

## TRILOBITES

# *Who Ever Said No Two Snowflakes Were Alike?*

By Nicholas St. Fleur

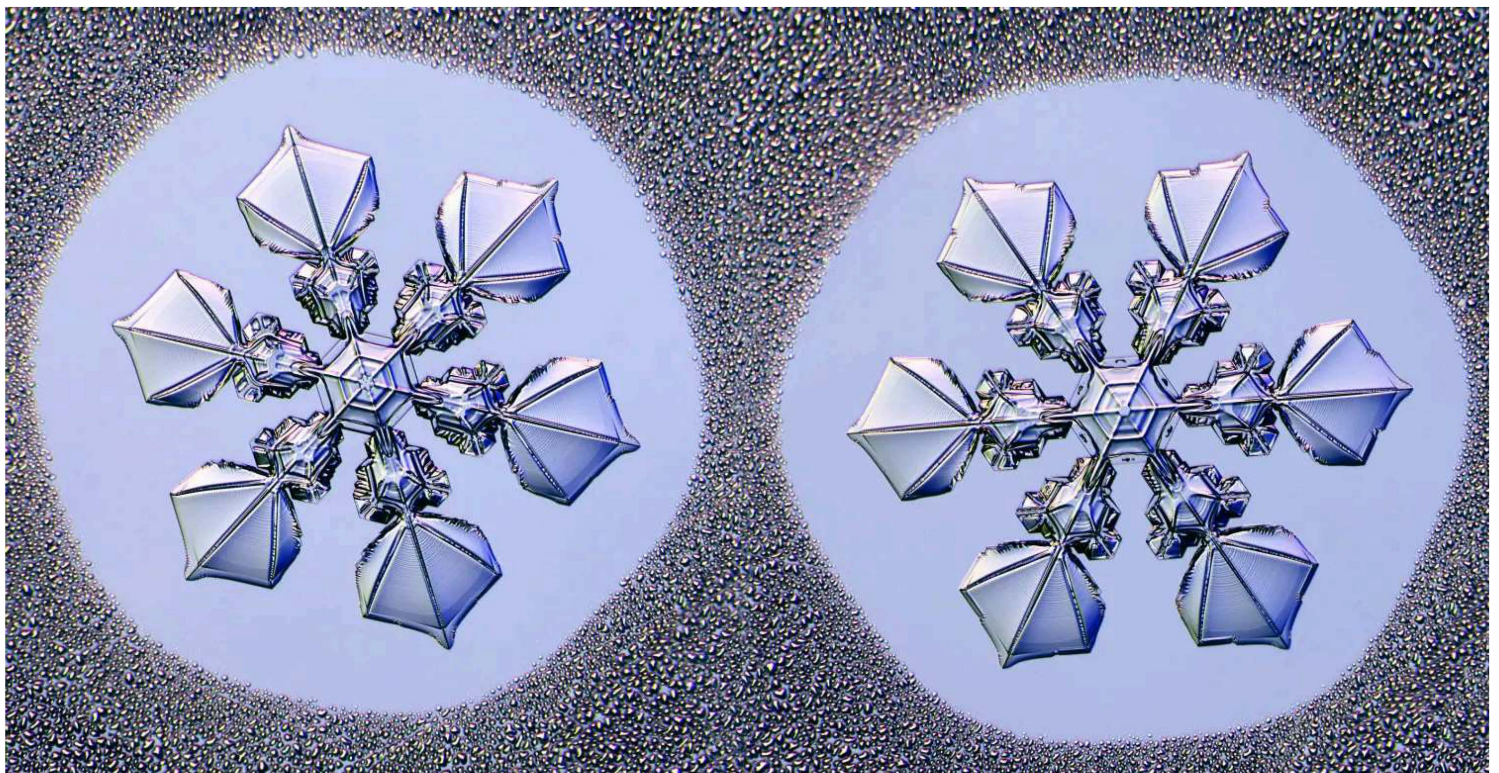
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As the East Coast braces for the first ferocious snowstorm of the season, we wanted to revisit a frosty adage: Is it true that no two snowflakes are the same? Never, ever ever?

Not quite, said Kenneth G. Libbrecht, a physicist at the California Institute of Technology, who found a way to create what he calls “identical twin” snowflakes in his lab.

Since each snowflake faces a different turbulent path through the atmosphere, each twist, turn and fall grants it a unique symmetry. But if you subtract nature’s volatility from the equation, then these icy flowers are no longer guaranteed uniqueness.

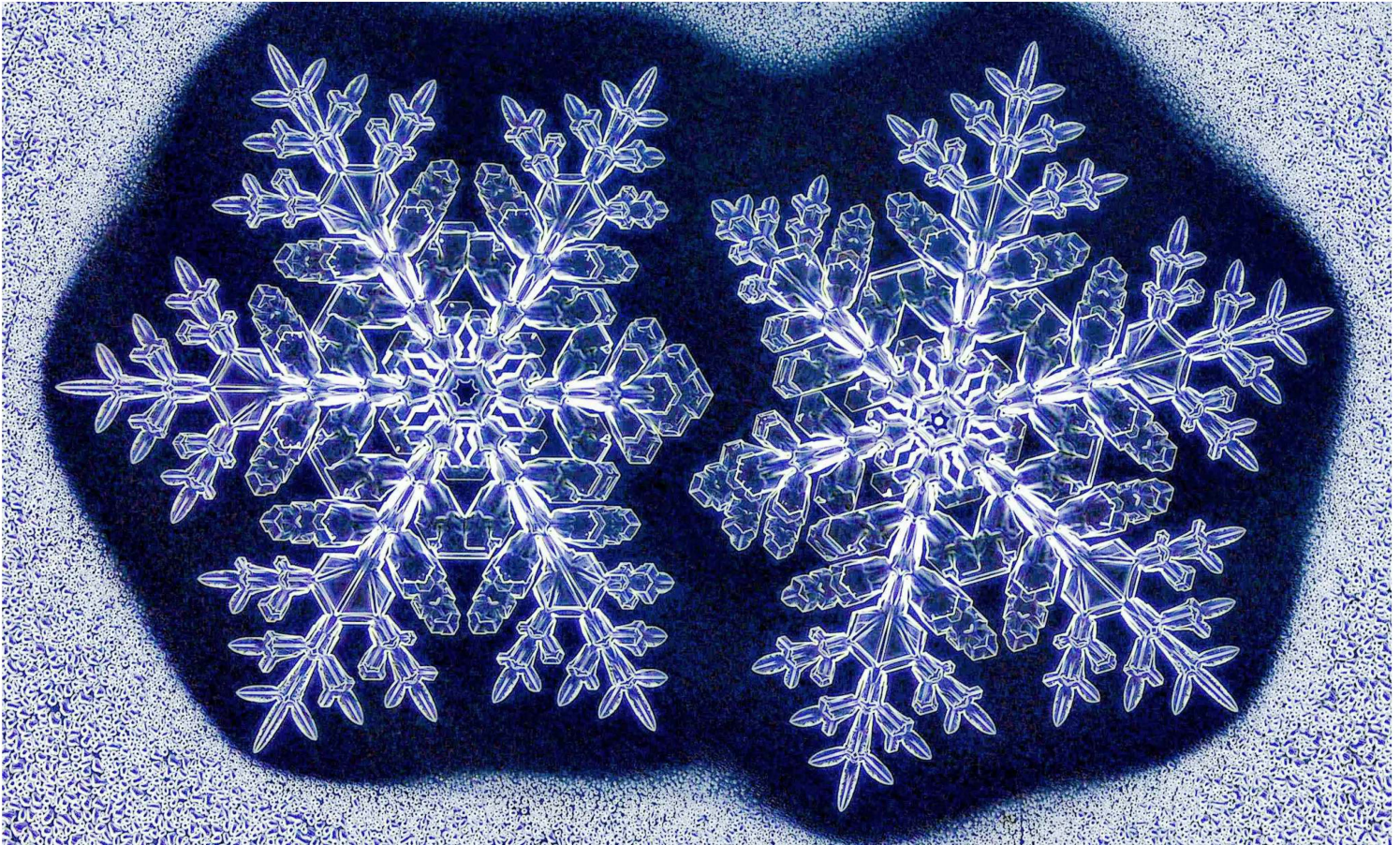
By placing two crystal seeds next to each other and growing them under the exact same conditions, Dr. Libbrecht found that he could create two snowflakes with nearly the same intricate shapes and patterns.



This is a photo of “identical twin” snowflakes taken under a photomicroscope designed to capture tiny snow crystals dubbed the “SnowMaster 9000.” Kenneth Libbrecht



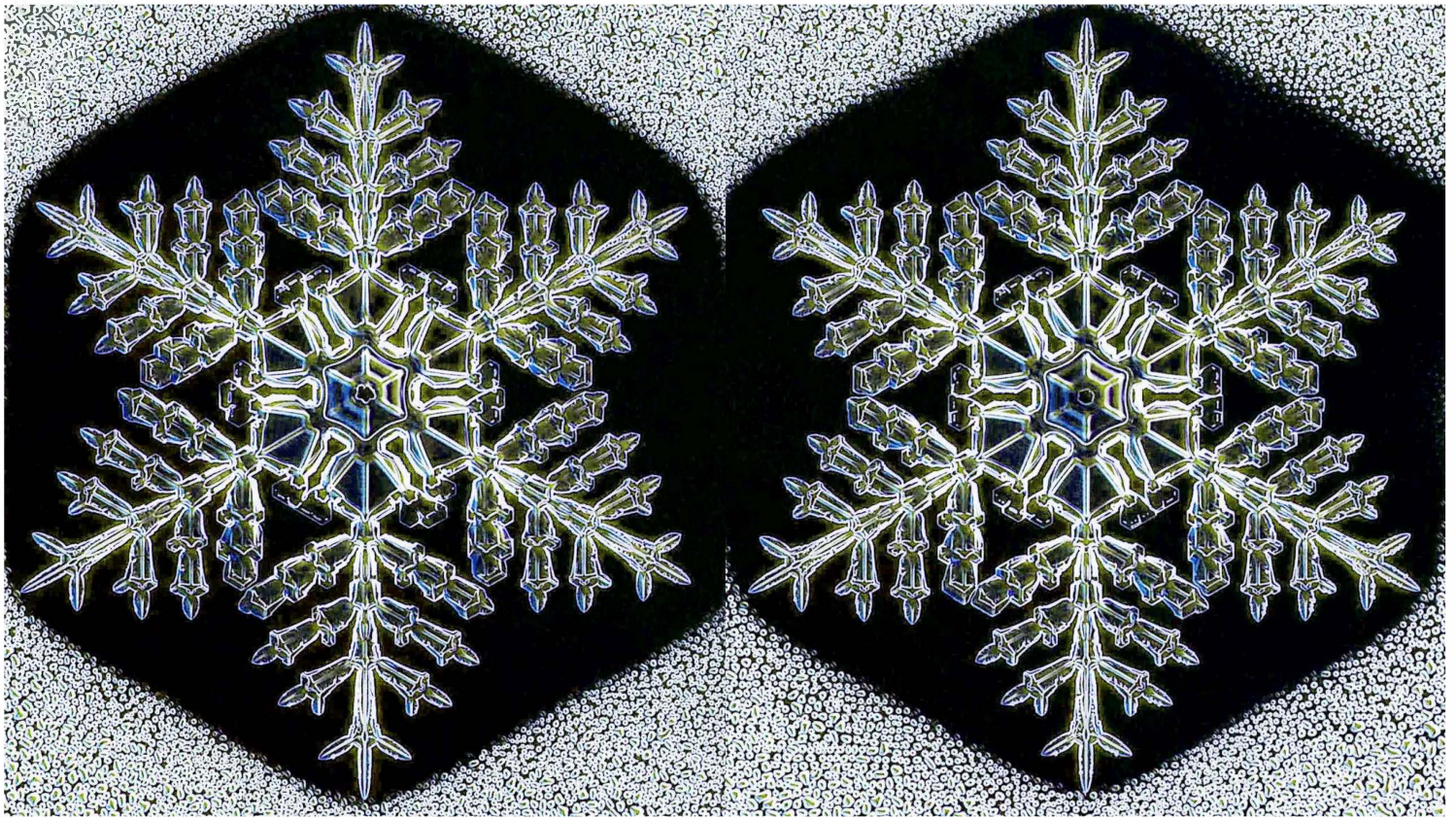
“I started calling them identical twins because they are like identical people,” he said. “They are too similar to just happen by chance, but not absolutely precisely identical to the last molecule.”



Grown side by side under identical conditions, these two twin snowflakes are nearly indistinguishable. Kenneth Libbrecht

Dr. Libbrecht has been growing snowflakes in sunny Pasadena, Calif. — where snow falls very rarely — using a laboratory chiller and sapphire glass for two decades, though he only struck upon the recipe for identical ones last August. By adjusting the temperature and humidity he can manipulate their designs, creating a vast array of patterns. He photographs them with the help of a photomicroscope that is specially designed to capture tiny snow crystals. Negative 10 degrees Celsius creates frozen flowers with flat plates. At minus 2 degrees Celsius he can make triangular snow crystals. If he grows the crystals under high humidity levels, eccentric side branches emerge.





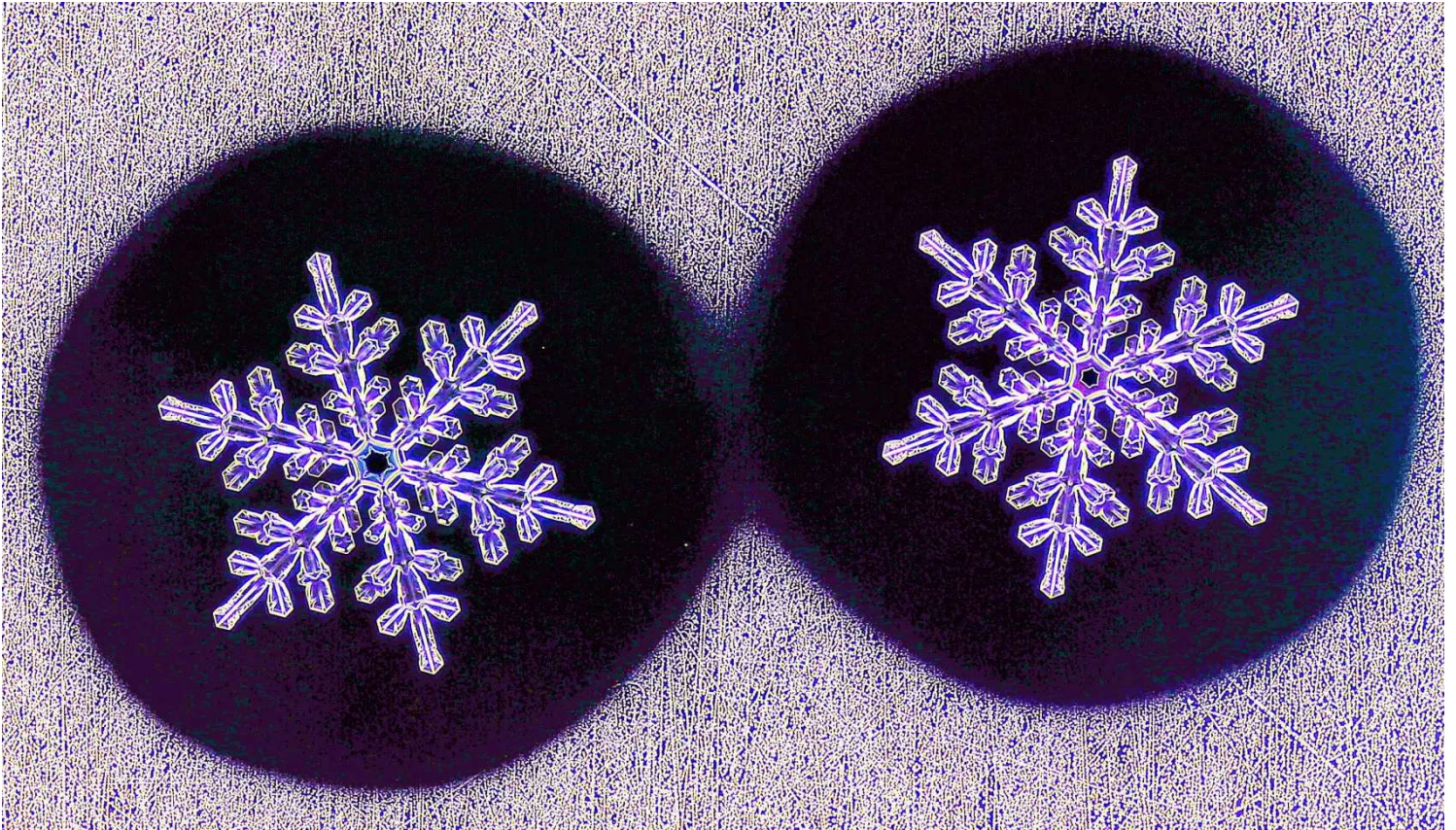
Twin snowflakes, grown from crystals under the same temperature and humidity conditions, surrounded by water droplets.  
Kenneth Libbrecht

To his surprise he found that lab-grown snowflakes don't actually grow along the glass surface that they are placed on. Instead they sprout more like mushrooms with microscopic nubs that support flat pedestals of ice. His synthetic snowflakes can take between 15 minutes and an hour to grow.

"We haven't violated any laws of physics," he said of his "identical twins." "We just found a loophole."

You can see more of Dr. Libbrecht's snowflakes on his website **SnowCrystals.com** and in his latest book, "The Snowflake: Winter's Frozen Artistry."





The identical twins start as seed crystals and take anywhere from 30 to 40 minutes to grow. Kenneth Libbrecht