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# LIVING

## Snowflakes and survival

*Both plants and animals show amazing adaptations to life in a snow-covered environment*

Wilson Bentley envisioned a snowflake as “an idea dropped from the sky, a bit of beauty incomparable, that if lost at that moment is lost forever to the world.” When he died in 1931, Bentley had taken nearly 6,000 photographs of snowflakes over the course of 46

Vermont winters. More than anyone else, he brought to the world’s attention the intricate, fragile beauty and diversity of snowflakes. He also changed the way we look at snow and winter.

First, a bit of science.

Snow is formed when water vapour changes into a solid crystal on a dust particle. The “seed” of dust forms the core of the crystal, drawing water molecules which freeze to its surface. A snowflake may be a single crystal or a group of crystals. All snowflake crystals

are symmetrical and six-sided. This is a result of the hexagonal crystal structure of ice and the angle at which oxygen and hydrogen bond together in a water molecule.

As a flake descends from a cloud, it will travel through changing layers of temperature and humidity, all of which will shape it differently. In addition, collisions with other snowflakes will also leave their mark.

Although many flakes are indeed the typical stylized six-pointed stars, there are many other types as well. Damp, mild conditions with low clouds and little wind often produce three-dimensional tree-shaped flakes. Colder, drier clouds often generate needle-like flakes.

Amazingly, it may actually be true that no two snowflakes are exactly alike. It has been estimated that there are more than a million different temperature and humidity levels possible in the atmosphere. This translates into 10 to the five-millionth power of possible temperature/humidity combinations. Author Jeff Rennie writes: “For two snowflakes to be exactly alike, they would have to grow on precisely the same core configurations, fall through the same sequence of conditions for the same amount of time and have similar collisions on the way down. Then the two flakes would have to be collected by the same scientist for verification.”

Both plants and animals show amazing adaptations to life in a snow-covered environment. Some of these adaptations are primarily anatomical, while others are behavioural.

Birch trees, for example, have flexible trunks that bend over with the weight of ice and snow without breaking. They usually spring back up when the snow melts. Snowshoe hares and weasels turn white in the winter, thereby gaining the advantage of camouflage. Hares have also adapted to winter conditions by developing large feet — hence the term “snowshoe” — which allow the animals to travel much more easily on top of the snow. Similarly, ruffed grouse grow combs on the sides of their toes which provide the birds with good support while walking on the snow.

There are equally important changes in the behaviour of many animals. Wolf packs, for example, generally choose to travel on frozen lakes in winter. Because lake snow becomes compacted by the wind, walking is much easier.

Another classic example of behavioural adaptation is the white-tailed deer. In Ontario, white-tailed deer are at the northern fringe of their range, and lack the anatomical adaptations such as long legs that moose have developed. When there are more than 50 centimetres of soft snow on the ground, deer are seriously handicapped and must expend large amounts of energy simply walking from one point to another.

They have, however, adapted to this challenge by changing their behaviour in winter.



Terry Carpenter, special to The Examiner

White-tailed deer are not well adapted to deep snow, and must change their behaviour in order to survive.

Every year, most deer migrate to special wintering areas where the snow cover is thinner, and browse is available. In agricultural lands close to Peterborough, the wintering site may be a cedar swamp or flood plain or simply the south-facing slope of a woodlot or field.

In northern Peterborough County, many deer move into large sites known as “deer yards.” These are areas of mostly coniferous tree cover. Conifers provide food, protection from the wind and less onerous walking because much of the snow is intercepted by the branches and eventually melts or sublimates back into the atmosphere.

The deer spend many hours lying under the protective boughs of these conifers. Deer yards are crisscrossed with a network of trampled trails used by the animals to travel from the shelter of the conifers to stands of hardwoods where additional browse can be found. Most of the new twig growth on preferred hardwood species such as red maple and yellow birch may have been consumed by late winter, however. The animals sometimes end up relying on older twigs which have a much lower food value. This becomes an especially serious problem when snow forces the animals into deer yards early in the winter, or when deep snow confines them to already overbrowsed areas.

The largest deer yard in the Kawarthas is the Peterborough Crown Game Reserve

north of Stoney Lake.

For many small mammals, however, snow is an important ally. Most of the mammal activity in winter is actually happening in the sub-nivean space under the snow. The temperature here remains just below zero Celsius, even when air temperatures at the surface are much colder. In this dark, damp habitat, the snow becomes crystalline and can be easily excavated by voles, mice and shrews. Large networks of trails are formed, many of which remain visible for a few days even after the snow melts.

Little do these animals know that owls can actually hear them moving under the snow. They are especially vulnerable when in the vicinity of “ventilator shafts.” These are holes constructed by voles in order to allow fresh air into the sub-nivean space when carbon dioxide levels become too high. It is amazing to watch an owl such as a great grey pounce on a seemingly lifeless expanse of snow and fly off with a vole in its talons.

Although owls do represent a very real danger, the biggest threat to small mammals comes from the possibility of inadequate snow cover. If the snow does not arrive soon enough after the onset of sub-freezing temperatures, or if the snow disappears in mid-winter, many will perish.

As adults, any attention we pay to snow is usually limited to how best to remove it from our driveway. Almost never do we

actually stop to admire snowflakes close up. The next time you are outside when it’s snowing, take a moment to carefully examine the flakes landing on your glove or sleeve. You will be amazed by the diversity and beauty of these jewels that nature tosses down from the sky in such abundance.

And, in case you were wondering, they look just like the snowflakes in the black-and-white photographs that Wilson Bentley took all those years ago.

### What to watch for this week

The first migrant songbirds return this month, most of them from the southern United States. Among the most anticipated are American robins, eastern bluebirds, red-winged blackbirds, eastern meadowlarks and song sparrows. Bird song increases accordingly. If you don’t already know the songs of these common birds, right now is a great time to learn them.

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