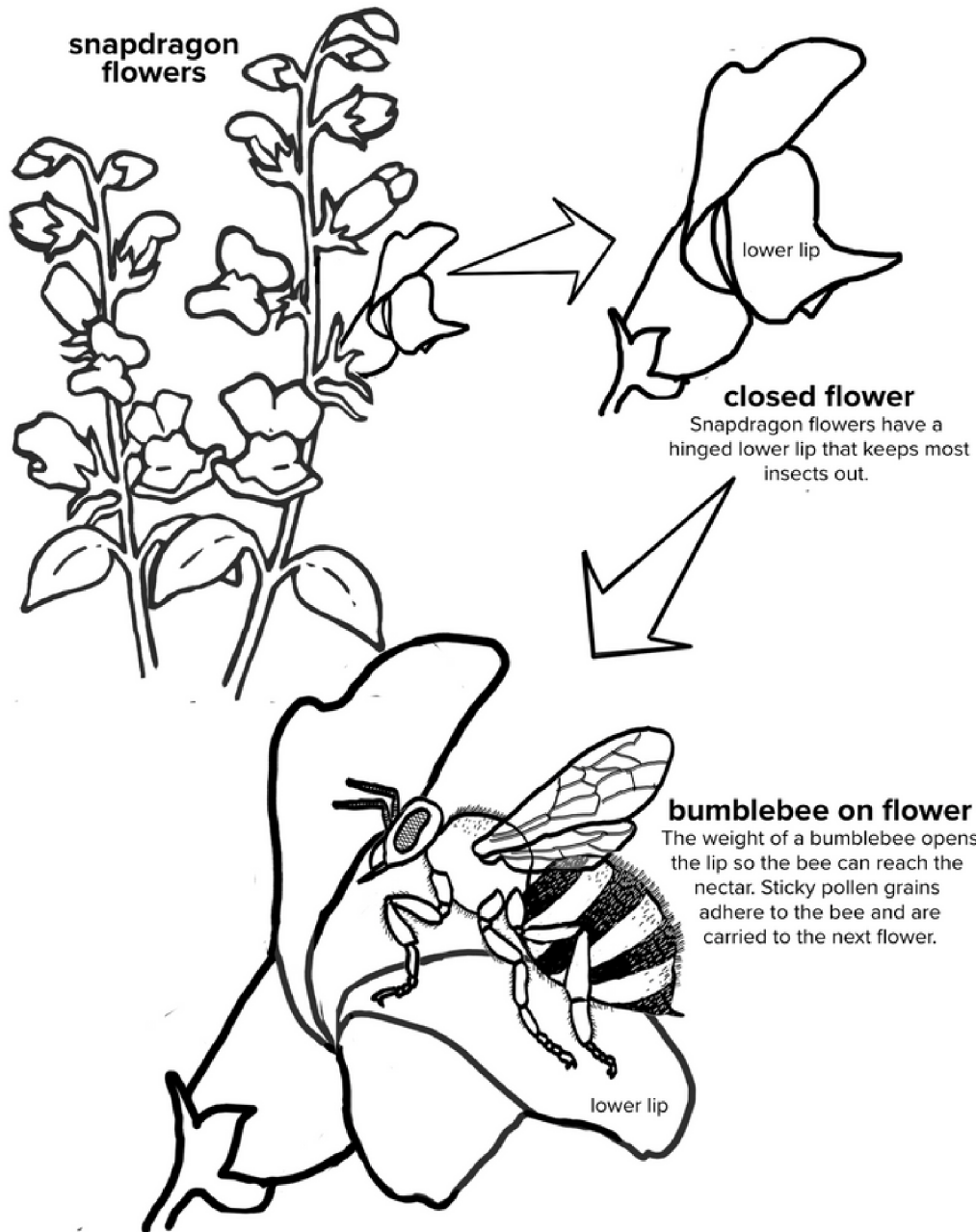
- Avoid using chemical pesticides and herbicides in your garden.
- Plant a variety of flowers that can provide blooms throughout the year.
- Reduce the amount of ground disturbance such as mowing or tilling during the spring.



# BUMBLEBEE



Bumblebees use "**buzz pollination**," a rapid vibrating motion which releases large amounts of pollen onto the bee, allowing them to pollinate a flower in a single visit. By contrast, a honeybee typically needs to visit a flower between 7-10 times before it is fully pollinated.



Which bee is which? Answer key: 1) b 2) c 3) a



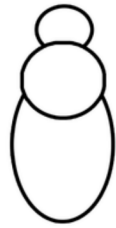


# BUMBLEBEE

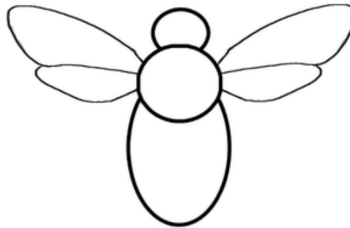


## Draw a Bumblebee

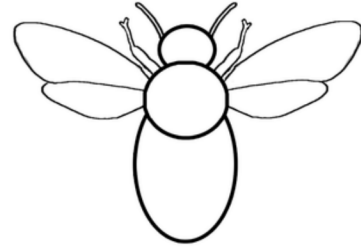
Use the steps below to draw a bumblebee in the space at the bottom.



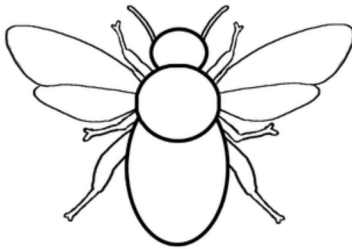
Draw the body like this.



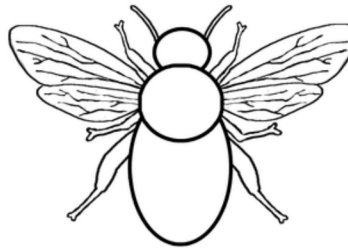
Add the wings.



Draw the antennae and front legs.



Add the middle and hind legs.



Draw some veins in the wings.



Add stripes and eyes.





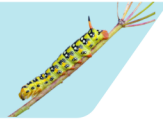
# SWALLOWTAIL BUTTERFLY



*Scientific Family: Papilionidae*

**Description:** There are many species of swallowtail butterfly, a group named for the tail-like extensions of their hindwings (although some species are "tailless"). Coloring and patterns differ between species and also between males and females. Most have some combination of yellow, blue, black, or red coloration on their wings. These butterflies can also be quite large; the giant swallowtail can have a wingspan of up to 7" and is the largest butterfly in North America!

## FUN FACTS



- There are over 550 species of swallowtails. They're found on every continent except Antarctica, with 30 species native to North America.
- Adults feed on flower nectar; they also sip from mud puddles to get vital minerals.
- Certain species of swallowtail practice Batesian mimicry; their appearance can closely resemble other butterfly species that predators find distasteful.
- Some swallowtail caterpillars eat plants that contain toxic defense chemicals and integrate these compounds into their bodies to prevent being eaten.
- When threatened, swallowtail caterpillars emit a repellant smell from their scent gland to keep predators away.
- The life span of most swallowtail butterflies ranges from 6 days to 6 weeks, depending on the species.

## HABITAT

The greatest diversity of swallowtails is found in subtropical and tropical regions, especially in East and Southeast Asia. Various species inhabit altitudes from sea level to high mountains. Swallowtails can be found near food sources, including gardens, fields, meadows, forests, and stream banks.



## FAVORITE PLANTS & COLORS



The caterpillars of different swallowtail species eat plants exclusively from one of the following 5 families: birthwort, custard apple, laurel, carrot, and citrus.

For example, the main host plant of the eastern black swallowtail (the most common species in North America) caterpillar is Queen Anne's lace. However, they also eat plants in the same family including carrots, dill, fennel, and parsley.

Adult swallowtails of all species have similar tastes. They prefer to feed on nectar-rich plants such as coneflowers, butterfly weed, zinnias, sages, lantana, Mexican sunflower, and more.

Like most butterflies, they prefer flowers that are white, pink, orange, yellow, red, or purple.



## HELP SWALLOWTAIL BUTTERFLIES THRIVE



- Create a swallowtail butterfly habitat in your garden by:
- Cultivating host plants that are preferred by the swallowtail caterpillar species in your area.
- Plant a wide variety of perennial and annual nectar-rich flowers in your garden for the butterflies to feed on.
- Preserve existing trees and plant new ones to provide the butterflies with nighttime roosts.





# SWALLOWTAIL BUTTERFLY



## 5 SWALLOW TAIL SPECIES



BLACK



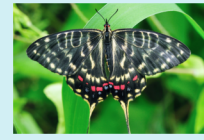
PIPEVINE



ANISE

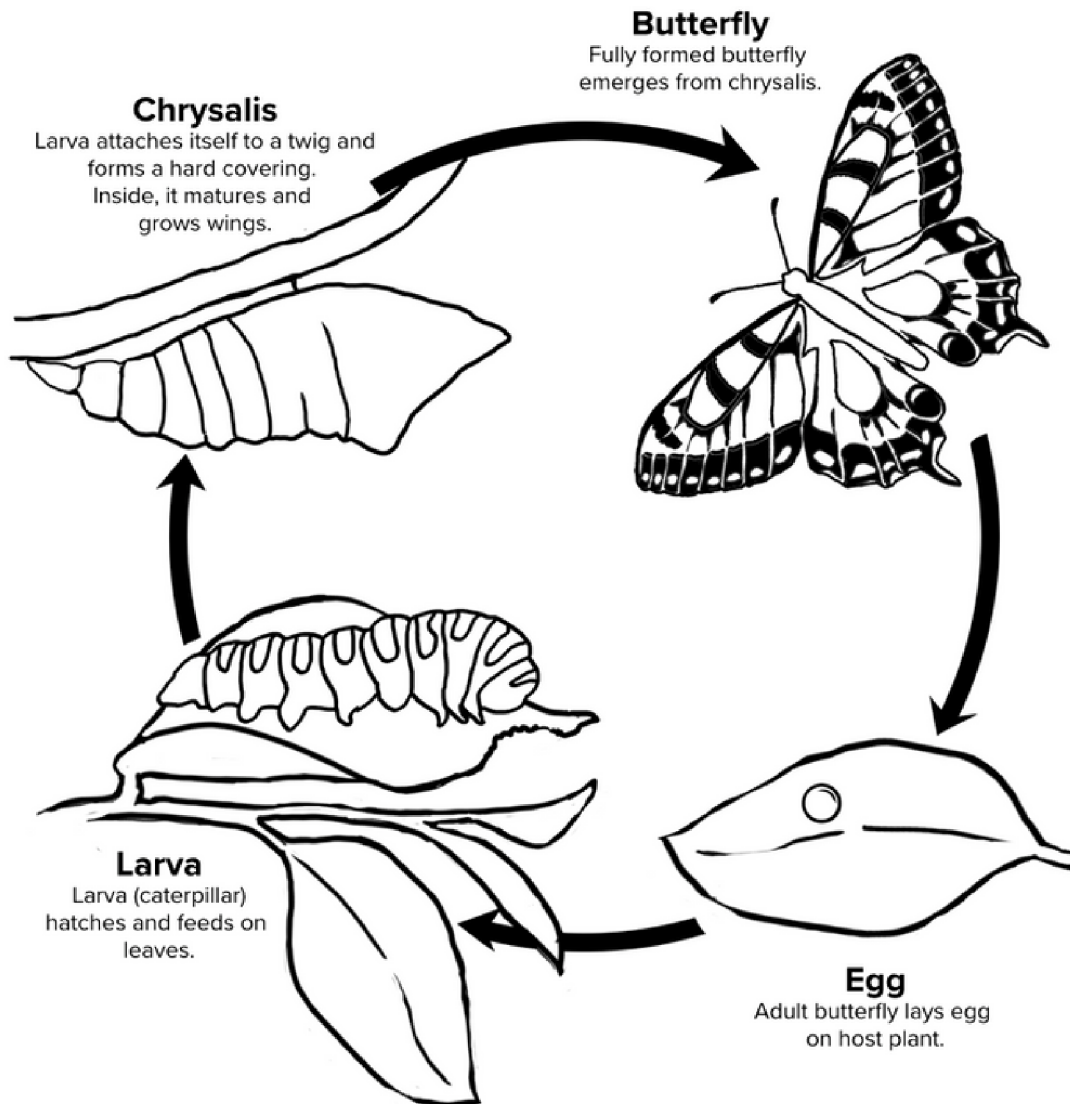


ZEBRA



DRAGON

## Swallowtail Butterfly Life Cycle 4 stages of metamorphosis





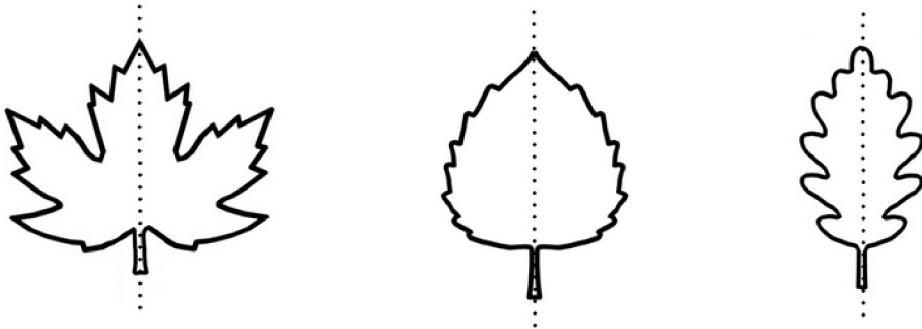
# SWALLOWTAIL BUTTERFLY



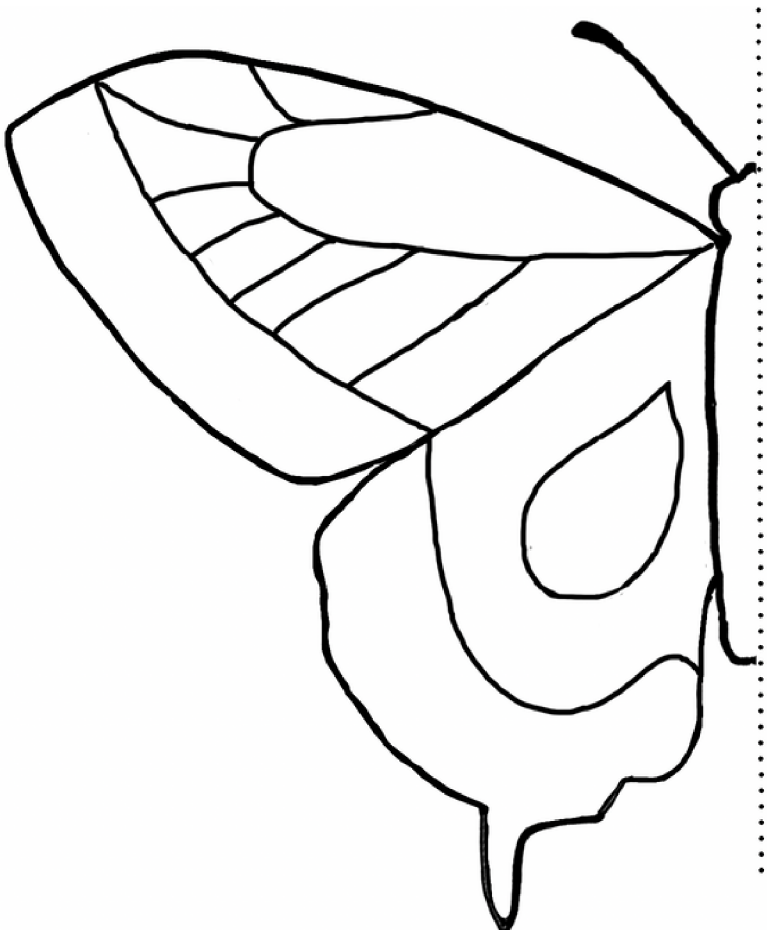
## Symmetry in Nature

An object is symmetrical when it is the same on both sides. You can draw a line down the middle and the two sides are mirror images.

These leaves are examples of bilateral symmetry:



Many plants and animals have bilateral symmetry. Butterflies are a great example. Finish the image below by drawing the other side of the butterfly.





# HOVERFLY









Other Common Names: Syrphid Fly, Flower Fly  
Scientific Family Name: *Syrphidae*

Description: Ranging in size from 1/4 to 1/2" long, hoverflies have two wings, large eyes, and stubby antennae. Although they don't have stingers, they mimic the color patterns of bees and wasps to scare off predators.

## FUN FACTS



-  There are 6,000 species of hoverflies found across the world.
-  They are the second most important pollinator after wild bees.
-  While hoverflies carry less pollen on their bodies than bees, they visit a larger number of flowers and travel longer distances.
-  In addition to being pollinators, hoverflies are beneficial to gardens because their larvae feed on pests like aphids and small caterpillars.
-  In order to attract the help of pollinating hoverflies, the flowers of a certain orchid species release chemicals that are similar to those given off by aphids.
-  Hoverflies are one of the best examples of *Batesian mimicry*, when one species copies the appearance and behavior of another to protect themselves.

### FAVORITE COLORS

White and yellow flowers

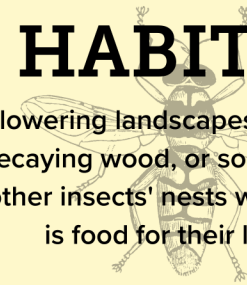
### FAVORITE PLANTS

Small, flat flowers that they can easily "hover" over such as: fennel, daisies, Queen Anne's Lace, Alyssum, cosmos, and zinnias



## HABITAT

Flowering landscapes, gardens, decaying wood, or sometimes in other insects' nests when there is food for their larvae



### POLLINATOR LOOK-ALIKES



Identify each pollinator:

- a) hoverfly
- b) honeybee
- c) yellow jacket

Check your answers on the coloring page!

## HELP HOVERFLIES THRIVE

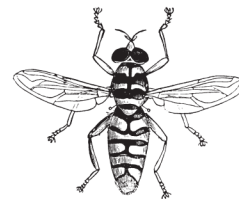
Hoverfly populations are larger in places where a diverse range of pollinator plants grow.

Healthy ecosystems = more hoverflies and pollinators!





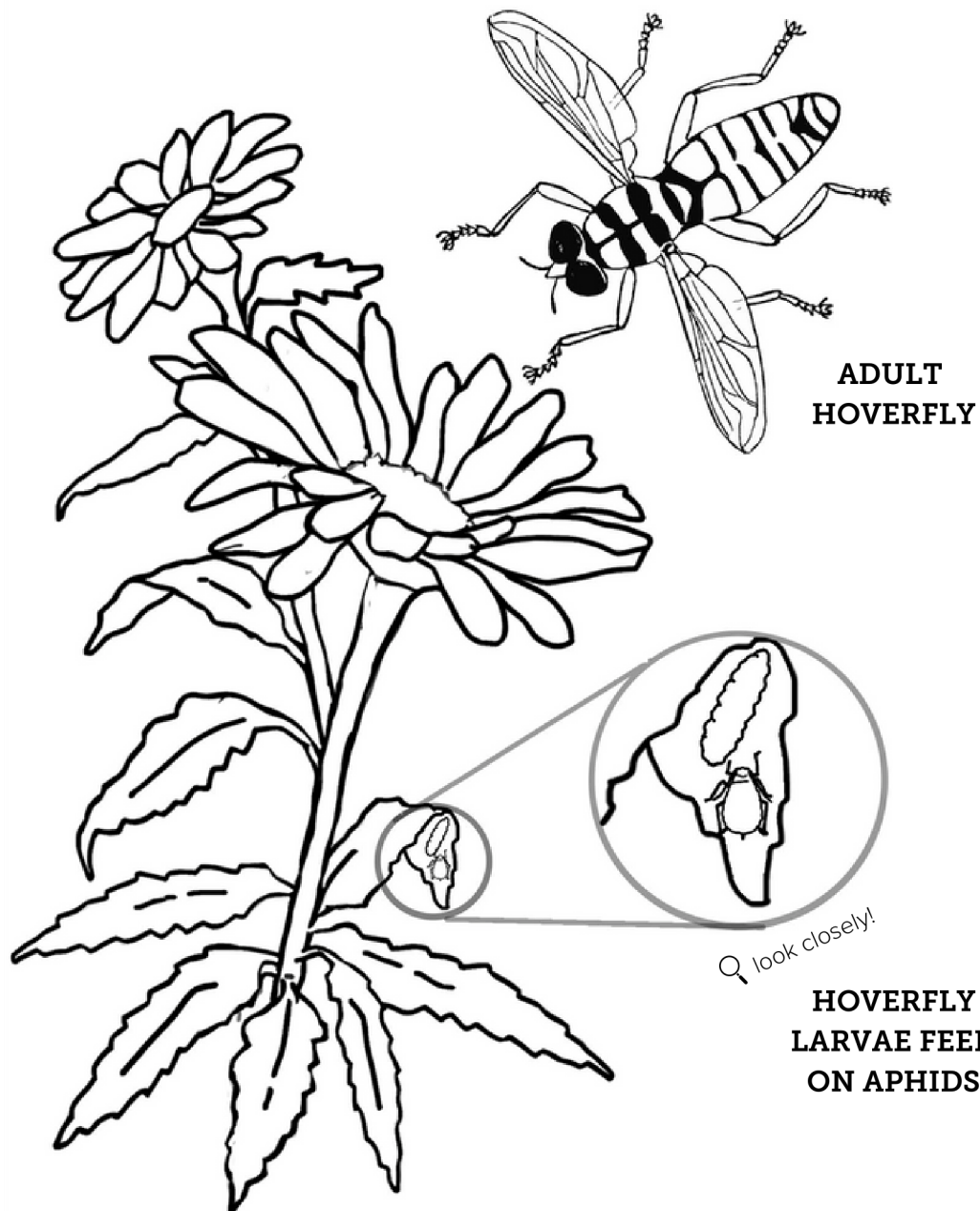
# HOVERFLY



HOVERFLY LARVAE

## Did you know?

Aphids cause millions of dollars in crop damage every year, making hoverflies and their larvae essential partners in farming and gardening.



ADULT HOVERFLY

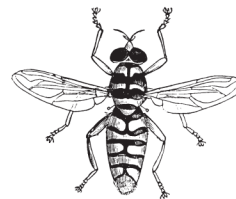
HOVERFLY LARVAE FEED ON APHIDS

POLLINATOR LOOK-ALIKES answer key: 1) b 2) c 3) a





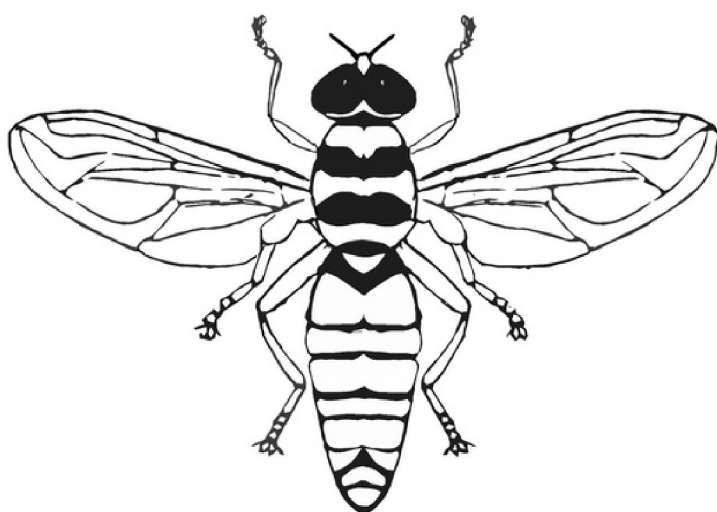
# HOVERFLY



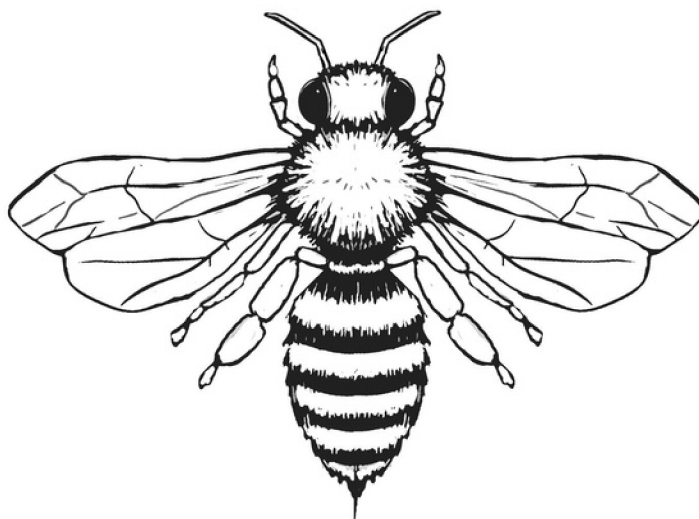
## Spot the Difference!

Hoverflies and honeybees look similar. For example, they're both flying insects with stripes on their bodies. But if you look closely you can see they are different. Circle all the differences you see. Then make a list and describe how they are different.

Hoverfly



Honeybee



Differences:

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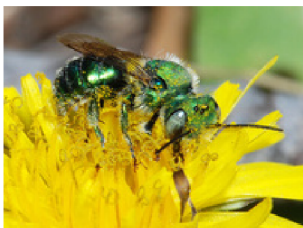
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Stinger	No	Yes
Hind legs	Thin	Wide
Body	Smooth	Fuzzy
Wings	2 (one per side)	4 (two per side)
Eyes	Very large	Smaller
Antennae	Short, straight	Longer, with bend
Hoverfly		Honeybee





# MASON BEE










*Scientific Family: Megachilidae Genus: Osmia*

**Description:** Mason bees resemble house flies in terms of size and color. They are about 3/8" to 5/8" in length. While typically they have metallic blue, black or green coloring, some species have a coat of golden fuzz and can be mistaken for a honeybee at first glance. Only females have stingers, but they are non-aggressive and rarely sting.

Mason Bee photo by Robert A. Behrstock




## FUN FACTS


-  There are 342 species of mason bees around the world, with 139 being native to North America.
-  A single mason bee can pollinate 2,000 flowers per day!
-  They are named for their practice of masonry and building walls in their nests using mud. Female bees seek out narrow, hollow tunnels and construct several "rooms" inside for egg-laying.
-  Mason bee moms are able to determine the sex of the eggs as they lay them. Because the males emerge in the Spring before females, she lays them last, in the front of the tunnel.
- Mason bees vs. honeybees**
-  Mason bees are solitary bees, which means that unlike the social honeybee, every female lays eggs and raises offspring by herself without the help of an organized colony.
-  Mason bees are extremely effective pollinators. As they land on blooms, mason bees do a "belly flop" onto each flower, covering their whole bodies in pollen. This pollen is readily transferred to the next flower they visit, resulting in a 95% pollination rate!
-  In contrast, honeybees collect most of their pollen in baskets on their hind legs, where it's less apt to be transferred to the next flower. The result is a mere 5% pollination rate.


Osmia Aglaia (male) image by Joe Dlugo

## FAVORITE PLANTS & COLORS

Mason bees emerge in early spring, making them excellent pollinators of early-blooming fruit trees. Although they're generalists (meaning they'll visit a wide variety of flowers), mason bees are especially attracted to brightly colored native flowers.

 **yellow** - sunflower, dandelion, daisy, acacia

 **purple/blue** - butterfly bush, catmint, lavender, salvia, canterbury bells, alyssum

 **white** - flowers in the rose family, including fruits like apples, blackberries, pears, and strawberries

Joseph Berger, Bugwood.org 5436312

## HABITAT

Depending on the species, mason bees can be found in deserts, prairies, shrub lands, deciduous forests, and coniferous forests. They build their nests in dried sticks/stems, hollow wood, rocks, or other sites that have narrow, open cavities.



Osmia chalybea (female) by Gretchen L. Grammer

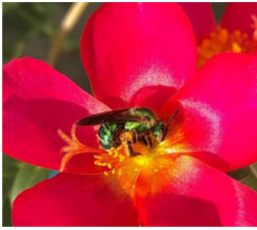
## HELP MASON BEES THRIVE



Mason bees need a nesting place, pollen/nectar from flowers, and a clay-mud source to thrive. If they cannot find a tunnel-shaped cavity in nature for their nest, they are also keen to occupy a human-made structure! You can easily build a mason bee "hotel" using reed tubes, store bought "bee tubes," or wood blocks with drilled holes that are at least 8mm in diameter.



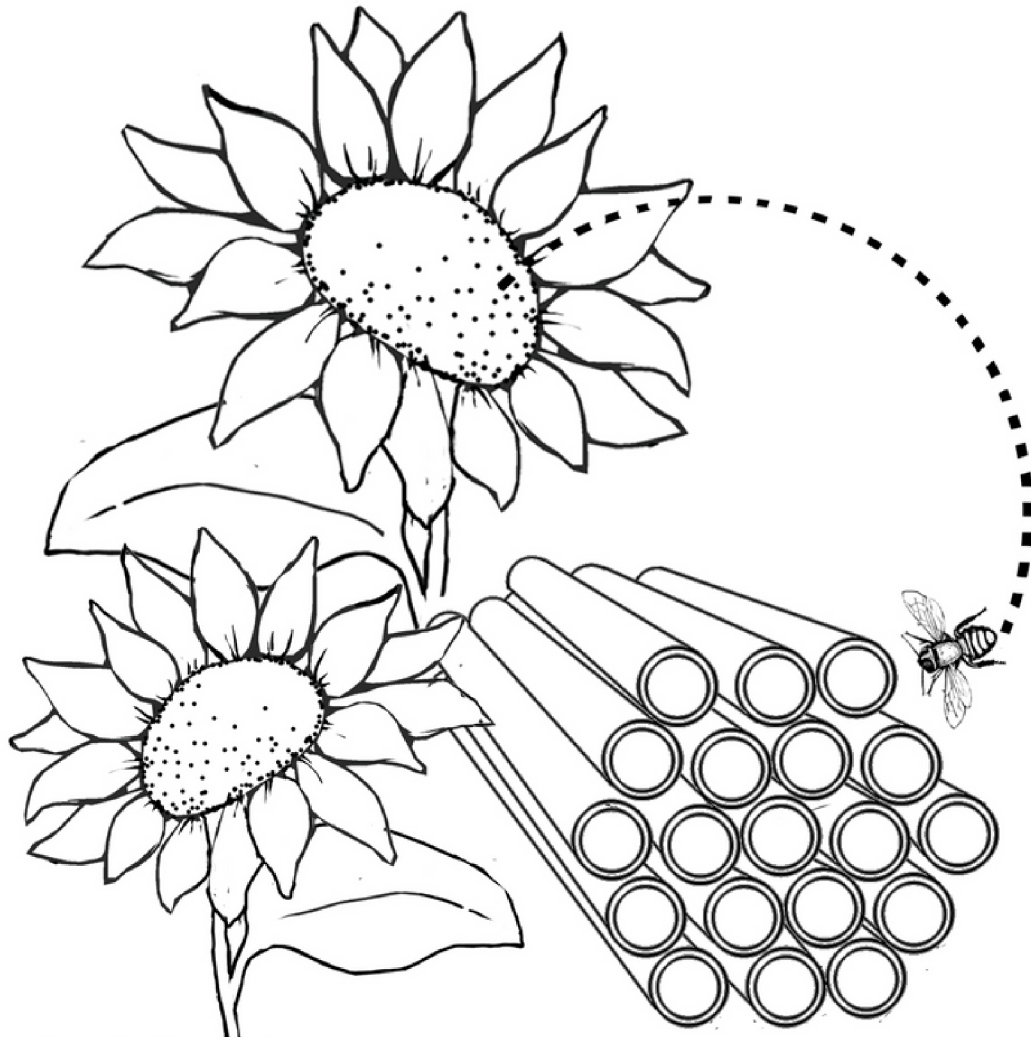
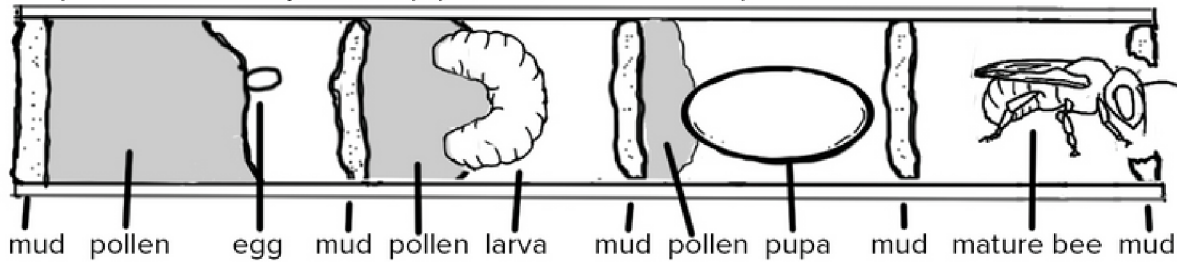
# MASON BEE



## CROSS-SECTION OF TUBE

A female bee closes off the end of a tube with mud, packs in a golden mound of pollen and nectar, and then lays an egg. She adds a thin layer of mud to close off the cell, and repeats the process for each "room" she creates. The egg hatches into larva, which eats the readymade food source. When it's ready, it forms a pupa. Inside, the larva metamorphoses into a mature bee and emerges when spring temperatures reach about 55 degrees.

Mason Bee photo by Lauren Engram, KidsGardening 2021 photo contest entry





# MASON BEE



Test your knowledge of these fascinating native bees by filling in the blanks.

(Answers at the bottom of the page.)

1. A single mason bee can pollinate 2,000 F \_\_\_\_\_ each day.

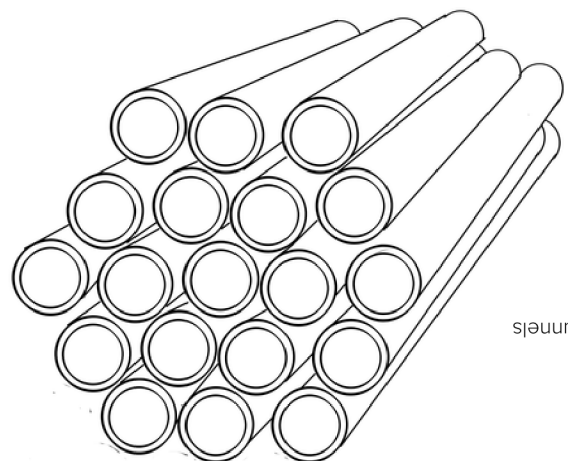
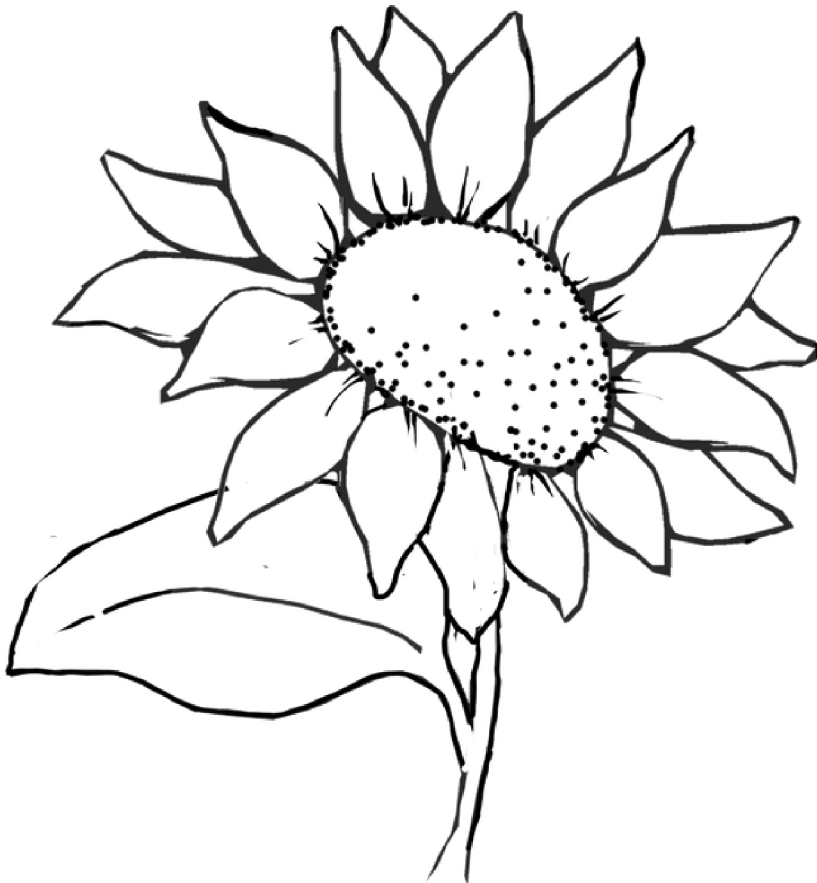


2. Mason bees construct walls in their nests using M \_\_\_\_\_.

3. Unlike honeybees that live in colonies, mason bees are S \_\_\_\_\_.

4. Mason bees build their nests in holes shaped like I \_\_\_\_\_ or I \_\_\_\_\_.

5. Mason bees are not aggressive and rarely S \_\_\_\_\_.



ANSWERS  
1. flowers  
2. mud  
3. solitary  
4. tubes, tunnels  
5. sting







# RUBY-THROATED HUMMINGBIRD




*Scientific Name: Archilochus colubris*


**Description:** Ruby-throats can grow up to 3.5" long and weigh an average of 4 grams (less than a nickel!). Both the males and females are green with white chests and bellies, but only males have ruby-colored throats while the females have white throats.


\*Hummingbird photo by Austin Ogolsky, KidsGardening 2020 photo contest entry


## FUN FACTS

 Ruby-throated hummingbirds have very fast metabolisms! Their heart can beat up to 1,200 times per minute and they can take about 250 breaths per minute.

 During their migration from the Eastern U.S. to Central America, the birds fly nonstop over the Gulf of México, covering 500 miles in 20 hours.

 They are the only breeding hummingbird in Eastern North America and are the most widespread among all 339 hummingbird species.

 Ruby-throats consume up to twice their weight in food (nectar, insects, and tree sap) every day.

 Their nests are the size of a thimble and take 6-10 days to build. They are made with various plant parts, bound with spider silk, lined with plant fibers (such as dandelion), and have lichen on the exterior.



## HABITAT

In the summer, Ruby-throats can be found in North America's deciduous woodlands and Canada's southern prairies. In the fall, they begin their migration to spend the winter in the tropical climate of Central America.



male



female


**FAVORITE COLORS**  
Red and orange flowers

**FAVORITE PLANTS**  
Nectar-rich and tubular flowers such as trumpet vine, columbine, jewelweed, petunia, morning glory, coral honeysuckle, buckeye, and cardinal flower



**HELP HUMMINGBIRDS THRIVE**

Mix 1 part white sugar with 4 parts water to make "nectar" for your hummingbird feeder. Do not add food coloring. Drain, wash, and refill the feeder every few days.





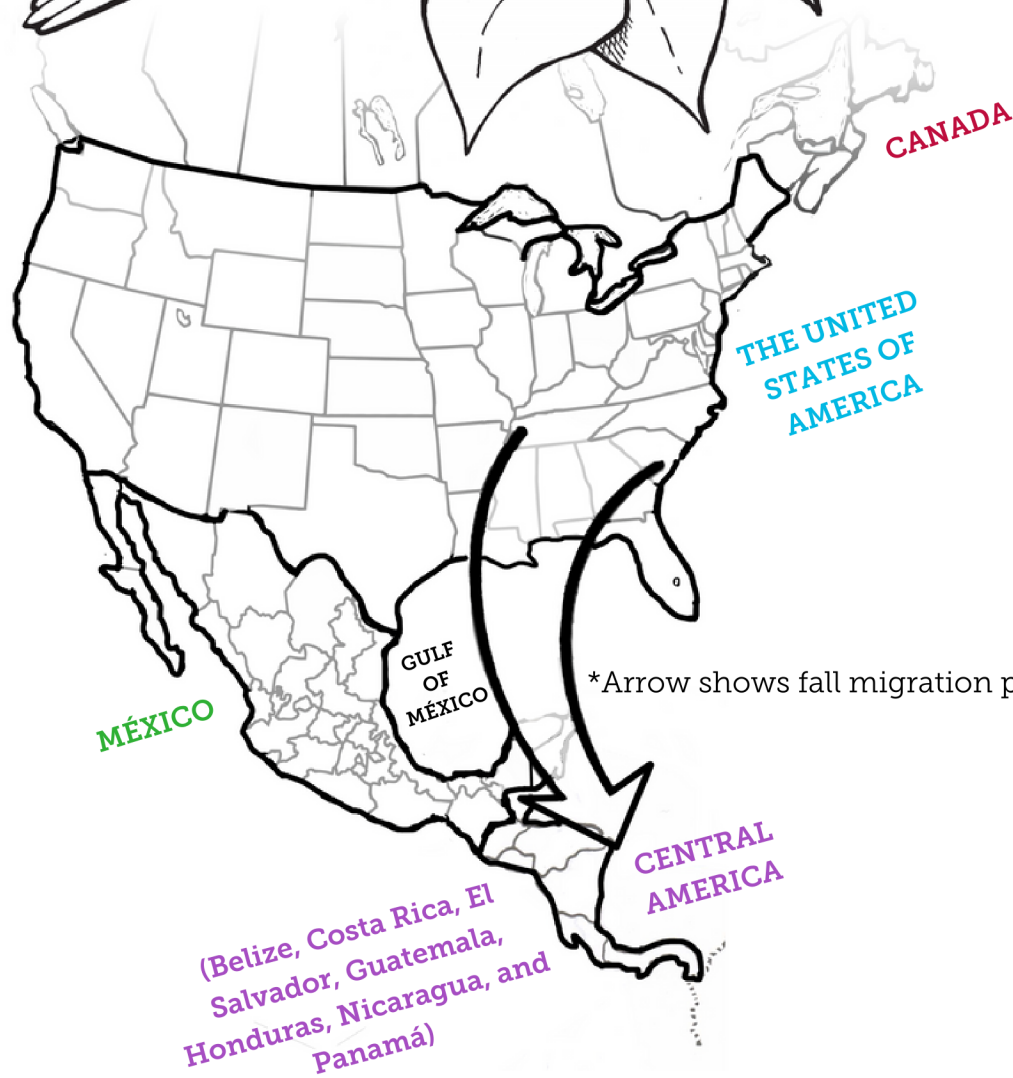
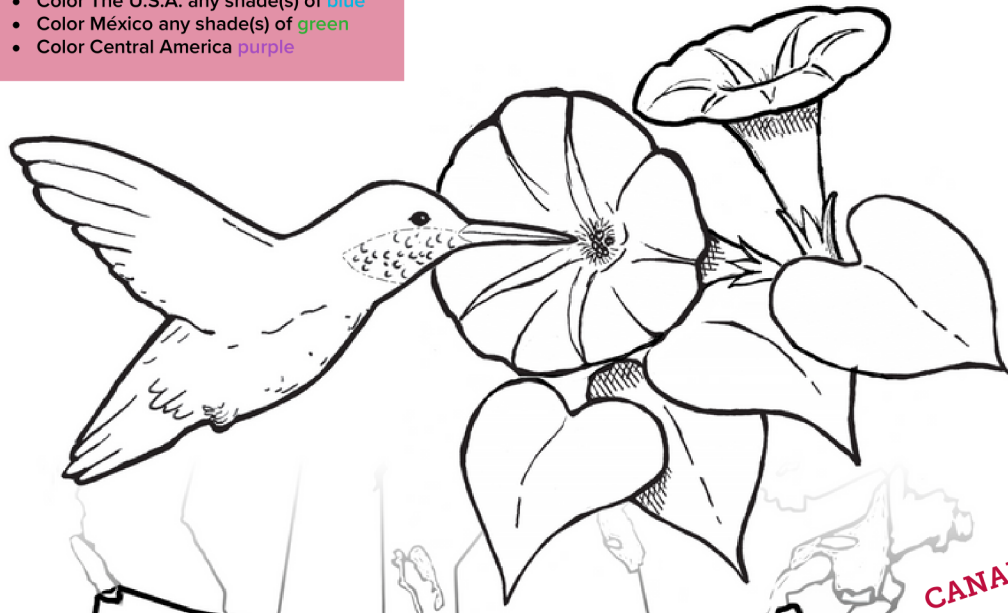
# RUBY-THROATED HUMMINGBIRD



## COLOR THE MAP



- Color Canada any shade(s) of **red**
- Color The U.S.A. any shade(s) of **blue**
- Color México any shade(s) of **green**
- Color Central America **purple**



CANADA

THE UNITED STATES OF AMERICA

MÉXICO

GULF OF MÉXICO

\*Arrow shows fall migration path.

CENTRAL AMERICA

(Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panamá)





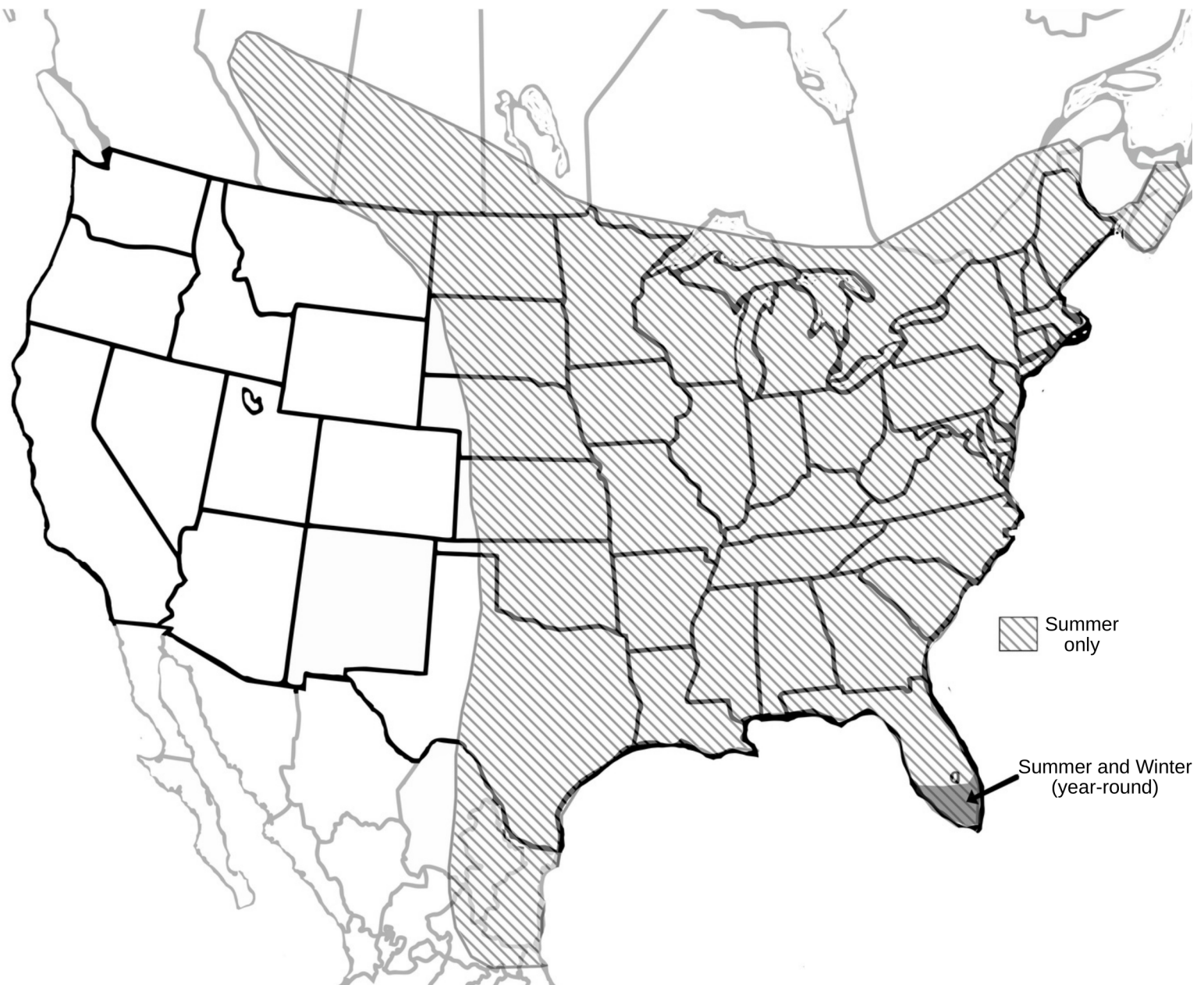
# RUBY-THROATED HUMMINGBIRD



## Where Do Ruby-Throated Hummingbirds Live?

Ruby-throated hummingbirds live in the shaded areas below during different times of the year.

1. Find your home on the map. Do ruby-throated hummingbirds live near you?
2. If yes, find out when during the year you can find them in your location — summer only or year-round?





# YUCCA MOTH









*Scientific Name: Tegeticula yuccasella*

**Description:** Blending in with the flowers they pollinate, yucca moths are mostly white, though some have black spots. As caterpillars, they are reddish-pink. As an adult, their length is around half an inch with females being slightly larger than males. Unlike most moths that have tongues, they have "tentacles" near their mouth for collecting sticky pollen.

## FUN FACTS



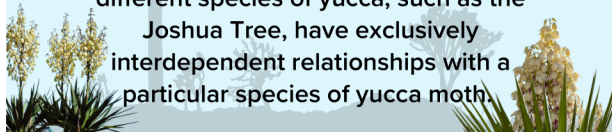
-  When spring arrives and the yucca blossoms, it releases a sweet fragrance. This is a signal to underground yucca moths in cocoons to emerge for feeding and mating.
-  Adult males never eat because they only live long enough to mate.
-  Using her tentacles, female yucca moths collect pollen while forming a small ball that is three times the size of her head, which she transports to other yucca flowers for pollination.
-  Yucca moths lay their eggs in the ovaries of the yucca flowers, but not where other females have laid to ensure there will be enough food for the caterpillars.
-  The flower's ovary will eventually develop into a fruit and seed pod, which will serve as the caterpillar's home and source of food.
-  After they feed on the seeds, they bury into the ground to cocoon (usually during rain) and the cycle repeats. They can wait up to 10 years for a yucca bloom!



Emergence hole in a yucca seed pod  
Whitney Cranshaw, Colorado State University,  
Bugwood.org

## FAVORITE PLANTS & COLORS

Yucca is the only plant that the yucca moths feed on. Yucca is a perennial and can live up to 20 years. Its flowers are a creamy white color. Many different species of yucca, such as the Joshua Tree, have exclusively interdependent relationships with a particular species of yucca moth.



## HABITAT

Yucca moths are native to the Southwestern U.S. and Mexico. They can be found in semi-arid and desert landscapes, wherever yucca plants grow.



Yucca moth on Yucca glauca flower pistil  
Granite Ridge Nature Institute, Lynn & Gene Monroe

## HELP YUCCA MOTHS THRIVE

As a specialist species, yucca moths depend on the yucca plants to survive. Conserving yucca plants in their native areas is essential for their preservation.

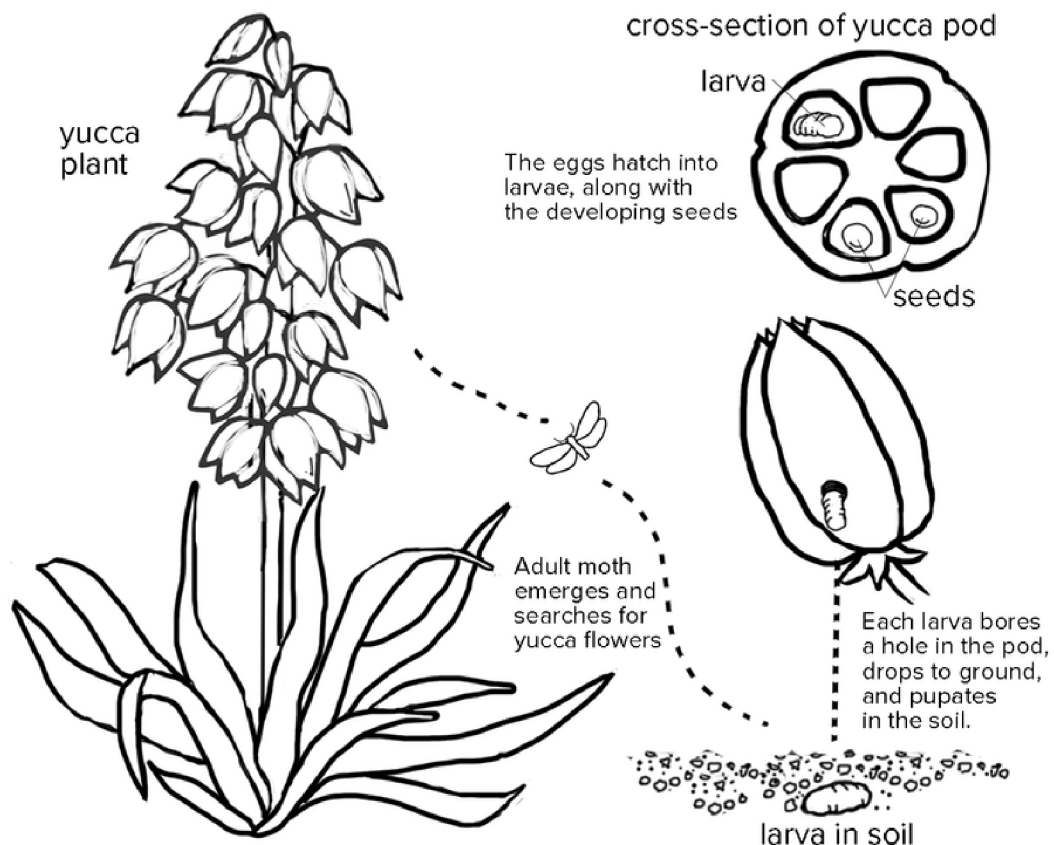
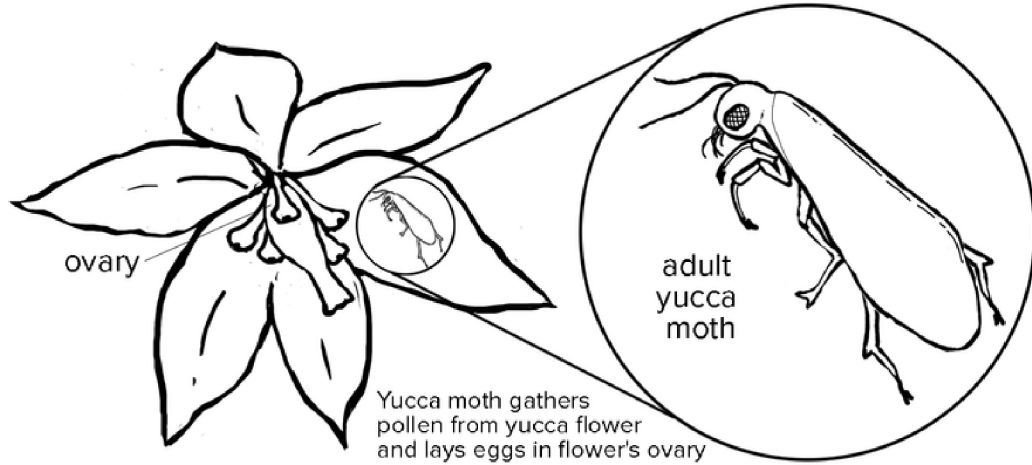


# YUCCA MOTH



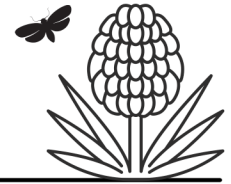
Mutualism: a symbiotic ecological interaction between two organisms of different species that "work together" and each benefit from the relationship.

## L I F E C Y C L E





# YUCCA MOTH



Complete the following sentences by unscrambling the underlined words and writing them on the lines.

(Answers at the bottom of the page.)

1. The color of a Yucca moth's wings is tewih. \_\_\_\_\_
2. Yucca moth are vatine to the southwestern U.S. and Mexico. \_\_\_\_\_
3. They can be found in semi-arid and sedrte landscapes. \_\_\_\_\_
4. Yucca moth caterpillars bury into the ogrudn to cocoon. \_\_\_\_\_
5. Yuccas are perennial plants that can live up to 20 syare. \_\_\_\_\_
6. Yucca flowers release a sweet fragrance to tactrat yucca moths. \_\_\_\_\_
7. Yucca moths edpden on yucca plants. \_\_\_\_\_



Answers:  
 1. white  
 2. native  
 3. desert  
 4. ground  
 5. years  
 6. attract  
 7. depend





# HONEYBEE





Common Honeybee Scientific Name: *Apis mellifera*


**Description:** Honeybees are predominately dark brown with a golden fuzz that covers their body. Their heads have 2 antennae and 5 eyes (2 large compound eyes and 3 "simple" eyes). Their thorax consists of 4 wings (2 larger forewings and 2 smaller hind wings) and 6 legs, with pollen baskets on their hind (back) legs. Their abdomen has 6 striped segments and only females have stingers.


## FUN FACTS





 Honeybees live in "hives" or colonies of bees with three types of members.

 **Queen:** There is only one per hive and she is the largest of them all. She lays up to 2,500 eggs a day and produces chemicals that guide the behavior of the rest of the colony.

 **Workers:** The most hard-working bees are the smallest and also all female. The worker bees forage for food (pollen and nectar), produce wax to build honeycombs, make honey, maintain and protect the hive, feed young bee larvae, and take care of the queen and drones. If a worker bee stings you, she will die.

 **Drones:** 5% of the colony are male drones, whose only purpose is to mate with the queen. Drones do not have any stingers.

 While honeybees are now important pollinators in the U.S., they are not native and were introduced by Europeans.

 Honeybees pollinate around 80% of agricultural crops grown in the U.S., making them a critical part of our food system and ecosystem.

## HABITAT

Honeybees can thrive wherever flowering plants are abundant, whether it is in woodlands, meadows, or a garden. They like to build their nests (the beehive) in cavities, especially hollow trees.



## FAVORITE COLORS & PLANTS



Honeybees prefer to pollinate any plant that is the most visible to them. Unlike humans, honeybees can see on the ultraviolet spectrum. They love most yellow, orange, blue, violet, and purple flowers. However, they do not like red as it appears "black," or the absence of color.

## HELP HONEYBEES THRIVE



- Cultivate a pollinator garden and fill it with nectar-rich plants of their favorite colors.
- Avoid the use of pesticides (even organic ones) as chemicals pose a threat to sensitive bee populations.
- Contact your local beekeeping club or state apiarist about starting your own hive.



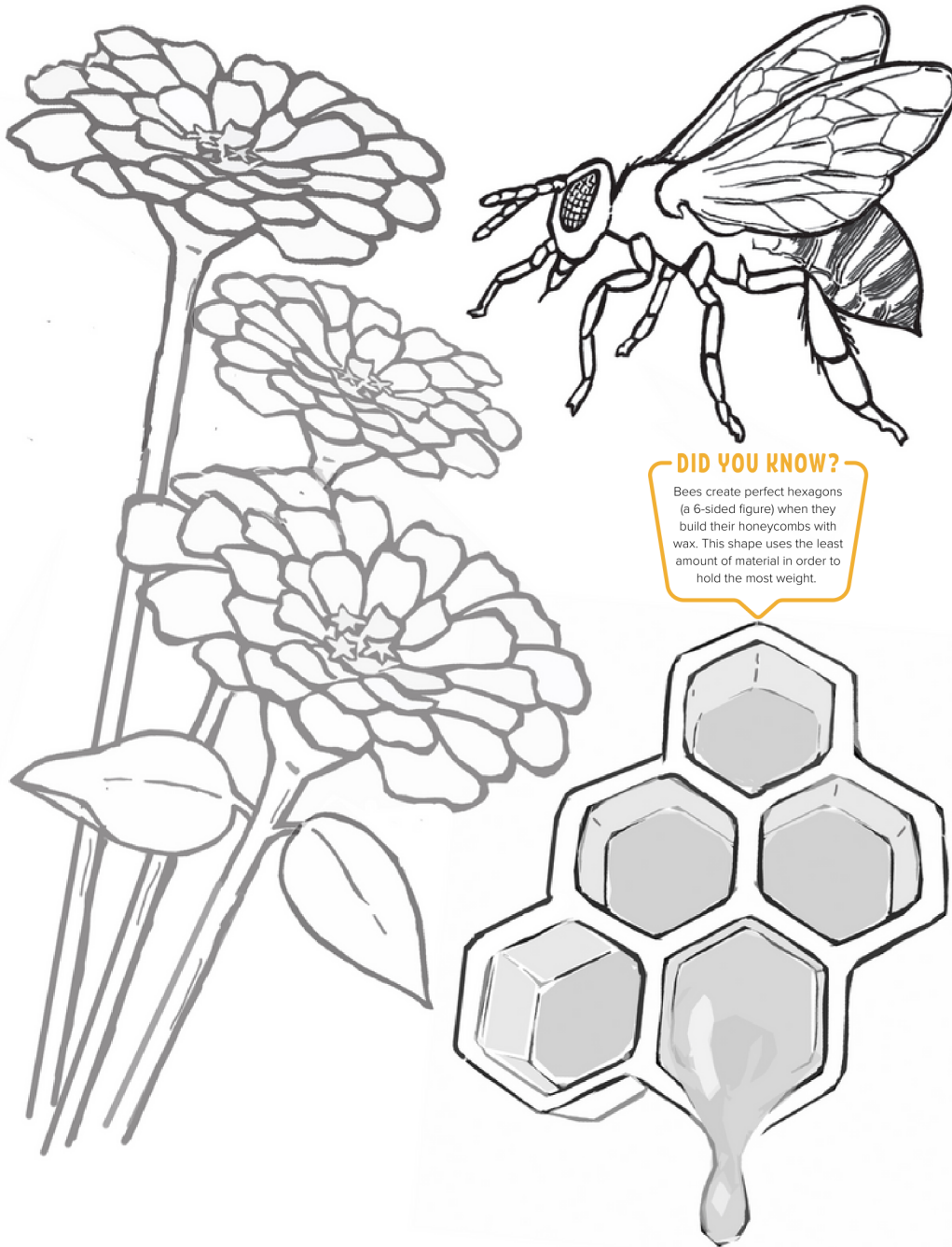
# HONEYBEE



## color perception chart

Color the zinnia flowers as they would be perceived by bees. For example, white-colored flowers seen with human eyes would appear blue-green by bees. "Ultraviolet" is perceived as a bright whiteish-blue or bright, "beyond violet."

HUMAN	RED	ORANGE	YELLOW	GREEN	BLUE	VIOLET	PURPLE	WHITE	BLACK
honeybee 	black	dark yellow - green	yellow-green	green	blue + ultraviolet blue	blue + ultraviolet	blue	blue-green	black



### DID YOU KNOW?

Bees create perfect hexagons (a 6-sided figure) when they build their honeycombs with wax. This shape uses the least amount of material in order to hold the most weight.



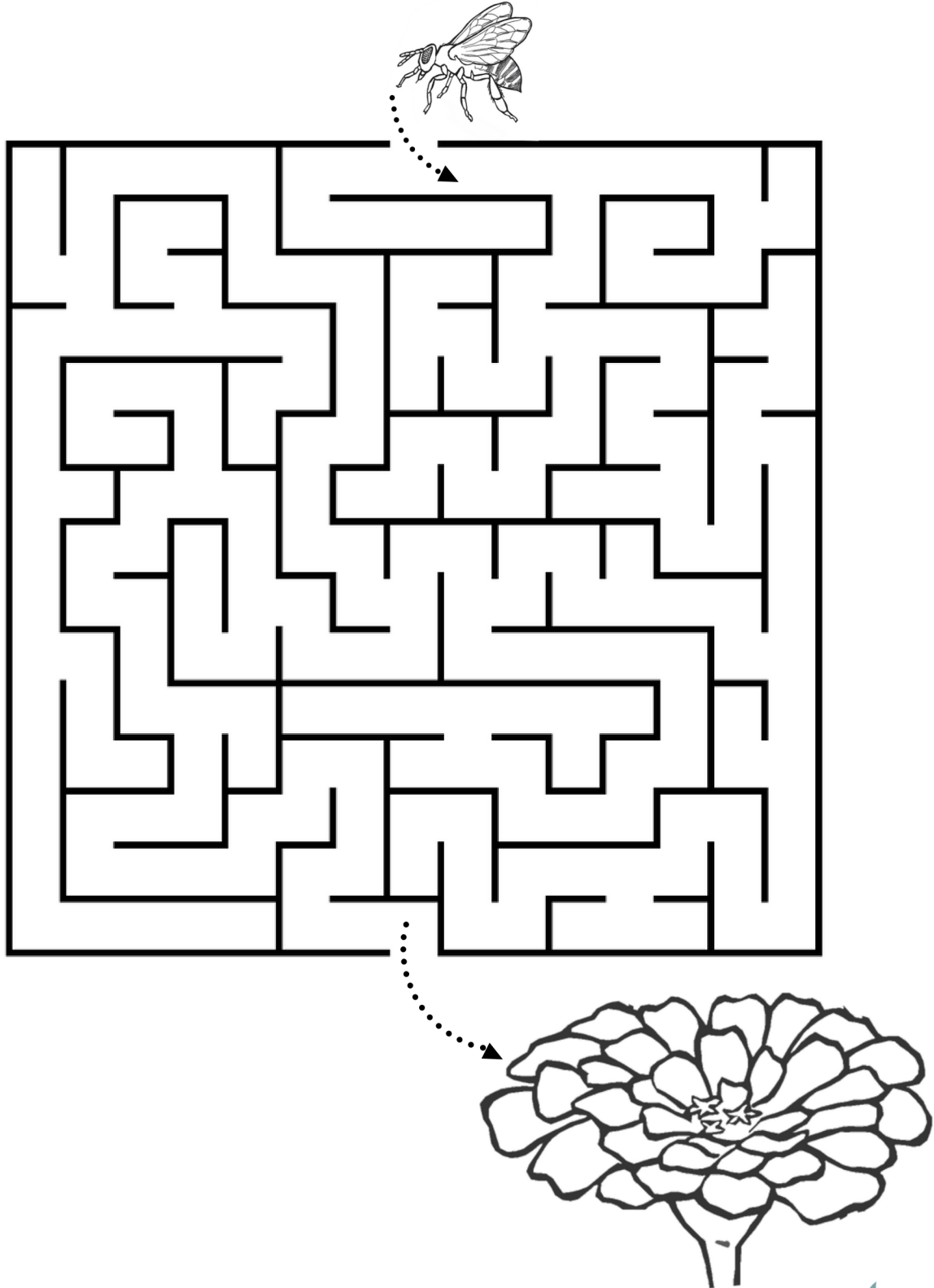




# HONEYBEE



Help this honeybee find its way through the maze to the flower.





# CHOCOLATE MIDGE



Photo by Ashley Bradford



Photo by Tom Murray

**Other Common Names:** Biting Midges, "no-see-ums"

*Scientific Family: Ceratopogonidae Genus: Forcipomyia*

**Description:** These tiny flies are only 1-3 millimeters long — about the size of a pinhead! Although they resemble miniature mosquitoes, they have distinctive feathery antennae. The chocolate midge is the only known pollinator of the cacao plant — the plant that produces the raw ingredient for chocolate!

## FUN FACTS



- Chocolate starts off as seeds (also called beans) that develop in pods on cacao trees.
- The botanical name of the tree, "Theobroma cacao," translates to "cacao, food of the gods."
- Cacao trees cannot self-pollinate; they depend on chocolate midges for pollination.
- As they travel from tree to tree in search of the flowers' sugary nectar, the midges inadvertently pick up pollen grains on their bodies and transport them to the next tree's flowers. Without these midges, we wouldn't have any chocolate!
- Due to its small size, a single chocolate midge can barely carry enough pollen to fertilize a single flower!



## Cacao = the chocolate plant

- Cacao flowers are small — just 1/2" in diameter. The intricate, downward-facing blooms grow directly on the trunk or branches of the tree.
- Each flower opens for just 24-48 hours.
- Only one out of every 400-500 cacao flowers produces a fruit, called a pod.
- Each oblong pod is 8-14" long at maturity and contains approximately 50 beans.
- Each cacao tree can produce 100-250 pods during its lifetime. However, only 10-30% of the pods on trees growing in plantations reach maturity for harvesting.
- Approximately 8 pods (containing 400 beans) are required to make 1 pound of chocolate.
- A single tree can only produce up to 9 lbs. of chocolate during its entire 25-year life!

## HABITAT

Chocolate midges are native to tropical rainforests. These important pollinators are found where cacao is grown in Central and South America, Africa, and Asia. Adult midges spend most of their time in shaded and damp spots such as crevices of roots, logs, stumps, and leaf debris, and this is where they lay their eggs. The open habitat of commercial cacao plantations offers less shade and lower humidity, making it less hospitable to the midges.



Photo by Tom Murray

Three midges rest on the eyes of a frog.

## HELP CHOCOLATE MIDGES THRIVE



Photo by Tom Murray

In their native habitat, cacao trees grow in the moist, shaded understory of the rainforest. However, most growers clear the large canopy trees to make room for more of the smaller cacao trees. This habitat disruption results in drier, sunnier conditions that are less favorable to the midges. It also reduces the overall biodiversity (variety of plants and animals) of the ecosystem.

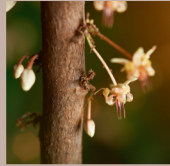
Look for "Fairtrade," "Rainforest Alliance," "UTZ," or "Organic" certified chocolate that is grown by farmers who practice eco- and midge-friendly agriculture.



# CHOCOLATE MIDGE



## The cacao plant



flowers



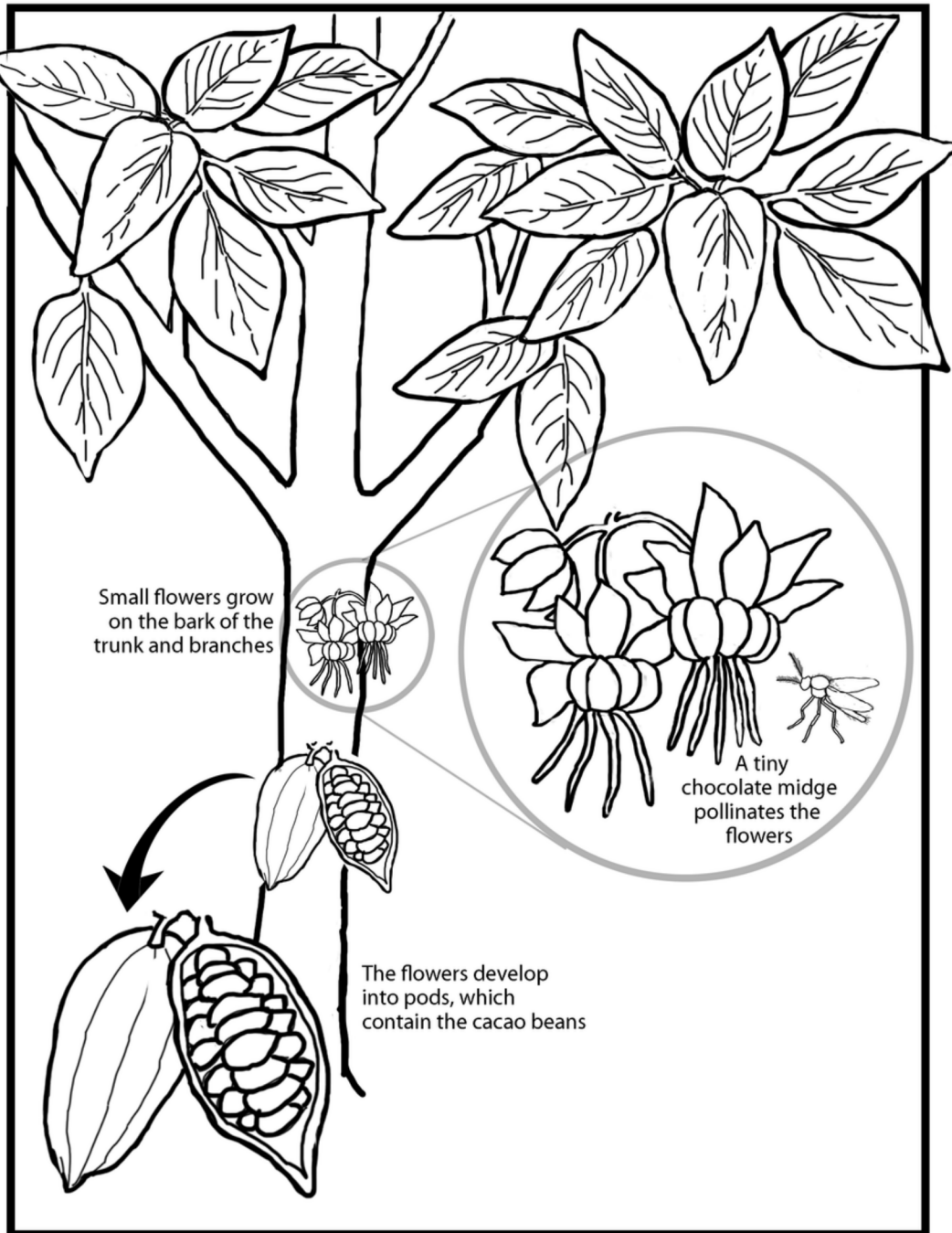
fruit



pod, halved



beans





# CHOCOLATE MIDGE



## Design a Sweet Treat!

Create your own chocolate candy bar below.

Name of your candy bar:

Describe what it will taste like:

List some of the main the ingredients:

How much will it cost?

In the space below, draw what your candy bar wrapper will look like.

A large, empty rectangular box with a thick black border, intended for drawing the candy bar wrapper.










# FLYING FOX BAT



*Scientific Order: Chiroptera (the only flying mammals) Genus: Pteropus*  
**Description:** Flying foxes are the largest of all bats. Their wingspans can measure up to 5' or more, and they can weigh up to 3.5 lbs. Females are usually smaller than males. They resemble a fox, with small eyes and large ears, but they do not have a tail. They have dark, dense fur, which covers their bodies (even toes!), but not their wings.

## FUN FACTS



-  There are more than 60 species of flying foxes.
-  Colonies can have up to 200,000 bats.
-  Flying foxes can fly up to 25 mph and beat their wings an average of 120 times per minute.
-  They are nocturnal, so they sleep during the day and search for food at night.
-  They have great night vision and sense of smell. Unlike insect-eating bats, they do not use sonar or echolocation (the use of high-frequency sounds to hunt in midair).
-  Flying foxes pollinate the flowers of many plants in their native habitats and are the only known pollinators of some rainforest species. They also disperse the plants' seeds.
-  Over half of the known species of flying foxes are threatened by human activity and in danger of becoming extinct.

## HABITAT

Flying foxes are distributed on tropical landmasses from the Indian Ocean to the western Pacific Ocean. They live in forests near the coastal areas of Australia, Asia, and Africa, and many islands in between. They prefer rainforest but can also be found in mangrove forests, coconut groves, and fruit orchards.



## FAVORITE PLANTS & COLORS

As generalists, flying foxes eat nectar, pollen, blossoms, fruit, seeds, and leaves from flowering and fruit-producing trees that are native to their habitat such as eucalyptus, lillipillies, and fig. They only consume cultivated fruits (i.e. mango, banana, papaya) when their natural diet is in short supply. Many native trees have evolved to have light-colored blossoms and fruit, which can easily be seen to flying foxes at night, although they are mostly attracted by the smell of the plants.

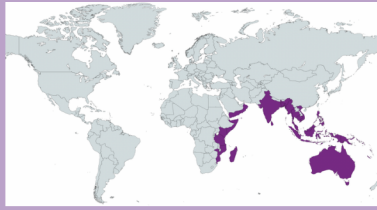


## HELP FLYING FOXES THRIVE

To help these long-distance pollinators travel between remnant forests, urban gardeners in Australia are planting wildlife corridors with native and nectar-giving trees.

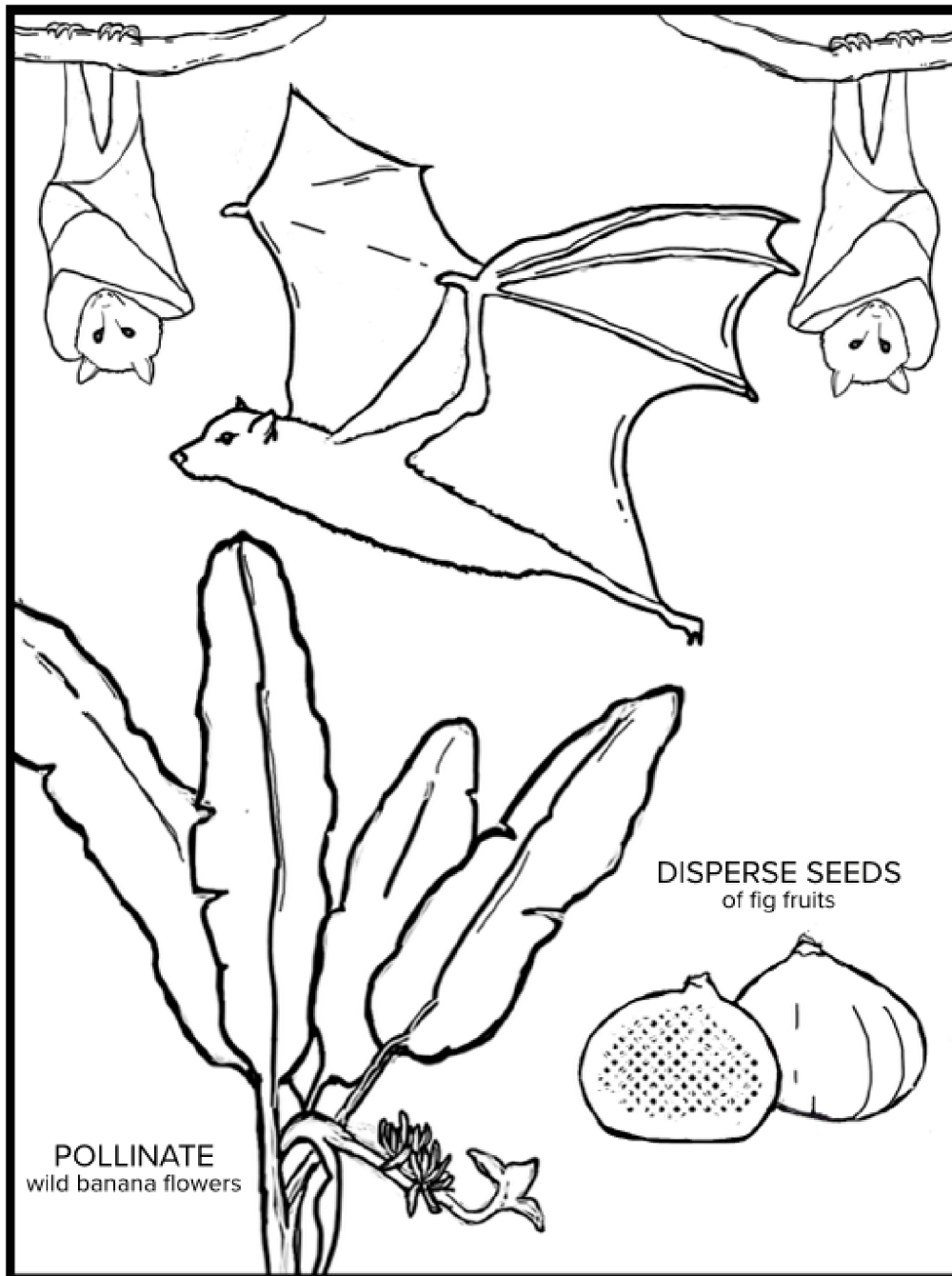


# FLYING FOX BAT



## D I S T R I B U T I O N

Flying foxes can be found on the Eastern hemisphere in the coastal areas of the countries shown on the map. They prefer warmer weather, access to fresh water, tall vegetation, and protection from temperature extremes.

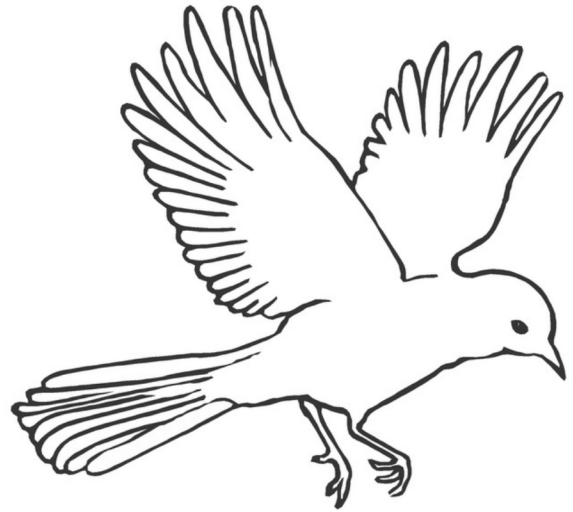
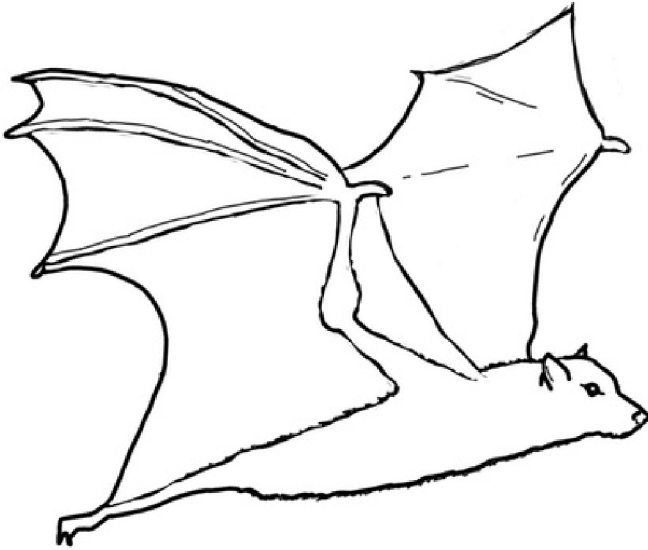




# FLYING FOX BAT



## Am I a Bat or a Bird?



1. I have fur on my body. \_\_\_\_\_
2. I have feathers. \_\_\_\_\_
3. I an important pollinator of tropical fruits. \_\_\_\_\_
4. I fly during the day. \_\_\_\_\_
5. I fly at night. \_\_\_\_\_
6. I have a beak. \_\_\_\_\_
7. I lay eggs. \_\_\_\_\_
8. I give birth to live young. \_\_\_\_\_
9. You can see my ears. \_\_\_\_\_
10. My ears are hidden. \_\_\_\_\_
11. I'm known for my excellent sense of hearing. \_\_\_\_\_
12. I have a tail. \_\_\_\_\_

- Answers
1. Bat
  2. Bird
  3. Bat
  4. Bird
  5. Bat
  6. Bird
  7. Bird
  8. Bat
  9. Bat
  10. Bird
  11. Bat
  12. Bird

