

Ground Nesting

Ground-nesting bees, which comprise the considerable majority of North American species, dig tunnels in mostly bare soil to create nests for their offspring. Depending upon the bee, the nest tunnels may be excavated in level ground or into the side of an inclined or vertical bank. Preferred soil type ranges from sandy to loamy, but is usually well-drained. The tunnel architecture of ground-nesting bees also varies widely in depth, length and complexity, in keeping with the species of bee which engineers its construction.



70% of North America's native bees are ground-nesters. Female [digger bee](#) (*Anthophora californica*) looking out from her ground nest. Photo by Rollin Coville.

While tunnel design may vary, most ground-nesting bees must contend with a common challenge – how to protect the developing offspring and food stores in their subterranean cells from excessive dampness and fungal attacks. To meet this challenge, most ground-nesting species, including mining, digger, polyester and sweat bees, have evolved mechanisms for lining their nest cells with water-proof secretions produced by specialized glands in their abdomens. Following its application to the lining of the brood cells, the secretions of most species seep into the surrounding soil, giving it a waxy or varnished appearance when dry.

The glandular substance secreted by the [polyester bee](#) (genus *Colletes*) to line her underground brood cells doesn't seep into the soil; instead it forms a cellophane- or "polyester"- like waterproof membrane which entirely separates the cell from the surrounding soil. The female bee uses her lobed tongue to paint the cell with droplets of this highly durable, transparent material. Because the female is able to create a perfectly waterproof seal for her brood cells, polyester bees can create their nests in very damp, and even flooded, conditions.

Although they are solitary species, numerous ground-nesting bees may nest in dense aggregations. There is, however, no cooperation or sharing of duties in these arrangements – merely tolerance among the solitary nesting females. Each female bee still excavates her own nest and tends her own brood cells. Sometimes these aggregations occur due to limited nest sites, whereas in other situations there is a tendency for females to found nests close to the spot where they were born. Such dense nest sites of ground-nesting bees are easily recognized by the tell-tale mounds of excavated dirt surrounding numerous, closely spaced holes in the ground.



*Some ground-nesting species nest in dense aggregations, evidenced by numerous closely spaced holes in the ground, often surrounded by tumuli (excavated mounds of dirt). Nesting aggregation of [mining bees](#) (*Andrena* spp), with nest entrances surrounded by tumuli. Photo by Matthew Shepherd, The Xerces Society.*

In some species of ground-nesting bees varying degrees of more advanced sociality does occur. This can range from the mere sharing of a common nest entrance, with each female creating and provisioning her own brood cells (known as communal nesting), to a temporary social order characterized by a division of duties among female workers, with only one egg-laying female per nest. This latter situation is found in several species of sweat bees (subfamily Halictinae), all of which have multiple generations of offspring per year.



Nest entrances of sweat bee species (subfamily Halictinae). The females of some sweat bee species will share a nest entrance. Photo by Matthew Shepherd, The Xerces Society.