Get Wild: The magic and science of snowflakes

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Karn Stiegelmeier
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Snow dancing, Ullr calling and deep yearning for more snow this season appear to have paid off! After such a dry fall and early winter, abundant snowfall finally is allowing us to enjoy our sliding recreation — the focus for many of us.

Snow is, of course, also essential to our rivers and water supply. The 40 million people in the Colorado River basin, and the vast agricultural network that we take for granted when we shop for groceries, depend on winter snowpack. Summit snow fills reservoirs with essential spring and summer water.

We hear a lot about how many inches of powder we can expect, and we plan our days around those predictions. But how many snowflakes actually fall in these storms? Many billions of these spectacular crystals create a snowfall. One pound of snow has an average of 22,400 snowflakes. And each snow crystal is an incredible work of science and art.

What is a snowflake? Perhaps you've had the pleasure of folding a paper in half, then into thirds and — with good scissors in hand and some careful cutting — created a beautiful replica of one of the unique snow crystals that can be seen without magnification under the right conditions. When we say snowflake, we usually mean snow crystal: a single crystal of ice in which the water molecules line up in a precise way.

How do these spectacular snow crystals form? Snow crystals generally are hexagonal (six-sided) due to the way they form. And they're not frozen raindrops (those are sleet). Snow crystals appear when water vapor converts directly into ice without going through a liquid state. Water molecules in ice crystals join together in a hexagonal structure because it is the most efficient way. After the crystals form a small hexagonal plate, branches sprout from the six corners as the crystal grows larger and more complex.

Formation depends on the changing temperatures and humidity each crystal experiences on its unique path through the clouds as it forms and falls. This trip through clouds, wind and humidity creates a unique crystal. Indeed, no two snow crystals are alike; each has its own variety of patterns and shapes. Snowflakes are classified as hexagonal and triangular crystals, hollow columns, dendrites and irregular snowflakes. Dendrites are multibranched or tree-like crystals that can be very large, complex and often visible to the naked eye.

The six-fold symmetry in a snow crystal is created by the water molecule arrangement in the ice crystal shape. There are other snowflakes less complex and beautiful. During artificial snowmaking at our ski areas, the compressed air expands and quickly freezes water droplets. The resulting snow is a dense cloud of tiny sleet particles that lack the ornate hexagonal structures of snow crystals.

Once on the ground, snowpack can assume different qualities, depending on temperature, wind and time. Under the right conditions, we can see spectacular fern-like crystal shapes on the ground after snowfall begins to melt and reforms. These are larger than any snowflake and are easily seen without magnification along a trail, especially in wet riparian areas.

As you are gliding on, entranced with the falling snow, you can always ponder with wonder and awe about the intricacies of the amazing physics creating these works of science and art.

So keep on snow dancing. If nothing else, it's good exercise! We have experienced a fantastic start to the new year with abundant snow. Bring on more beautiful hexagonal crystals!

Karn Stiegelmeier

> "Get Wild" publishes on Fridays in the Summit Daily News. Karn Stiegelmeier is the chair-elect of Eagle Summit Wilderness Alliance, an all-volunteer nonprofit that helps the U.S. Forest Service protect and preserve the wilderness areas in Eagle and Summit counties. For more information, visit EagleSummitWilderness.org.