



Bee All-Stars

Project Directors

Gretchen LeBuhn and Trena Noval

Designer

Kelly Green
dearkellygreen.com

Illustrations

Noel Pugh: Bee Illustrator
fullpollenbasket.com
Vessy Ivanova: Family Tree

Photography

Kristy Baker, H.Go, Efram Goldberg, Nancy Hamlett, MJ Hatfield, Ron Hemberger, Gary McDonald, Tom Murray, Harsi Parker, Kurt Schaefer, Stephen Schueman, Lynette Schimming, Hartmut Wisch

Content Contributors

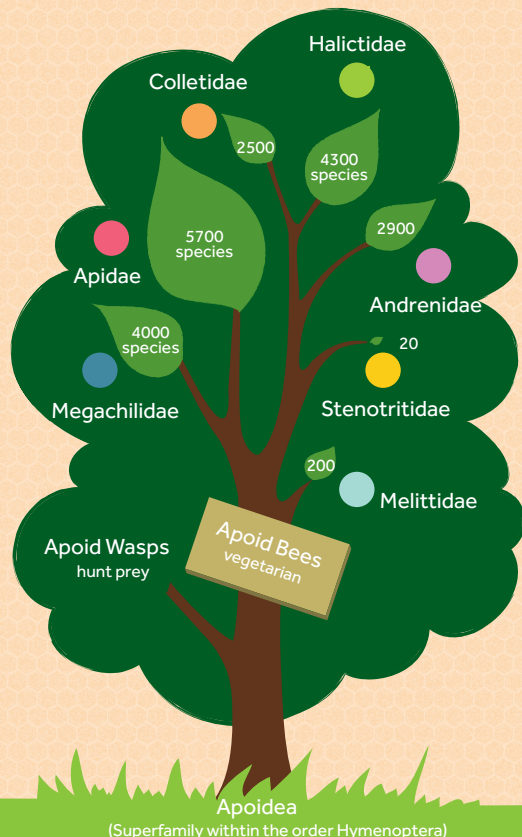
Peralta Elementary School (Oakland, California)
Teachers Pam Lucker, Anne Larsen and Ana Thomas and her 4th grade class, 2014

Funded with generous support from the Panta Rhea Foundation: www.pantarhea.org

For more information about this project and more, please visit www.greatsunflower.org

Bee Family Tree

The family colors found in the small circles for each genera also match the color banner on the front of each card.



The following icons will help you get to know each bee better.

Foraging



specialists (sp)

Pollen Transport



leg

Physical Identification



2 submarginal cells (2sm)



3 submarginal cells (3sm)



generalists (gn)



abdomen

Flight Seasons



summer



fall



spring



stores internally

Nesting



parasite



ground



cavity



parasite - do not store pollen

Genus *Agapostemon*

Physical Characteristics

Males have black / yellow striped abdomen. Females have bright shiny green head, thorax and abdomen, or a black/brown abdomen with white hair bands.

Food Resources

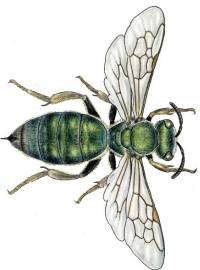
Prefer shallow flowers.

Nests

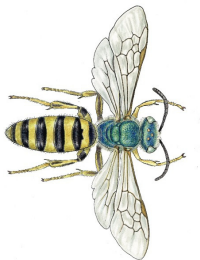
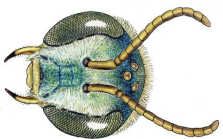
Nests in deep vertical burrows in flat or sloping soil, sometimes in banks. Mostly solitary, some nest communally.

Fun Fact

Only female bees overwinter. All male bees die in the fall.



female
texanus



male
texanus



Genus *Hylaeus*

Physical Characteristics

Slender, hairless, black with bright yellow or white markings on face and legs, more so on males.

Food Resources

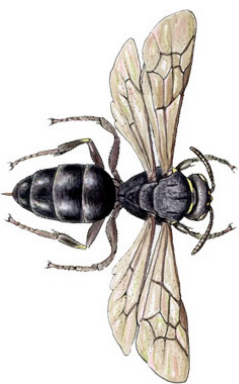
No pollen-carrying scoopa. Small body size enables them to access deep flowers.

Nests

Twig and stem nesters who line brood cells with self-secreted cellophane-like material. Many rely on nest burrows made by other insects.

Fun Fact

They carry both pollen and nectar internally and regurgitate it upon returning to their nests. Their yellow shaped marks on their faces look like they are wearing a wrestler's mask.



modestus



greatsunflower.org/agapostemon



40 species in worldwide, 14 in North America

greatsunflower.org/hylaeus



700 species worldwide, 14 species in North America

Genus *Agapostemon*

(ag-uh-PAHST-eh-mon)

Green Sweat Bee
Family Halictidae



Genus *Hylaeus*

(hi-LAY-us)

Yellow-Faced or Masked Bees
Family Colletidae

Genus *Colletes*

Physical Characteristics

Moderately hairy and slender, with pale bands of hair on abdomen, "heart-shaped" face (eyes slanted toward each other) and "teardrop" shaped abdomen

Food Resources

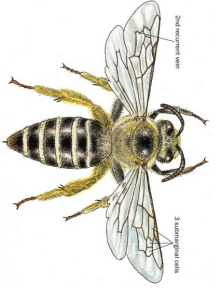
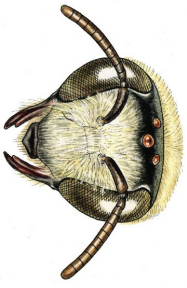
Found on Asteraceae, Papilionaceae, Hydrophyllaceae, Boraginaceae, Malvaceae, Zygophyllaceae & Salicaceae in CA.

Nests

Ground nesters in shallow nests (4-6 inches deep.) Sometimes nest in large aggregations.

Fun Fact

Females line cells with a natural polymer like, cellophane bubbles so her young are well-protected from water as they develop in the soil.



hyalinus



Genus *Halictus*

Physical Characteristics

Dark brown to black or dark metallic green sheen, with bands of hair on outermost edge of plates on abdomen.

Food Resources

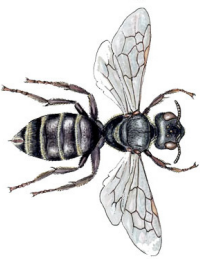
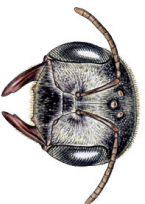
Commonly found on Asteraceae (plants in the Daisy family).

Nests

Semi social ground nesters. Some species have small nests with a single queen and a few workers. Other species build long-lived nests with multiple queens and hundreds of workers.

Fun Fact

In some *Halictus*, daughters remain in the nest and help care for young. A single nest can be established in spring and continue to be productive until late fall.



ligatus

tripartitus



greatsunflower.org/colletes



95 species in North America, 330 species worldwide



Genus *Colletes*

(koe-LEE-teez)

Polyester or Digger Bees
Family Colletidae



greatsunflower.org/halictus



442 species worldwide, 10 species in North America



Genus *Halictus*

(nah-LICK-tuss)

Sweat Bee
Family Halictidae

Genus *Lasioglossum*

Physical Characteristics

Slender, dusky black to brown, dull green or blue; bands of hair on their abdomen—similar to *Dufourea*, but antenna are higher on face.

Food Resources

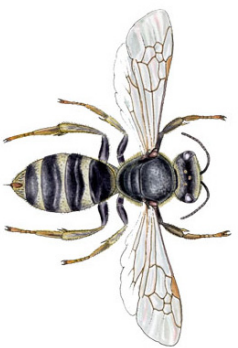
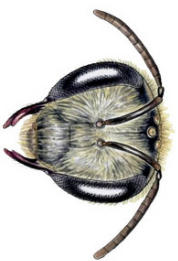
Are both specialists and generalists and attracted to *Oenothera* and *Clarkia*.

Nests

Ground nesters, can exhibit a full range of social behaviors (both social and solitary). Some species will nest in rotten logs.

Fun Fact

They have glands that produce mix of chemicals called lactones. Each bee has its own unique combination of lactones that it uses to line nests. This helps the bee find its own nest when returning from foraging.



titusi



Size
3 to 10 mm, or
1/8 to 3/8 inch



treats.unjflower.org/lasioglossum



over 1700
species worldwide,
280 species in
North America



Genus *Lasioglossum*

(LAZE-ee-oh-gloss-um)

Sweat Bee
Family Halictidae

Genus *Dufourea*

Physical Characteristics

Narrow black, dull green, or metallic blue bodies, sometimes with red abdomens; antennae are very low on their face—similar to *Lasioglossum*, but have much lower antennae.

Food Resources

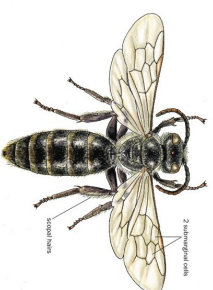
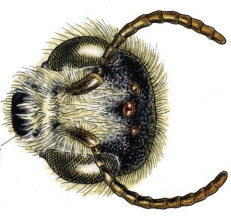
Specializing on a wide variety of different plants including *Liranthus*, *Eschscholzia*, *Clarkia*, *Oenothera*, *Helianthus*, *Campanula*, *Calochortus*, *Monarda*, *Phacelia*, *Mimulus* and various others.

Nests

Nests can be very shallow in the ground and easily invaded by other bees.

Fun Fact

The variation of mouth shapes in *Dufourea* species allow for foraging from different size and shaped host plants.



vernalis



Size
3.5–11 mm long, or
about 1/8 to 3/8 inch



treats.unjflower.org/dufourea



170 species
worldwide,
80 species in
North America



Genus *Dufourea*

(dew-FOUR-ee)

Sweat Bee
Family Halictidae

Genus Sphecodes

Physical Characteristics

Shiny slender brown to black wasp-like bees, often have red on their abdomen.

Food Resources

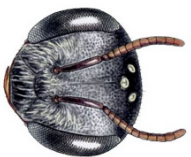
Do not forage for provisions for their offspring because they do not make their own nests.

Nests:

They are cleptoparasites (nest invaders), and lay their eggs in cells of the other species. Their offspring kill the host larvae and take over the provisions of the host bees.

Fun Fact

Females have spines on hind legs, ridges and grooves in their exoskeleton to protect them from attack of host bee. Called "cuckoo bees" because their behavior mimics that of cuckoo birds.



antiochensis



Size
4.5 - 15 mm long, or
about 3/8 to 5/8 inch



Genus Andrena

Physical Characteristics

Black/dull metallic blue or green, some have pale bands of hair on long slender abdomen, velvety facial indentations (fovea) with white to brown hair.

Food Resources

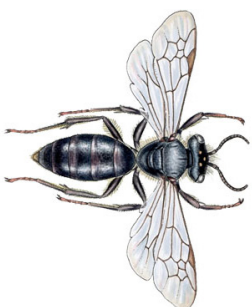
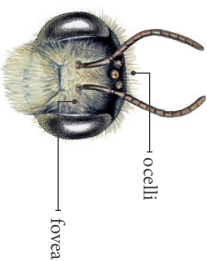
Both generalist and specialists.

Nests

Mostly solitary ground nesters but sometimes nest communally. Two or more females share a nest but build and provision their own nest cells. Prefer sandy soil near or nest under shrubs. Females line cells waxy material.

Fun Fact

With over 1,300 species, *Andrena* are one of the largest of all bee genera. Females need to gather about half their body weight in pollen to lay their eggs. This can take them 6 - 7 journeys to gather!



caerulea



Size
7 - 18 mm, or
about 1/4 to 3/4 inch



greatsunflower.org/sphecodes



300 species
worldwide, 80
species in North
America

greatsunflower.org/andrena



over 1300 species
worldwide, 550 in
North America

Genus Sphecodes

(sfe-KO-deze)

Cuckoo Bees
Family Halictidae



Genus Andrena

(an-DREE-nuh)

Digger or Miner Bees
Family Andrenidae



Genus Panurginus

Physical Characteristics

Jet black, sometimes shiny, with dark colored hairs, moderately hairy, long abdomen.

Food Resources

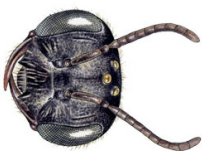
Primarily specialists found on *Ceanothus*, *Nemophila*, *Ranunculus*, though some are generalists.

Nests

Ground nesters, some species use the same area for nesting year after year and form large aggregations in these areas.

Fun Fact

Males will patrol the nest area looking for new females to emerge. They can get so excited that they will often form a "mating ball" by having 2-5 males mob a newly emerging female. The female will escape the ball with one male riding on her back.



nigrithritus



Genus Perdita

Physical Characteristics

Usually black, but sometimes with metallic green or blue abdominal hair bands. Often have yellow or white markings on face or abdomen, profile of body often seems flat relative to other bees. They are often mistaken for small wasps.

Food Resources

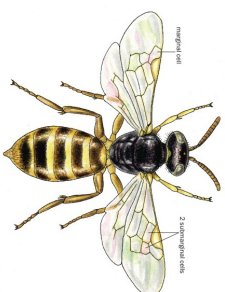
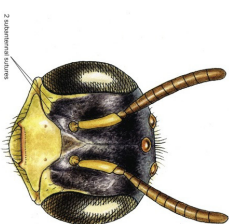
Even though they are specialists, they visit many different flowers for nectar.

Nests

Mostly solitary ground nesters, but can sometimes be communal.

Fun Fact

One unique aspect of nests are that the females do not line their brood cells. Instead, they cover the pollen ball with a glandular secretion. When larvae hatch, they then chew through this protective covering to reach the pollen.



thois



greatsunflower.org/panurginus



47 species worldwide, 19 in North America



Genus Panurginus
(Pa-nur-gin-us)

Panurginus
Family Andrenidae

greatsunflower.org/perdita



630 species worldwide, most in North America



Genus Perdita
(per-DIH-tuh)

Miner Bees
Family Andrenidae

Genus *Dianthidium*

Physical Characteristics

Black or brown, pale white, yellow or ochre patterns on abdomen, cylindrical body shape, spine or tooth on the tibia of the midleg. Has an arolium between tarsal claws.

Food Resources

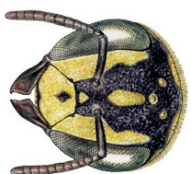
Short-tongued; specialize on Asteraceae (plants in the Daisy family).

Nests

Some construct nests out of pebbles and resin. Others nest on top of twigs, or in any available burrows. Males are very territorial at nest sites.

Fun Fact

Collects resin from trees to create waterproof nests from pebbles allowing bees to lay eggs in both protected and unprotected spaces (like a notch of a tree branch).



pudicum



Genus *Anthidium*

Physical Characteristics

Robust, black, with yellow or white pattern of stripes that is interrupted in the middle of abdomen, abdomen is broad and somewhat flattened, males larger than females, has no arolium between tarsal claws.

Food Resources

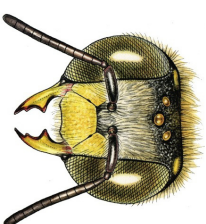
Short-tongued; both generalists and specialists.

Nests

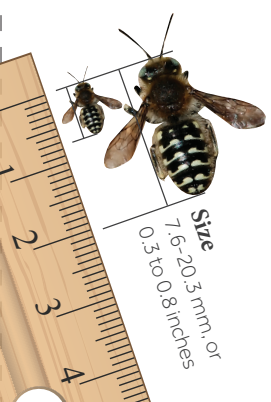
Wool carders nest in a variety of places: old burrows of other insects and bees or key-holes. They line their nests with plant material and seal them with pebbles, wood, plant material and even lizard dung!

Fun Fact

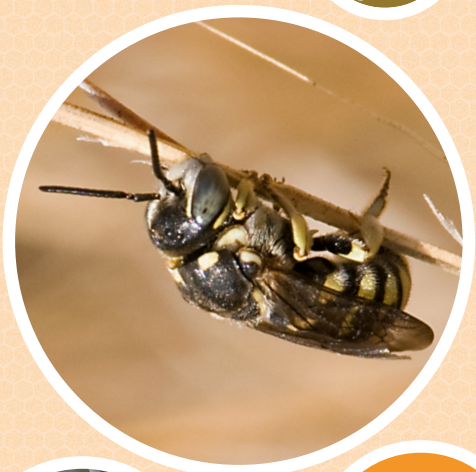
Called Carder bees because females use the hairs (or "wool") from plants to line their burrows, using their mandibles to "card" the fibers into cell walls.



mormonum



greatsunflower.org/dianthidium



28 species worldwide,
24 species in North America

Physical Characteristics

Robust, black, with yellow or white pattern of stripes that is interrupted in the middle of abdomen, abdomen is broad and somewhat flattened, males larger than females, has no arolium between tarsal claws.

Food Resources

Short-tongued; both generalists and specialists.

Nests

Wool carders nest in a variety of places: old burrows of other insects and bees or key-holes. They line their nests with plant material and seal them with pebbles, wood, plant material and even lizard dung!

Fun Fact

Called Carder bees because females use the hairs (or "wool") from plants to line their burrows, using their mandibles to "card" the fibers into cell walls.

greatsunflower.org/anthidium



170 species worldwide, 29 in North America



Genus *Dianthidium*

(die-AN-thid-ee-um)

Resin or Mason Bees
Family Megachilidae



Genus *Anthidium*

(AN-thid-ee-um)

Carder Bees
Family Megachilidae

Genus *Megachile*

Physical Characteristics

Smoky colored and wide-bodied. Flattened abdomen with pale hair bands on the integument. Females often have huge mandibles used for cutting leaves to build nests.

Food Resources

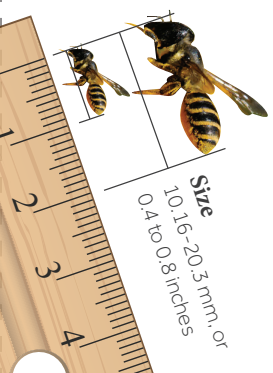
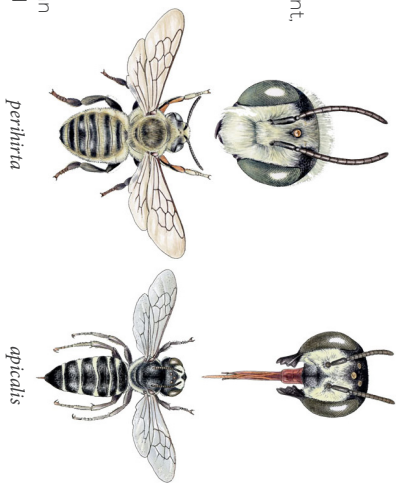
Specialize on flowers or plants from the family Asteraceae.

Nests

Often cut pieces from leaves or flowers with mandibles and use pieces to form nest cells. Can nest in abandoned beetle tunnels or preformed tunnels in wood or pithy stems.

Fun Fact

They have been found nesting in garden hoses. Genus includes the largest bee in the world – a Malaysian species with a 2.5" wingspan!



greatsunflower.org/megachile



1500 species
worldwide, 139 in
North America

Genus *Megachile*

(meg-uh-KILE-e)

Large Leaf-Cutter Bees
Family Megachilidae

Genus *Osmia*

Physical Characteristics

Stout, round, have metallic sheen, shiny green, blue, or even purple color, with broad head and wide abdomen

Food Resources

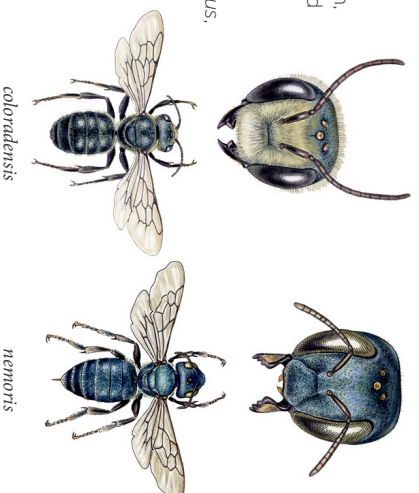
PREFER Rosaceae, fruit trees, Fabaceae, *Mimulus*, *Lotus*, *Placelia* and *Aster* species

Nests

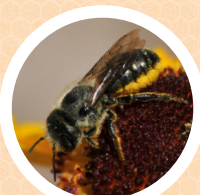
Solitary nesters in pre-existing holes and artificial sites (wood blocks with holes, paper drinking straws/bamboo). Or collect a variety of materials to construct nests.

Fun Fact

They are very efficient pollinators. It takes two hives of honey bees (approximately 10,000 to 25,000 bees) to pollinate an acre of fruit trees, but only 250 *Osmia* females for the same task!



greatsunflower.org/osmia



350 species
worldwide, 135
species in North
America

Genus *Osmia*

(OZ-me-yuh)

Small Leaf-Cutter or
Mason Bees
Family Megachilidae

Genus Apis

Physical Characteristics

Moderately hairy, elongated with hairy eyes, dark brown or black to pale gold with darker stripes on their abdomens.

Food Resources

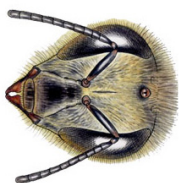
Used all over the world for a variety of crops.

Nests

Communal nesters in large cavities above or below ground such as rock crevices, tree holes, walls of buildings and managed hives. Workers build multi-celled honey combs of wax. Queen lays a single egg in a cell.

Fun Fact

Larvae that are fed a special diet of royal jelly become queens. A single hive can house 20,000-30,000 bees in winter and 60,000-80,000 bees in summer. Female queens can live up to 5 years!



melifera



Size
12-16 mm, or
0.5-0.6 inches

Genus Ceratina

Physical Characteristics

Long, shiny, hairless bees, black, dark blue or dark green with yellow or white markings on their face. Females often have a yellow bar on front of face below antennae. Closely related to *Xylocopa* but much smaller and flatter.

Food Resources

Are found on a wide variety of plant species

Nests

Make their own tunnels in wood or pith of plants like elderberry, box elder and sumac. Females will overwinter as adults in excavated stems and modify this nest to lay her brood.

Fun Fact

Found on all continents except Antarctica! There are parthenogenic females that can produce offspring without mating.



aantha



Size
3-10 mm, or
0.11-0.4 inches

greatsunflower.org/apis



7 species
worldwide,
1 species in
North America

Genus Apis

(A-pus)

European or Western
Honey Bees
Family Apidae



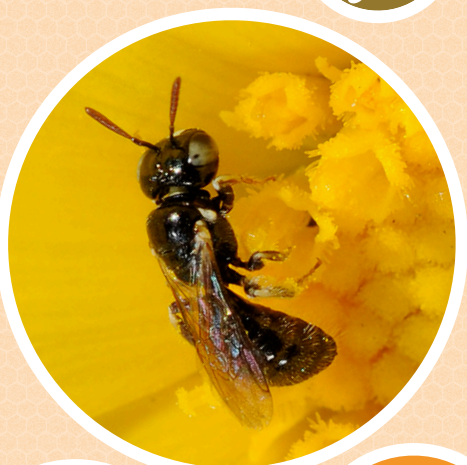
Genus Ceratina

(sera-TIE-na)

Genus Ceratina

Small Carpenter Bees
Family Apidae

greatsunflower.org/ceratina



351 species
worldwide, 21
species in North
America

Genus *Tripeolus*

Physical Characteristics

Dark black, medium sized with white or cream markings on thorax and abdomen, look armored (which reflects their lifestyles as nest invaders.)

Food Resources

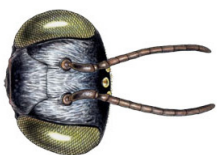
Visit flowers only to gather nectar, since they are parasitic bees they do not gather pollen.

Nests

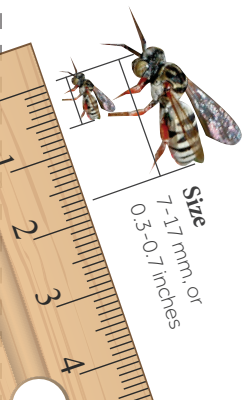
Lay eggs in the nest of their host bee species, primarily parasitize Long-horned bees like *Eucera*, *Melissodes* and *Peponapis*.

Fun Fact

These bees match their seasons to that of their host bees. They will follow their host bee back to the nest and then sneak in once the other female leaves.



melanarius



Size
7-17 mm, or
0.3-0.7 inches

Genus *Xylocopa*

Physical Characteristics

Robust bees, large round head, shiny abdomen, hairy thorax with dark wings, black, dark metallic blue, or green in color and males are sometimes golden.

Food Resources

They like larger open flowers and will often rob flowers of nectar by slicing a hole in the base of a flower to suck out the nectar.

Nests

Make their own tunnels in wood or pith. Bee generations can overlap and mothers and daughters can share nests. Males will guard the nests and chase away even humans (but do not have stingers so they will not hurt!)

Fun Fact

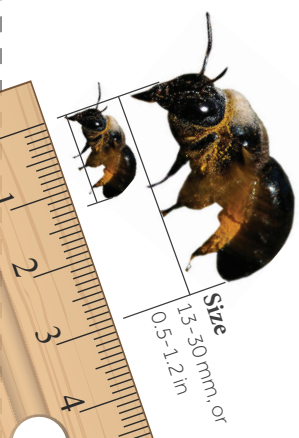
Some males will use scents to attract females to their territories.



tabaniformis



californica



Size
13-30 mm, or
0.5-1.2 in

greatsunflower.org/tripeolus



150 species
worldwide,
108 in North
America

greatsunflower.org/xylocopa



400 species
worldwide,
32 in North
America

Genus *Tripeolus*

(tri-e-PEE-o-lus)

Cuckoo Bees
Family Apidae



Genus *Xylocopa*

(zile-low-COPE-uh)

Large Carpenter Bees
Family Apidae



