

# Conversations with Snow and Ice

observation/imagination in art and science

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Snow, lying in pure white fields, is one of the many forms taken by water, a substance basic to nature. We see the harshness, the gentleness and the beauty of such a scene and it moves our sensitivity and imagination to create new fairy tales, new poems, new stories and new works of art.

Since ancient times, we have continued to ask questions about the mystery of this world of white. We see this in *Meteorologica* by the ancient Greek philosopher Aristotle. The Roman poet Titus Lucretius Carus, a proponent of the ancient Greek atomism, talked about snow in his *On the Nature of the Universe*. The Renaissance giant, Leonardo da Vinci, in his fragmentary *Notebooks* gives his thoughts on the formation of snow.

Everyone now knows what the geometrical patterns of snow look like, and historically these were described, though quite simply, a long time ago in China, as early as the 2nd century B.C. That type of description was not made in the west until the middle of the 13th century, and recorded observations and sketches based on visual sightings came around at last in the middle of the 16th century and those by Olaus Magnus (1490–1557) are considered to be the world's first. From then on, modern natural science moved forward in experimentation and observation, and the invention of the microscope as an observational tool allowed the view of snow crystals to become ever more accurate, with sketches frequently augmented by the observer's imagination. Then, with the invention of cameras and advances in photographic technique, many records were made throughout the 19th century of snow crystals as a part of meteorological research. In 1931, Wilson A. Bentley gathered together a giant collection of photographs of snow crystals that were not as much scientific observation as demonstration of the beauty of snowflakes.

The Japanese experimental physicist, Ukichiro Nakaya (1900–1962) through his scientific studies on snow and ice helped develop glaciology into an internationally prominent field science. Born and raised in Japan's deep-snow country, his memories of childhood together with fascinating beauty of Hokkaido in winter, which he was later exposed to, became the basis for research in his adult life. From the time he was a student, the influence of Terada Torahiko, who mentored him in the diverse aspects of modern physics, most importantly, complex systems, developed in him the wide-range sensitivity of an experimental physicist, and cultivated in him the knowledge that science was something close at hand. He experimented with the scientific classification of natural snow crystals and was the first in the world to successfully produce artificial snow crystals. Nakaya's insatiable search led eventually to his studies on ice crystals, which ties in with the studies of environmental problems the Earth faces today. He gained a deep insight into the role that science has to play in society and tried to educate the public on the role.

Nakaya said, "Science is a collaboration between humans and nature." This means that the basis of science definitely lies in confrontation with deep aspect of nature, and in accumulation of solid observation with rich imaginative powers, and also in a thirst for beauty. His famous phrase "Snow crystals are letters sent from heaven" is, at first glance, a poetic expression, but it is permeated with the daring inference and imagination of his methodology for relating atmospheric conditions far above the ground with the snow crystals observed on the earth's surface. Here, the road to truth in science is not merely a mechanical operation to analyze logically an accumulation of facts and observations. The importance of intuition and imagination in the trail leading from observation to hypothesis and to a framework of new thought is something that is similar to the creativity seen in a process of artwork creation.

This exhibition follows the trail of a scientist who has confronted the extremes of nature in snow and ice, and tries to show that his observations and imagination have led to a longing for the beauty of nature by an abiding interest in the generation of "form". The creations of contemporary artists that are on display in this exhibition have been inspired by the attitude, methods and results given by Nakaya in his approach to science. They are, in that, an homage to his work.

Carsten Nicolai has the audience participate in reproducing the artificial snow crystals made by Nakaya. Shiro Takatani has created new images from the photographs of snow crystals that Nakaya has left with us. Fujiko Nakaya, his daughter, has taken up the challenge of reproducing the form without form with artificial fog instead of her father's artificial snow crystals. Yutaka Sone has recrystallized Nakaya's snow crystals in marble. Thus, each of them has taken the observation and imagination left by Nakaya and developed them into diverse art works. We can also understand here how it is that the ice core project stands at the cutting edge of science and how it is now carrying on with Nakaya's work.

In modern times, science and art have each become specialized and they bifurcated, and while science has taken itself beyond the classical view of nature, that relationship is being rethought at the leading edges of science and art. More and more, people today are talking about art and science having the same root, or being complementary human undertakings. However, the contemporary world is one of forward moving technology and there is a fear that, within it, the basis for the universal human endeavors of observation and imagination is withering away. This exhibition will allow us to search for clues in the reevaluation and reconstruction of that basis and to develop a new world of empathy and beauty.

(From the catalogue of the exhibition)