

## Bee Lifecycles

The term “sweat bee” is the common name assigned to a group of ground-nesting bees belonging to the family Halictidae, due to their known attraction to the salt in human perspiration. This term has, however, become rather a catch-all phrase to describe all the closely related genera in the subfamily, Halictinae, regardless of whether they actually share the trait of being drawn to human perspiration. What these sweat bees, or halictids as they are often called, do have in common is that their life cycle differs from that of most solitary bees.

Female sweat bees emerging in the spring will have already mated the summer before, and then overwintered as adults. So when she emerges from hibernation, the mated female will immediately go about the business of founding her nest, unimpeded by a pool of over-eager males. In fact, at this stage there won't be any males at all. Not until one or more generations of offspring are produced, will males appear on the scene.



*[Halictus tripartitus](#) female.*



*[Agapostemon texanus](#) female.*

*Sweat bees typically have multiple generations of offspring per year; the last generation of female sweat bees in late summer will mate and then hibernate for the winter, emerging to found new nests in the spring. Photos by Rollin Coville.*

The mated female will excavate the individual brood cells in her ground nest, provision the cells, and lay an egg in each cell, in the same way as other ground-nesting solitary bees. She uses the sperm stored the previous summer in her spermatheca to fertilize the eggs which will become her female offspring. Unfertilized eggs will develop into males. In some species of sweat bees the first round of offspring will all be female. Because these females can't mate (due to the sheer absence of any males to mate with), any eggs they do lay will necessarily be unfertilized, or male.

This trait of producing a first generation of all female offspring likely contributed to the development of certain social behaviors exhibited by many species of sweat bees. Because females in the first round of offspring are unable to mate immediately, rather than found their own nest, they may be inclined to remain with the natal nest and become workers for the founding female. Some of this sociality among sweat bees is described in more detail in the next section covering the life cycles of annually social native bees.

Sweat bees, whether solitary or social, are further distinguished by typically having more than one generation of offspring per year. The earlier generations of females appearing in spring and early summer will not mate and overwinter. Instead they will immediately found their nests just as other solitary bees, and die within a few weeks. Towards the end of the nesting season, usually in late summer, the final round of offspring will be produced. After the males and females of this generation mate, the males will die and the mated females will hibernate for the winter. These overwintering females will emerge the following spring to begin a new cycle.

## Carpenter Bee Lifecycle

Though they are still considered solitary species, the life cycle of [large carpenter bees](#) (genus *Xylocopa*), doesn't conform to that of the typical solitary bee. They are the longest lived bees, with females living into, or even completing, their second year. Unlike most solitary bees, the female survives long enough to see her adult offspring, and in some cases interact with them socially. The likelihood of such interactions is increased by some of the carpenter bee's distinguishing behavioral and developmental features.

To begin with, male and female offspring newly emerging from their brood cells in summer do not immediately leave their natal nest and find mates, as with other solitary bee species. Instead, these juvenile adults typically remain in their natal nest for eight months through fall and winter, leaving it only occasionally to forage. During this juvenile stage, the ovaries of the females are often not fully developed, and in some species the males aren't ready to fly, so mating doesn't occur until the following spring.

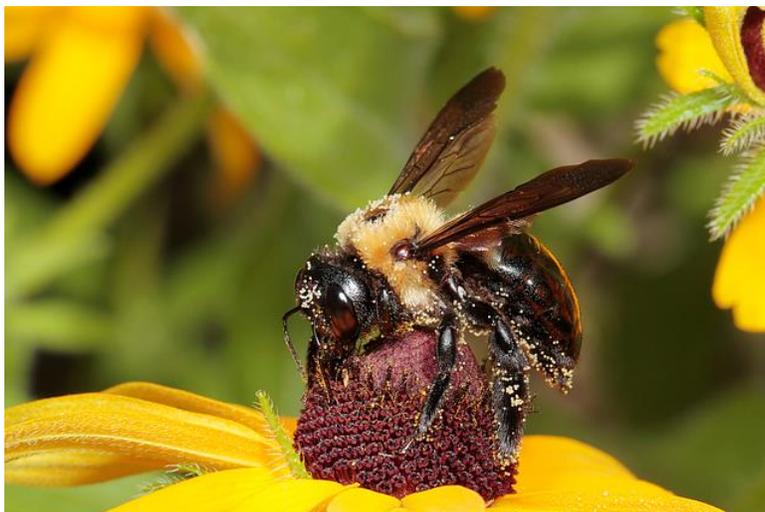


*Carpenter bees are the longest lived native bees, the females often living up to two years. Female carpenter bee (*Xylocopa tabaniformis*) foraging on *Salvia*. Photo by Celeste Ets-Hokin.*

In the spring both males and females will finally leave the nest. The males will set up territories where females forage, and over the course of the next few weeks, mate with most of the females. These males, having by this time completed roughly a year of life, will die by the summer. The mated females will found new nests of their own, each female excavating a wood tunnel, and creating, provisioning and sealing her brood cells. But here the female carpenter bee exhibits a behavior which distinguishes her from the typical solitary bee. As her nest is never sealed, the mother remains inside to guard the entrance against intruders. She will stay with the nest until her offspring are ready to emerge in about six weeks from their brood cells. Her longevity enables her to provide an additional assurance that her progeny will survive to adulthood.

Emerging in summer, her offspring will form the new overwintering juvenile community. They will remain in their natal nest until the following spring, bringing the life cycle full circle. Despite the long juvenile stage before mating, the carpenter bee life cycle is then in some respects similar to that of other solitary bees – they typically have just one generation per year, with each egg-laying female excavating her own tunnel nest and creating and provisioning her brood cells. However, most species of carpenter bees which have been studied exhibit some aspects of social behavior. These tendencies can prove useful, given that the entrance to a carpenter bee nest is not sealed, and must be vigilantly guarded against insect predators while new offspring are developing in their brood cells.

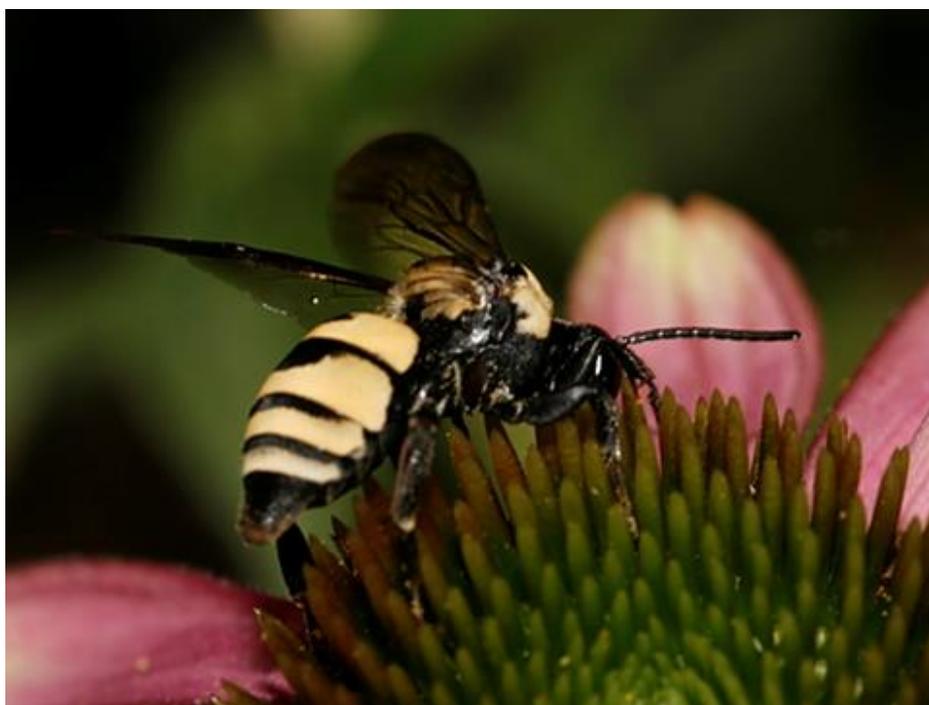
Some females of carpenter bee species like *Xylocopa virginica*, pictured here, will not mate until they are in their second year of life. Overwintering communities of male and female carpenter bees may share a nest with females of a previous generation. Photo by Rollin Coville.



For example, in *Xylocopa virginica*, not all the first-year females emerging in spring will mate and found their own nests. Instead, they may stay with the nest of a female relative in her second year, guarding the entrance for her while she is out on foraging trips. For services rendered, these female guards will remain in the nest with the new juvenile overwintering community, and then become the egg-layers themselves the following spring. And this is just one of many complex, multi-generational nesting scenarios that can occur among the species of this long-lived bee.

#### **Cuckoo Bee Lifecycle (The Career Criminals of the Native Bee World)**

While the females of most bee species labor tirelessly to construct and provision the nests for their offspring, not quite all of them fit this industrious profile. Roughly 20% of North American bees are parasitic or cuckoo bee species. Rather than do an honest day's work to create her own nest, the female cuckoo bee relies upon the females of a host species to do all the work for her.



The female cuckoo bee is equipped with a thick cuticle to withstand attacks by the host species. Female of [Triepeolus](#). Photo by Celeste Ets-Hokin.

Most North American cuckoo bees are “kleptoparasites”, which refers to solitary bees which lay their eggs in the provisioned nests of other solitary bees. The female cuckoo bee detects the nests of her particular host species by scent. She waits outside the nest until the host female leaves on a foraging trip, and then slips in unnoticed to lay her egg(s) in a prepared brood cell. Afterwards she makes a hasty retreat, and if all goes according to plan, escapes undetected. Because the female cuckoo bee does no foraging to provide food stores for her offspring, she lacks the specialized hairs possessed by most female bees for transporting pollen. Most cuckoo bees are, however, equipped with an exceptionally thick cuticle to withstand attacks from the host female, in the event a confrontation does occur.

Meanwhile, back in the host brood cells, the developing cuckoo bee larvae carry out their part of the criminal master plan. Most cuckoo bee larvae possess sizeable, sickle-shaped jaws which they employ to kill the host egg or larva, after which they commandeer the food stores for themselves. Suitably nourished, the cuckoo bee larvae develop within the host brood cells, emerging as adults the same season as their host species. These adult cuckoo bees mate, with mated females going on to uphold the fine family tradition of breaking and entering.



*Female cuckoo bee (genus [Xeromelecta](#)) waiting outside the nest of a host female bee (genus [Anthophora](#)). Photo by Rollin Coville.*

But kleptoparasites are petty criminals compared to the other, much smaller, group of cuckoo bees known as “social parasites”. In North America, these are most notably the “cuckoo bumble bees”, which parasitize the annually social colonies of various bumble bee species. While these parasitic females may inhabit the social nests of bumble bees, they are themselves definitely not members of polite society. Declaring herself queen by either killing or controlling the existing one, the female cuckoo bumble bee will subjugate an entire bumble bee colony, compelling it to progressively attend to and feed her offspring.

She begins by entering an established bumble bee nest with a host queen and a sizeable staff of female workers. Either covertly or by force, she then assumes the role of queen, laying her eggs in the brood cells prepared by the host species. She eats any of the host queen’s eggs. Depending upon the species of cuckoo bumble bee, she either destroys the host queen or forces her into servitude along with her workers. Because the cuckoo bumble bee cannot construct her own brood cells or collect pollen, she compels (by physical attacks or the use of pheromones) the host workers to provide her with food and to raise her developing offspring.

The cuckoo bumble bee offspring develop into adulthood within the bumble bee nest, and then leave to mate. Mated females hibernate over winter, emerging the following nesting season on the heels of their host bumble bee species. The cuckoo bumble bee female is then ready once again to establish her reign over the social nest of a bumble bee, be it in a decidedly anti-social fashion.