Male or Female Bee?

As described in the preceding anatomy section, there are some basic anatomical differences between male and female bees. Males have seven abdominal segments, while females have only six; males have 13 antennal segments, and females have just 12; females have a stinger at the end of their abdomen, and male bees have none. While these structural differences may be useful in determining the gender of a collected specimen, they are not particularly helpful in discerning the sex of a bee that landed ever so briefly on a garden flower. There are, however, some notable physical and behavioral differences between the males and females of many bee species that can assist the casual bee-watcher in distinguishing gender.

Physical Clues

Color – In some species, males and females have obviously different color patterns in one or more regions of their bodies. This is true for a number of our more frequent garden visitors, including some species of bumble bees (genus *Bombus*), large carpenter bees (genus *Xylocopa*) and green sweat bees (genus *Agapostemon*).

Bombus flavifrons

Male. Photo by Rollin Coville.

Female. Photo by Rollin Coville.

Xylocopa varipuncta

Male. Photo by Rollin Coville.

Female. Photo by Celeste Ets-Hokin

Agapostemon texanus

Male. Photo by Celeste Ets-Hokin.

Female. Photo by Rollin Coville.

The males of some bee species have either a white or pale yellow coloring on the clypeus (front section of the face below the antennae), absent in the female. Good examples of this are squash bees (genus *Peponapis*) and some digger bees (genus *Anthophora* or *Habropoda*).

Males of Anthophora pacifica have a yellow clypeus, absent in the females. Photo by Rollin Coville.

Size – Because they produce eggs, female bees are typically larger or have more robust abdomens than the males of their species. A bumble bee queen, as the designated egg layer of a colony, is considerably larger than both the males and the female workers of her species. A primary exception to this size rule is in the case of males that represent some territorial species. These macho males, exemplified by carder bees (genus *Anthidium*), are distinctly larger than the females and are built to deter other males and bee species from encroaching on their turf.

Antennae – Male bees have longer antennae than do the females of their species. Longer antennae have more chemoreceptors, which the male uses to detect the presence of females. Female antennae are shorter and often noticeably "elbowed". Such gender variation in the length and character of the antennae are quite pronounced in some species. For example, the long-horned bees earned their common name due to the extremely long antennae sported by the males of these species. The considerably shorter, elbowed nature of the female long-horned bee antennae is easily distinguished.

Melissodes male – long antennae.

Photo by Rollin Coville.

Melissodes female – short antennae.

Photo by Celeste Ets-Hokin.

Pollen-Carrying structures – Besides the readily apparent color differences exhibited by the males and females of some species, an easy way to differentiate the sexes of most other species is by the presence or absence of pollen-bearing structures. Since male bees play no role in provisioning the nests for their offspring, *only female bees have specialized hair structures for transporting pollen back to their nests.* So when you see a bee with a dense collection of pollen on either the hind legs or the underside of the abdomen, you'll know it's a female.

Female long-horned bee(left) showing a loaded scopa, or pollen brush, on her hind leg and female leafcutter bee with scopa filled with pollen on the underside of her abdomen. Photos by Celeste Ets-Hokin.

The females of a number of solitary bee species, which are frequent denizens of our residential gardens, make this gender distinction quite obvious. Sunflower bees (genus *Svastra*) and long-horned bees (genus *Melissodes*) have such thick scopae (brushes of specialized hairs for carrying pollen, sometimes called "pollen brushes") on their hind legs, that when loaded with pollen, they resemble leg-warmers. Female leafcutter bees have a dense scopa on the underside of their abdomens, so when it is filled with pollen it appears as though they have a bright yellow or orange belly. The scopa on these and many other medium- to large-sized female bees are often pronounced enough to be noticed even when they're not saturated with pollen. But even some of the tiniest sweat bee females can be easily identified when the scopae on their hind legs are carrying pollen.

Female sweat bee (Halictus) with a loaded pollen brush on her hind leg. Photo by Celeste Ets-Hokin.

Female bumble bees carry pollen in a structure called a corbicula (or pollen basket), consisting of a bare concave patch surrounded by a fringe of stiff, inward curved hairs, on each hind leg. Because bumble bees moisten their pollen with nectar, the loaded corbicula appears as a glistening globule of whatever color pollen was being collected. And of course, male bumble bees would never be seen carrying a pollen basket of any color.

Behavioral Clues

If the physical characteristics of a native bee visitor to your garden don't immediately reveal its sexual identity, spend some time observing the bee's behavior. Behavioral traits can often suggest more about a bee's gender than can its physical appearance, especially when viewed from a distance. Female bees, having no time to waste, are focused on collecting pollen and nectar to provision the nests for their offspring. They move quickly from flower to flower, before flying off to deposit the gathered food stores back at their nests. It's very rare to see a female bee resting.

Males, on the other hand, are a different story. As they don't contribute to any nest building or nest provisioning enterprises, their singular objective is to mate – early and often. Since the females of most species mate only once (they would never complete their nests if they entertained the advances of every male!), males have evolved various strategies for maximizing their chances to encounter as many virgins as possible. Not particularly known for their finesse, the various behaviors of male bees can be quite conspicuous, even in our own backyards.

Male carpenter bee (Xylocopa tabaniformis) attempting to mate with a female. Mating pairs can occasionally be observed mid-air, with the female attempting to continue her foraging activities, with the persistent male – who has an entirely different agenda – still attached to her back. Photo by Celeste Ets-Hokin.

Heading her off at the pass – One of the most important ways in which solitary male bees have adapted to the virgin-finding challenge, is to emerge from their nests several days to a week before the females. The males use this opportunity to scout the area, and so determine the best locations for intercepting females once they emerge. This is usually a likely nest site or a patch of flowers that the females might favor for foraging. In either case, solitary males can often be seen flying frenetically about potential rendezvous spots, searching for females.

Males behaving badly – In the case of some ground-nesting bees that nest closely together in the same site year after year, swarms of newly emerged males can often be seen flying around the nest, waiting for the females to dig their way to the soil surface. When a female finally makes it to the surface to take her first breath of fresh air, one or many over-eager males pounce on her immediately. In some species the males don't even bother waiting for a female to dig her own way to the surface – instead they dig down to meet her, and grasping her with their jaws, drag her to the surface to mate. So much for candy and flowers!

Male digger bees converged on a single female just emerging from the nest. Photo by Rollin Coville.

Males at flowers – But all of this drama aside (a version of which unfolds here every spring with a community of nesting *Habropoda depressa*, near the Lake Merritt Gardens in Oakland), what you're most likely to observe in your own garden are solitary male bees flying in various search patterns around the flowers where females forage. Males of some species will fly in darting haphazard loops around a patch of flowers; others will actually defend a specific territory, which they patrol rigorously. Males of many species will knock other flower-visiting insects, other than a receptive female of their own species, off of any flowers in their path. To keep up their amorous pursuits, males will often stop to rest or to drink nectar at the flowers they're patrolling. Resting bees are almost always males.

This male leafcutter bee (Megachile perihirta) will aggressively patrol and defend a patch of flowers for potential female mates. When mating, male of this particular species places his characteristic hairy white front foot over the female's eyes! Photo by Rollin Coville.

The garden bully – A notorious example of an aggressive territorial bee, common to residential gardens, is the carder bee (genus *Anthidium*). The introduced carder bee species, *Anthidium manicatum*, is in fact the most aggressive territorial bee known. Originally from Europe, this bee is now a familiar visitor to gardens across North America. The male of this species can be observed flying in a highly regular pattern, patrolling a patch of flowers that he is protecting for potential female mates. He will establish a perch somewhere along his route, to which he returns repeatedly during his patrol. From this vantage point, the male carder bee can survey his floral domain. When he spots a flower-visiting insect other than a potential mate, he will forcibly evict it; hovering briefly behind the trespasser, the male carder bee then flies at it full tilt, knocking it off the flower and sometimes to the ground. This little thug will even take on carpenter bees!

A male carder bee (Anthidium manicatum) perched on a Hydrangea petal surveying his territory. Any flower-visiting insects, other than potential female mates, that venture into his domain will be bounced out by this aggressive territorial male.

Although harmless to humans, the male carder bee is equipped with a row of stout spines (visible in the photo) at the end of his abdomen, which he employs to discourage the more persistent trespassers.

Photo by Celeste Ets-Hokin.

The male of Anthidium manicatum is known to mate up to sixteen times a day. By rigorously defending a patch of flowers for females of his species, he is able to offer a protected floral resource, not depleted of nectar or pollen by other flower visitors.

Photo by Rollin Coville.

Boys night out – Undoubtedly exhausted from a long day of amorous endeavors, the males of a number of species will find joint refuge in a flower for the night. While female bees spend the night in the nests they are in the process of constructing, males will resort to sleeping on a flower or stem, often in communal roosts. Male long-horned bees (genus *Melissodes* or *Eucera*) are particularly well known for congregating on a favorite forage flower beginning in the late afternoon, and then settling in for the night. I once received a call from a concerned gardener, who saw what she assumed to be a cluster of dead honey bees inside one of her dahlias. The photograph she sent me clearly identified the presumptive "dead honey bees" as instead being a sizeable gathering of male long-horned bees having a snooze-fest.

A group of male long-horned bees calling it quits for the day, and roosting communally in this Dahlia. Photo by John Turner.

Male squash bees napping in a squash blossom. Males have a yellow spot on the front of their faces, absent in the females. Photo by Celeste Ets-Hokin.

Male squash bees (genus *Peponapis*) can also be routinely observed on summer afternoons sleeping inside the flowers of various squash plants. Several males are often found napping together inside the blossoms – the same blossoms, it should be noted, from which the female squash bees were busily collecting pollen in the early morning hours. Most any gardener who grows squash is sure to enjoy a front-row seat for this bit of afternoon male bee theater, by just peering inside a few of the bell-shaped flowers.

Scent of a female – The male solitary bee then devotes most of his activity to chasing females, drinking (nectar), and sleeping. You won't need to count the segments of the antennae to identify a male bee in your garden – just observe his behavior. You may even catch him wave those long antennae about as he goes, the better to pick up the scent of a nearby female.

Male long-horned bee. Photo by Rollin Coville.