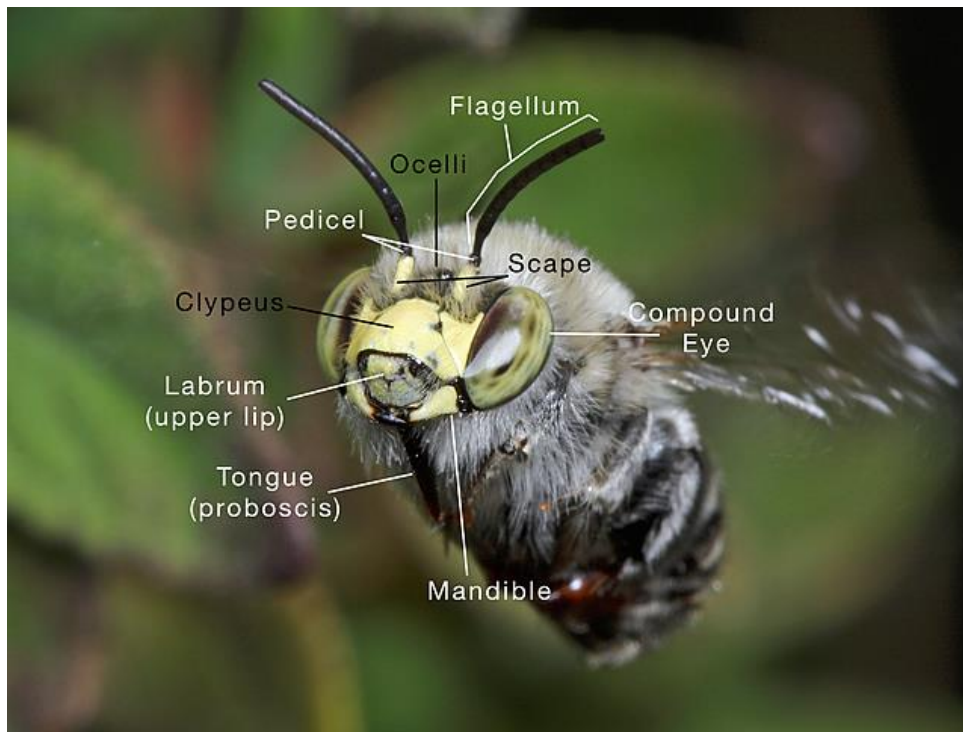


Basic Bee Anatomy

The overall body plan of a bee includes three major regions: the head, the thorax, and the abdomen. The principle structures of each are described below. To assist you in visualizing the narrative descriptions, these significant anatomical features are also illustrated in the accompanying diagrams.



Main features of the head of *Anthophora californica*. Photo by Rollin Coville.

Head – The three important functional structures of the bee’s head are the eyes, the antennae, and the mouth parts.

Eyes – Bees actually have five eyes! They have a pair of large compound eyes located on the sides of the head, and they also have three small simple eyes, or “ocelli” on the top of the head. The ocelli do not perceive form, but act as highly sensitive light meters.

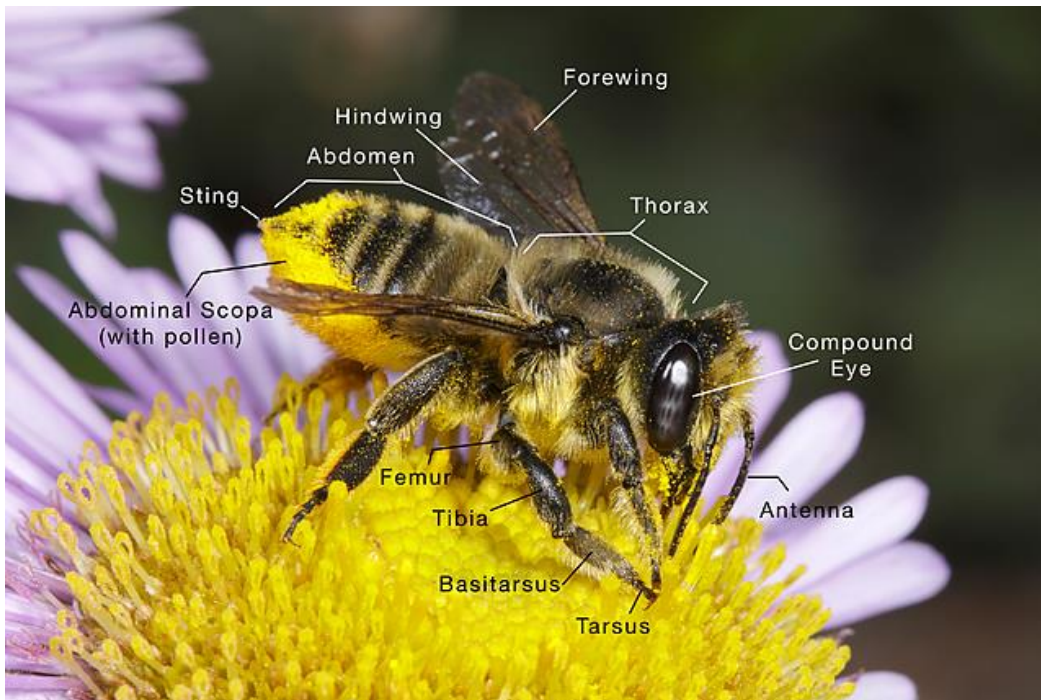
Antennae – Attached to the bee’s head is a pair of segmented, flexible antennae that are composed of three segment types – the scape, the pedicel, and the flagellum. The scape is the long base segment immediately attached to the head; the pedicel is a small cup-like segment that joins the pedicel and the flagellum; the flexible flagellum make up the remainder of the segments – 10 for females and 11 for males. In addition to having an extra flagellar segment, the antennal segments in male bees are longer than in females; both of characteristics allow the male to carry more chemoreceptors, which assist them in detecting the presence of females.

Mouth – The mouth of a bee includes both chewing and lapping structures. They have a pair of jaws, or “mandibles”, that are used for chewing, and in some cases for cutting. Female leafcutter bees use their mandibles like scissors to cut pieces of leaves in precise shapes for their nests. Males of some species use their mandibles to lock onto the stems of plants while they sleep. For sucking nectar, bees have a complex tongue structure, called a proboscis. The upper lip of a bee is called the labrum.



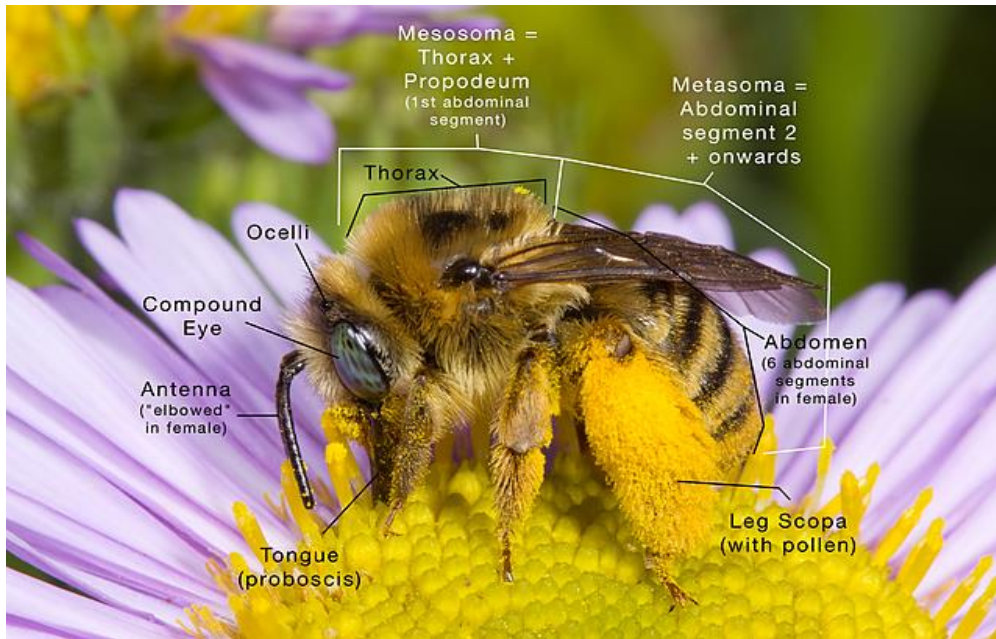
Anthophora urbana Cresson showing off the proboscis (tongue) structure. Photo by Rollin Coville.

Clypeus – The clypeus is the front portion of the bee’s face, below the antennae and above the lip or labrum. The clypeus in the males of many species has a lighter coloration (usually yellow or white), than that of females, and so can be used to help differentiate the sexes.



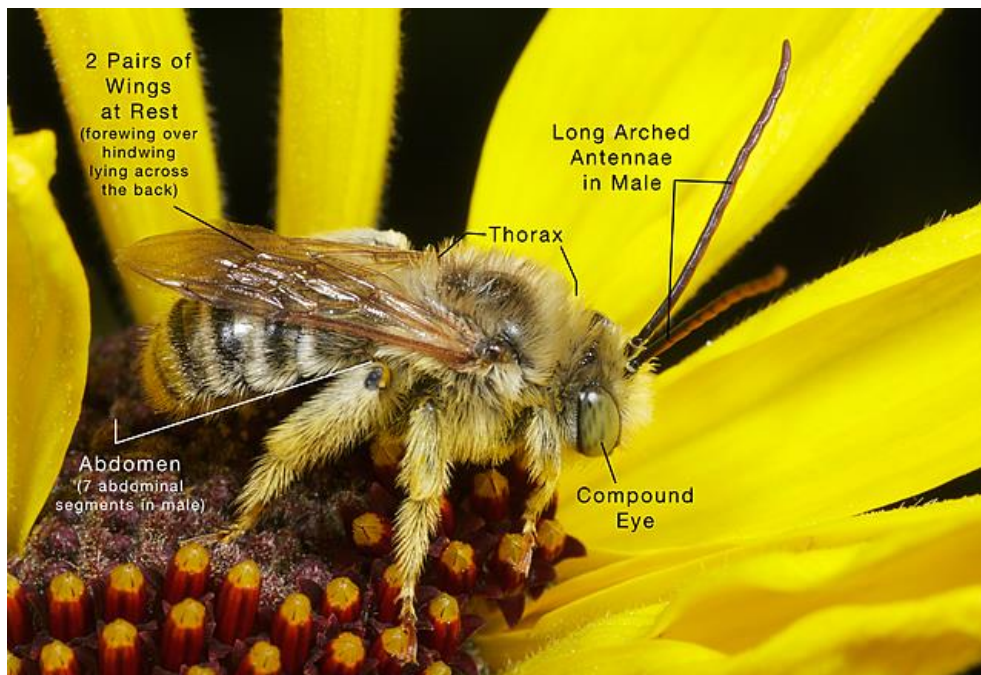
Major features of a female *Megachile perihirta* showing the abdominal scopa. Photo by Rollin Coville.

Thorax – The thorax is the middle section of the bee that you see before the “waist”. In bees the thorax is actually fused to the first abdominal segment (called the propodeum). Taken together, the thorax and propodeum are then technically referred to as the “mesosoma”, while the remaining abdominal segments (2, onwards) comprise the “metasoma”. Throughout this App, however, we will use only the common terms, thorax and abdomen, when referring to these regions of the bee’s body. Attached to the bee’s thorax are two pairs of wings and three pairs of legs.



Female Melissodes robustior showing major body parts and leg scopa with pollen. Photo by Rollin Coville.

Wings: Bees have two pairs of wings, the forewings and the hindwings. During flight the forewing and the hindwing are actually hooked together by a series of tiny hooks, making it appear that there is just one pair of wings. At rest, a bee typically lays the forewings over the hindwings along its back, which also makes it difficult to discern the two separate pairs of wings.



Male Melissodes robustior showing major body sections. Photo by Rollin Coville.

Legs: The fore, middle and hind legs of the bee all have a femur, tibia, basitarsus and tarsus. The hind legs are of particular importance, as this is where the females of most species carry their pollen loads. Within this general group of native bees, all except bumble bees transport pollen on a brush of specialized hairs called a “scopa”, located on each hind leg. On the hind legs of female bumble bees is a structure called a corbicula, which is used for carrying pollen moistened with nectar. Sometimes called a “pollen basket”, the corbicula is a concave area on the tibia surrounded by a fringe of stiff, inward curved hairs. While the males of some species have relatively hairy legs, no male bees have specialized structures for transporting pollen.



Female Bombus vosnesenskii showing pollen-loaded corbicula. Photo by Rollin Coville.

Abdomen – The abdomen is the segmented, hind-most region of the bee’s body, beginning just after the waist. Female bees have six abdominal segments, with a stinger at the end of the last segment. Males have seven abdominal segments, and no stinger.

Females belonging to the family, Megachilidae, have a scopa or “pollen brush” (brush of specialized hairs for carrying pollen) located on the underside of the abdomen. These bees do not have pollen brushes on their hind legs, as do the females of most other species of native bees.

There is wide variation among native bee species in the coloration of both the integument and the hair covering the abdominal segments. These variations, sometimes appearing as distinct markings or striking colors, can often aid in identifying different species of bees and sometimes in distinguishing gender.