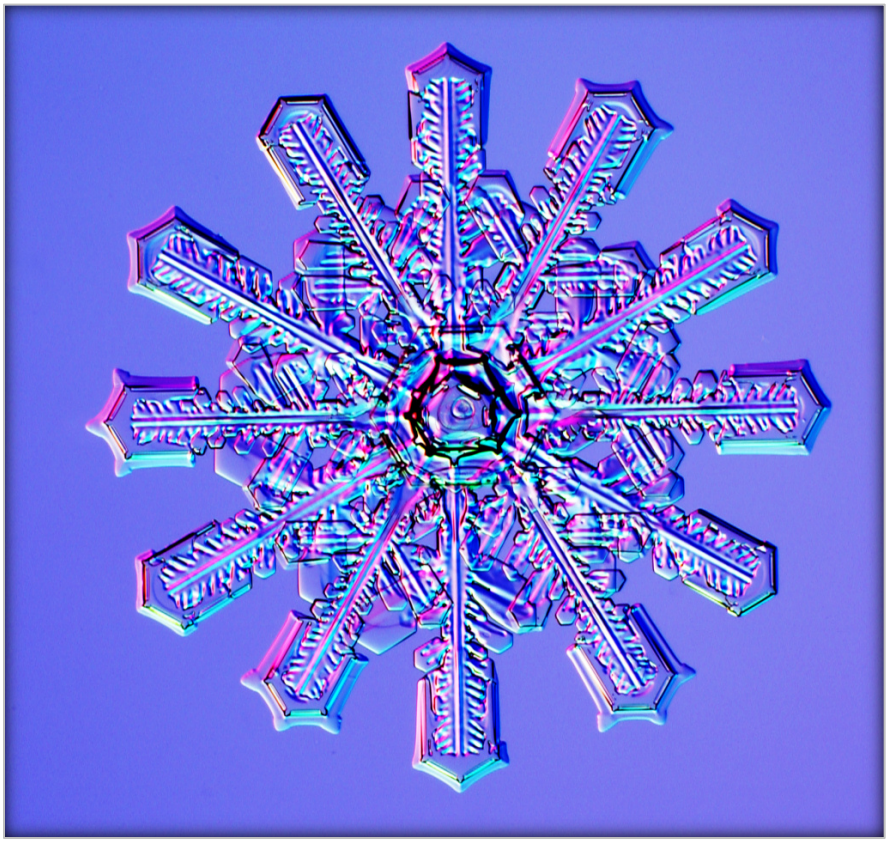
Dr. Kenneth Libbrecht, Scientist and Artist



K. Libbrecht. A twelve-branched snowflake photographed in Ontario, Canada.
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Kenneth Libbrecht is a snowflake designer. He is also a physicist, working at the California Institute of Technology (Caltech). These two interests merge in his study of the molecular dynamics of snow crystals. World-renowned expert on this topic, Libbrecht has authored several popular books, which include *The Snowflake: Winter's Frozen Artistry, The Secret Life of a Snowflake, The Art of the Snowflake* and *Ken Libbrecht's Field Guide to Snowflakes*. His snowflake art has adorned four 2006 US stamps. And he was the snowflake advisor to the movie *Frozen!* Libbrecht has graciously permitted us to share one of his images on the cover of the issue.

Winterless California seems an unlikely place to study snow, but Libbrecht's work is enabled by technology. He grows snowflakes in a vapour diffusion chamber or a convection chamber and then photographs them with a photo-microscope. In his lab, Libbrecht continues work begun by earlier researchers, such as 17th century German scientist Johannes Kepler, 20th century photographer Wilson Bentley of Vermont and physicist Ukichiro Nakaya of Japan.

Libbrecht explains that a snowflake is a snow crystal, a six-sided structure that emerges from the hexagonal orientation of a frozen (solidified) water molecule. And he notes that the lacy, symmetrical beauties that we call snowflakes are just one form that ice crystals can take. Libbrecht has developed a 35-type taxonomy of snow crystals—according to which, the snowflake appearing on the cover of this issue is a stellar dendrite.

Libbrecht has wondered why different kinds of snow crystal forms emerge under different environmental situations. His lab equipment has helped him to regulate crystallization conditions, and thus, to observe and to predict the kind of snow crystal that will emerge. He notes that it is because crystallization conditions in the wild are innumerable, and continually and adversely shifting, that snowflake shapes are endless—and often imperfect.

Artistically, Libbrecht's knowledge also enables him to design snow crystals, and to try to perfect them by controlling growth conditions. He has also worked with creating twin snowflakes—proving that two snowflakes *can* be alike, if their growth conditions are rendered identical.

Find out more about Libbrecht and about snow crystals on his website, SnowCrystals.com, and in the fascinating video about this artist-scientist produced by the STEM education organization Brilliant. These works provided the material from which this statement was composed.

Holly Tsun Haggarty, Lakehead University