

# Get Wild: Watermelon snow in the High Country

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Watermelon snow is pictured in Alaska in June 2022. The color represents millions of tiny dormant cysts from cold-tolerant algae, which become concentrated as the snow melts.  
*Frances Hartogh/Get Wild*

On a summer hike into the High Country, you may notice patches of red or pink “watermelon snow” on melting snowfields. The color represents millions of tiny dormant cysts of a cold-tolerant algal species, *Chlamydomonas nivalis*, becoming concentrated as the snow decreases. Walking on the snow compresses and concentrates the red algae in your footprints. Take a moment to marvel at how these little organisms are uniquely adapted to their inhospitable habitat: high elevation, cold, intense sunlight, UV radiation and few nutrients.



These single-celled *C. nivalis* algae were once called psychrophiles (meaning cold-loving), but more recent research suggests they are cold-tolerant mesophiles, growing best at temperatures ranging from 41-59 degrees Fahrenheit, but not above 86 degrees. They can persist in their cyst form when temperatures are below freezing (32 degrees).

A relative of *C. nivalis*, *C. reinhardtii*, is a true mesophile, growing best at moderate temperatures between 68-86 degrees in fresh water. *C. reinhardtii* has been highly studied as a “model organism” for research on major questions in cell and molecular biology, such as genetics and mechanisms of photosynthesis, flagellar movement and cell response to light.

Like all green plants, these algae have chloroplasts that contain the green pigment chlorophyll. Their photosynthesis uses the energy of the sun to convert carbon dioxide and water to sugars and other essential organic compounds and releases oxygen. In the dark, they can also take in organic material from the environment as a source of energy and food.

The red color of *C. nivalis* reflects that they contain an accessory pigment, astaxanthin, in addition to the green chlorophyll. The red carotenoid pigment functions like sunscreen to protect the DNA and other cell components from intense solar UV radiation. However, in absorbing the radiation, this red pigment also leads to melting of the snow, which causes concern that these algae, and even dust blown onto the snow, may accelerate glacial melting.

## Life cycle

*C. nivalis* spends much of its year as a thick-walled, dormant cyst. As conditions warm, the cyst forms four motile green vegetative cells, each containing two flagella (cellular tails) to propel it in the liquid melting snow. Each has an eyespot to orient it for optimal photosynthesis. Sensitive to temperature and drought stress, these cells swim in the snow to reach optimal conditions, dividing to form more cells during the brief summer. Later, two vegetative cells fuse to form a zygote: it loses the flagella, makes more red pigment to pack around cell components, and forms a thick cell wall to protect the cyst from dehydration. While vegetative cells' diameters measure about 10 micrometers — larger than bacteria, similarly sized to yeast cells — the cysts are much larger, 35-50 micrometers.

Is it safe to eat watermelon snow? It's not a snow cone. Some reports say it acts as laxative. But consider that *C. nivalis* isn't the only thing living in this inhospitable ecosystem. There are also diverse fungi, bacteria, viruses and some worms, along with dust, pollen and other debris carried by winds and deposited on the snow.

*C. nivalis* is the most common of the snow algae, although there are some 60 other species identified in the West alone. The snow algae *Chloromonas brevispina* makes green cysts deeper in the snow, or in areas with less UV light. Sometimes orange and purple patches appear on snow, which could be different varieties of *C. nivalis*, or other species. For now, enjoy the lovely colors on the snow as you hike in the High Country, and appreciate these tiny organisms that can thrive in such an environment.







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Joan Betz is a retired Biology professor from Regis University, and a Board member 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](https://www.eaglesummitwilderness.org).

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