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# WINTER OF THE BUMBLEBEE

By Kent McFarland

**L**ong live the queen! Most of the bumblebees you see flying now are young queens preparing for winter. Each year in the bumblebee kingdom, only a juvenile queen will carry the colony's torch through winter to produce the next generation. Everyone else – workers, drones, and the old queen – dies with the onset of fall frost.

Not so with the honeybee, with which more people are familiar. In the dead of winter, I have often visited the honeybee observation hive at the Vermont Institute of Natural Science, which is made with a pane of glass on each side of a thin box. The workers are all gathered around the queen in one spot. If you put your hand on the glass away from them, the glass is frigid, but the back of my hand on the glass right in the center of the cluster is incredibly warm. Eating stored honey keeps their metabolisms high enough to produce excess heat and keep the cluster alive.

Bumblebees take a completely different approach. They do not put all of their energy into food storage for the winter but hedge their bet on the survival of a few queens. During the waning days of late summer and early fall, larvae begin to develop into virgin queens and males rather than the workers that have been hatching all summer. Colonies may produce up to one hundred reproductive bumblebees, hoping that at least one or two queens will survive to re-establish a colony the next spring.

When male bumblebees emerge from the cocoon, they may spend several days in the hive and drink some of the stored honey. (Bumblebees do produce some honey, just not the great quantities of their honeybee brethren.) Then the males leave the nest to forage and live on their own, often finding shelter under plant leaves and flowers during inclement weather and at night. I have seen them in the cool morning air sitting on goldenrod flower heads barely able to move. The male bumblebees have one charge in life: stay alive long enough to mate. Each male leaves a chemical attractant along a regular flight path in its territory.

New queens emerge from the hive a week after the males. Unlike the males, they will leave the nest to forage by day and return for shelter at night. And unlike their sisters, the workers, they do not add any provisions to the nest.

As the days grow shorter, a fertilized queen visits flower after flower, drinking lots of nectar to build body fat and fill her honey stomach. The honey stomach is a small sack that can hold between five-hundredths and two-tenths of a milliliter (A teaspoon holds about five milliliters). Each flower may yield only one thousandth of a milliliter of nectar, causing the queen to visit up to 200 flowers to get her fill.

Not all flowers are alike. Fall flowers like goldenrod and aster, for example, generally yield far less food than jewelweed blossoms. Bumblebees must sustain thoracic temperature at 86 to 95 degrees F. to be able to fly. So when the morning temperatures are cool, it does not pay for them to visit flowers of poor quality, because they burn as much fuel as they gain from foraging. Queens won't emerge to forage in the cool mornings until the air temperature is around 50 degrees.



While the young queens are buzzing around foraging, they are also picking up any perfume left by a male. If the scent is to their liking, they may land and wait for the male. Mating can last up to an hour and a half, but sperm transfer generally occurs in the first two minutes. Why the long encounter? Males want to make sure the future colony belongs to them. When he is done mating he exudes a gummy substance onto the queen that blocks any other males from mating with her.

When the queen has mated, she searches for a good place to burrow into the soil for the long winter wait. Once under ground, usually one to six inches down, the queen somehow knows to avoid the false start of the January thaw and wait until late April or early May, when the warmth of the spring sun penetrates her underground home and she emerges to forage and start a new colony. The queen lives!

Many people live in fear of bumblebees, perhaps because, unlike us, they don't try to keep their whole clan alive for the winter, instead rolling the dice on the survival of just a single individual. That, and the fact that bumblebees sting us. But think twice before swatting a bumblebee at this time of year, especially one that's not bothering you. You can never know if it might be that one important queen.

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