

Chautauqua Watershed Notes  
From the Chautauqua Watershed Conservancy  
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The Many Colors of Snow

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For the Chautauqua Watershed Conservancy



*Go outdoors on a cold, sunny morning and you'll be surprised by the colors you see in the snow-covered landscape. Under the right conditions you may even see giant, glittering ice crystals like the ones shown here.  
(Photo by Mark Baldwin)*

Let me tell you the Russian tale of Silvershod, a magic reindeer with a silver hoof. It was winter and Dara the heroine stood by her adopted father's hut. Silvershod leapt atop the hut and struck with his silver forefoot. As he struck, blue sparks flew into the air. They fell to the earth as bright sapphires. He struck and struck. Red sparks flew, and became rubies. Green sparks became emeralds. White sparks became diamonds. Heaps and heaps of jewels tumbled sparkling, from the roof.

Hike, snowshoe or ski along Chautauqua County's overland trails on a cold winter morning and you too will see heaps of sapphires, rubies, emeralds and

diamonds sparkling in the sunlight. Has a magic reindeer struck his silver hoof upon the land? Something almost as magical is happening.

The day before this magical morning, in the warmth of the afternoon sun, the air absorbed water evaporating from the snow. The sun slipped below the horizon and the temperature plummeted. When it's cold there is less energy. This reduced energy causes the air molecules to crowd together and the water molecules among them to join each other (condense). The air molecules squeeze the water out of the air and onto the top layer of snow where it crystallizes into multifaceted crystals similar to cut diamonds. When dawn arrives these crystalline structures capture the morning light, bend it, separate it, reflect it off facet after facet, bending it and separating it more and more until the light separates into the colors of the spectrum and escapes to dazzle our eyes. It is just like when raindrops separate sunlight into a rainbow or when a prism separates a beam of light into a rainbow on your wall.

Why, then, does snow usually appear white? First you should understand why we see color. Light travels in waves. Each color has a specific wavelength. When one of these wavelengths of light strikes our eye the eye tells the brain to see the color of that wavelength. If the light striking our eye contains all wavelengths together we see white. Snow on the ground is a conglomerate of half melted snow crystals interspaced with

pockets of air. A beam of sunlight enters this mass. All the wavelengths of light bounce around and are indiscriminately scattered, absorbed and reflected so that the light that reemerges is all colors together and we see white.

Now look deep into a hole in that apparently white snow where the lower layers have compacted into ice. It's blue! Light behaves in a unique way as it travels into ice. Ice is relatively solid. There are not many air pockets. Without the scattering effects of the air pockets, like snow on the ground, light can penetrate deep into the ice. As it travels deep into the ice the longer red and green wavelengths are absorbed first; only shorter blue wavelengths reflect back out, and that is what we see.

Chautauqua winters are not, as many people will claim, just a black and white interlude between Technicolor seasons of spring, summer, and fall. Hike, snowshoe, or ski out and see winter's jewels for yourself!

The Chautauqua Watershed Conservancy is a private, not-for-profit, 501(c)(3) organization with a mission to preserve and enhance the water quality, scenic beauty and ecological health of the lakes, streams and watersheds of the Chautauqua region. Its urgent focus is to conserve the endangered natural shore lands of Chautauqua Lake, which provide fish and wildlife habitat and pollution filtering functions essential to a healthy lake. Only four miles (10%) of the lake's shoreline remains in a natural, undeveloped condition. The Conservancy is funded primarily through membership donations. Its annual membership campaign is currently underway. It is presently raising funds to conserve the Chautauqua Lake's most important remaining natural shoreline habitats, undertake programs to address the root causes of the conditions that fuel lake plant growth, and manage its preserves. It is the only local organization conserving lands in perpetuity for these purposes. Please contact the Conservancy at 664-2166 to join!