

Surviving a Long Cold Winter, Insect Style

Outdoor insects of northern latitudes have had to solve the problem of winter survival. Entomologists do not know all about the devices which temperate insects use to help them withstand the cold of winter, for these devices are founded within the physiology, or bodily functions, of the insects.

For example, diapause (an obstinate state of arrested development) enables some insects to pass the winter safely. Common white cabbage butterflies have at least two broods per season, but when the caterpillars are exposed to daylengths of 12 hours or less, the pupae which form enter diapause and do not develop further until the following spring. The tent caterpillar, on the other hand, goes into diapause as an egg. Other species may enter diapause as larvae or as adults. Diapause is under the influence of light, which affects the hormonal system of the insect and results in profound physiological changes. We should not, therefore, make too close a parallelism between diapause and cold survival.

Some insects survive the winter without diapausing; what is the nature of cold hardiness in these insects?

One alternative is supercooling; that is, as the temperature drops below the freezing point, body water becomes more ice-like in its molecular arrangement but nucleation (centres of ice formation) is absent. Some insects will supercool in this way to -40°C without harm. However, should nucleation and freezing occur, these insects will usually die because of cell damage. Insects which supercool usually have a lowered freezing point of body fluids, the result of a high solute concentration and/or the presence of glycerol in their bodies. In effect, they produce their own antifreeze!

Finally, a lot of insects are unharmed by freezing. Such insects show a buildup of glycerol in their tissues as cold weather approaches and insect physiologists generally agree that glycerol-containing cells can be frozen without injury. However, the nature of the freezing-tolerance conferred by glycerol is still unknown.

R. W. Salt, the foremost Canadian researcher on cold hardiness in insects, summed up our knowledge of winter survival of insects as follows "Diapause may have attributes that favour winter survival but the two factors that really determine cold hardiness are supercooling potential and presence of glycerol."

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Notes on an Osprey Nest

On September 18, 1975, while returning from a day in the field, my eyes, lower than usual, spied an unusual "blob" on the horizon. Unusual since I had been on that particular road many times before and the blob went unnoticed. On closer examination with binoculars and telescope, it was decided that the "blob" consisted of an osprey nest and one osprey repairing the nest. In the days that followed, the now quite obvious nest was checked daily for activity.

On September 19, it was noted (by Kathy Martin) that a second osprey was utilizing the tree and until September 24 our notes suggested that two osprey were simply maintaining or repairing a nest, possibly for next year's breeding season. Calling could be heard from the road but this vocal activity did not seem one of alarm. On September 24, the first hint that the nest had been active all summer was noted when 2 adults were observed as well as movement of a third object in the nest. It was later confirmed that the family consisted of two adults and two young.

The nest was located in Chelton not far from Central Bedeque. It was within a mile of Northumberland Strait which provided the ospreys with its usual diet--fish. This nest as well could be home base for osprey sighted several times along the Dunk River. The nest 60 feet high in a dead white pine, towered above the mixed woodlot by 20 feet. The nest, 2.5 - 3 feet in diameter and about two feet high, was made of twigs and old branches.

Nelson Hurry arrived on September 25 to band the young osprey. As he climbed the tree, two young osprey flew from the nest scolding and calling. What had earlier been considered as flightless young turned out to be quite able flyers. The nest