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Crystals from another climate

Not all snowflakes come from a studio art department, and this man can prove it.

By Brenda Rees
Special to The Times

Winter in Southern California may feel different from other times of the year, but let's face it: We still wear shorts, plant vegetables, ride bikes and dine alfresco. Sure, we might toss on a sweater to take the chill off, but who are we kidding?

So when we depart our alluring climate for places more harsh — say, the snowbank currently known as New York City — it's a reminder that Los Angeles is missing a key ingredient in wintertime magic: snowflakes.

Those artistic masterpieces that seemingly come into being out of thin air and then float lazily downward to become many things: a snowman, a thrill path for toboggans, an arsenal for snow fights or a sweet delicacy upon the tongue.

As scientific wonders, snowflakes are much more than just frozen water and dust to Kenneth Libbrecht, a Caltech physics professor who is fast becoming one of the world's snowflake experts though his academic research and close-up photographs that capture the essence of these temporary crystals of winter.

With a series of books, photographs and a website (www.snowcrystals.com) that gets 2 million hits a year, Libbrecht is expanding his snowflake empire this year when the U.S. Postal Service issues a commemorative four-stamp set with his snow crystal photos.

Later, a new Libbrecht book will hit the stands: a pocket-size field guide to snowflake types that will make it easy for everyman to identify and classify nature's frozen art.

Libbrecht attributes the interest in snowflakes to the fact that it's "a neat popular science that's fun and educational. And, you really don't have to have a science background to appreciate the science behind how these icy structures form."

Indeed, Libbrecht's photos show off an amazing micro-world of dendrites, needles, barbells and prisms. After forming with growing ice and shrinking water, snow crystals take on shapes and attributes depending on, among other factors, the temperature and humidity of the surrounding air.

Extreme cold conditions create crystals with more facets; partially hollowed columns are common when the temperature is just below freezing.

In all, Libbrecht has categorized about 35 distinct classes of snowflakes with permutations that are seemingly infinite.

The adage is true, asserts Libbrecht, who explains that the statistical possibility of having two identical snowflakes is so unfathomably vast that it's safe to say no two are exactly alike. After all, they are manufactured in the atmosphere at about 1-million billion crystals per second.

"I like to say that each snowflake has its own unique pattern, its fingerprint so to speak," he says. "They really are one-of-a-kind marvels."

Aprofessor at Caltech for 22 years, Libbrecht jumped onto the snowflake bandwagon a few years back after chewing the fat with some students about crystal growth. That discussion got him thinking about how snow forms and when he went to check out research, he discovered very little was written about ice crystals. "It really shocked and surprised me that there wasn't much in published," he says. "It was uncharted territory."

Libbrecht read the 17th century accounts of snowflakes by Descartes and Robert Hooke and checked out sketches by Arctic explorer William Scoresby. He learned about 19th century snowflake amateurs such as Wilson Bentley, a Vermont farmer who took the first snowflake photographs.

Inspired, Libbrecht started to grow synthetic snowflakes in his lab and developed microphotography techniques for capturing the fleeting images. He was then ready for the outside, honest-to-goodness flakes of winter.

Since snow pickings are slim in Pasadena, Libbrecht needed a cold-weather friend. He enlisted another flake-ophile, Patricia Rasmussen from Wisconsin, to take pictures in her barn using his hand-made microscopic camera.

During the winter of 2001-02, Rasmussen snapped photos that eventually became important to Libbrecht's research as well as the focal points of his first book, "The Snowflake: Winter's Secret Beauty" (2003, Voyageur Press).

Libbrecht now drags his camera-in-a-suitcase on family skiing vacations, weeklong trips to visit colleagues up north, and personal pilgrimages to snowy destinations. California snow, he says, is just too warm for good pictures. Sorry, Big Bear. Sorry, Tahoe.

For example, snowflakes chosen for the stamps were photographed by Libbrecht in Fairbanks, Alaska; in the Upper Peninsula of Michigan; and in his personal favorite snow spot, Cochrane, Canada, in the province of Ontario.

Photographing in the field is fairly uncomplicated — he jokes that it's "more difficult getting my camera through airport security." Out in nature, however, Libbrecht simply lets crystals fall onto a piece of cardboard and, using a small paintbrush, places the specimen on a microscope slide and positions it in the camera base.

After a quick adjustment of light and focus, he clicks away. Time is of the essence — a flake can start evaporating in a matter of seconds.

Libbrecht admits that he oftentimes gets consumed in his snowflake work. Once, he was searching and snapping from 7 a.m. to 5 p.m. "The snow was really good and I kept finding great samples," he says sheepishly. "You certainly can get lost in them."

Snowflake watching

Physics professor Kenneth Libbrecht offers a few tips for families who want to engage in some snowflake watching.

Arm yourself with a simple magnifying glass ("The $5 ones are good," he says) and catch flakes on your sleeve, a piece of cardboard or even a car windshield. Make sure it's cold enough outside for stable flakes; shield your steamy breath or you'll end up with a puddle.

Become a crystal explorer. Try to find the basic snowflake types, as outlined in Libbrecht's upcoming field guide or found in "A Field Guide to Falling

Snow" chapter in his book "The Snowflake: Winter's Secret Beauty." Be on the lookout for elusive 12-sided snowflakes, double stars and monster crystals.

Remember, Libbrecht advises, snowflake watching is just like bird watching. "Both [activities] are just fun things to do. You're outdoors discovering on your own," he says adding that oftentimes you'll go hunting for a certain species and end up finding another. "Have patience and be prepared. It's nature after all."

-- Brenda Rees