



Article & Photo by Margie Manthey and published in the Westport Review Mirror, 2020



The Mourning Cloak - Winter Warrior

Although it might seem strange to focus on a butterfly in wintertime, it's actually a perfect time to learn about one in particular. The mourning cloak was named for the somber brown colour of its drab outer (closed) wings. When resting on a tree with closed wings, it resembles a bark chip; this helps protect it from birds, praying mantises and other predators. In contrast, its inner (open) wings are a lovely chestnut-brown with a row of iridescent blue spots and a creamy yellow border. It flits about in search of tree sap, its main food source, especially from maple, poplar, oak and birch trees, and can be observed in wooded areas, shorelines and fields. It also feeds on rotten fruit and, less frequently, on flower nectar, so it's not a major pollinator.

The mourning cloak is among the first species of butterflies to emerge in early spring, often while patches of snow still linger on the ground. Seeing one fluttering around a wintry landscape is somewhat confounding. Unlike some other butterfly species that migrate or overwinter in cocoons, chrysalises or eggs, the mourning cloak hibernates as an adult butterfly. So, how does this delicate creature endure an Ontario winter? The answer is in an incredible survival adaptation called *freeze tolerance*. To keep from freezing, the mourning cloak reduces the amount of water in its blood and slowly replaces it with antifreeze agents like glycerol and sorbitol. This process is triggered by shorter daylight hours as summer advances and takes time to complete before the onset of cold weather. It enables the butterfly to spend the winter in *cryopreservation*, whereby its cells, tissues and organs will be protected despite freezing temperatures. In autumn, it will search for a place to hibernate -- a tree cavity, under loose bark, in log piles or unheated structures -- virtually any nook it fits into that offers protection from wind, birds and squirrels. There, the butterfly enters a stage called *diapause*, and its metabolism and respiration slow down. As winter progresses, the diapause process is reversed, but only after a sustained period of cold weather passes and the days lengthen again. This helps prevent the butterfly from freezing after a false spring.

When it finally emerges from its nook in the spring, its wings are often tattered, as it is now 8-9 months old. (Believed to be the longest-lived butterfly, the mourning cloak usually lives for 10 months, but may live as long as a year.) It has springtime ambitions: find food, mate, and don't get eaten. Before it can accomplish these goals, it must fly; but to do that, it needs to be warm. It flutters its wing muscles to generate heat or basks in the sun with open wings, its dark colour helping to absorb heat. Once aloft, the flight muscles produce enough warmth to keep it airborne. If it is unable to fly from a predator, the mourning cloak tucks in its antennae and stays still, mimicking a chunk of bark. After mating, the female mourning cloak lays her eggs on a host tree branch. The hatched caterpillars eventually undergo metamorphosis and emerge as adult butterflies by June or July. Depending on the region, food availability and weather, this new generation of mourning cloaks might reproduce over the summer -- or, they may have a brief inactive time, called *aestivation*, similar to hibernation. Those that snooze, awoken by summer's end in time to build their food reserves and undergo the physiological changes that turn them into winter warriors.

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