would sink underwater and accumulate in cold dark chunks at the bottom of our water sources, unable to be warmed and thawed by the rays of the sun in spring. The plants and animals of the water would be frozen, and the accumulating blocks of ice could plunge much of the world into Ice Age conditions.

Another marvel of frozen water is the formation of billions of snowflakes, no two of which are exactly alike. These softly falling flakes can be austerely simple or intricately complex. Many are shaped like six-pointed stars, others are in the shape of six-sided prismatic columns or thin geometric plates. Each shape depends on the temperature of the atmosphere in which the individual flake was formed.

These cool fragile flakes accumulate into an efficient insulation material—blankets of snow, warm cover indeed for sleeping plants and protection for the grouse and other wildlife creatures seeking shelter from freezing nights.

Snow Keeps in Warmth

This overcoat of snow keeps in the warmth stored up in the earth during summer, mainly because innumerable tiny cells or pockets in the airy snowflakes hold the air prisoner and virtually eliminate the escape of heat into the atmosphere. For example, a thermometer registering 27 degrees below zero F. in the open air when plunged about seven inches into a snow drift showed a temperature 24 degrees above zero—a difference of 51 degrees.

Winter is the growing season of millions of other ice forms—those fragile fern shapes and fairy gardens that spread across the window panes, the frost flowers that bunch up along a frozen path, the frost columns that push up mounds of soil into tiny pillared caverns and sugar-like edgings around fallen leaves, dried seed pods and rocks.

Winter is the season when stars in the frosted sky seem most brilliant, when they seem to swing so close to earth that they become caught in the branches of trees, forming ornaments on outdoor Christmas evergreens more beautiful than man could ever make.

Perhaps the stars seem more brilliant because no foliage hinders our clear view of the winter sky, or perhaps because the cold air is so dry and hence clear at this season. But mostly it is because the richest region of the heavenly constellations is in full view on winter evenings. There is mighty Orion, the warrior, with the three stars of his belt. The Great Square of Pegasus, the winged horse, fills the sky. Cassiopeia, the queen, sits on her broken throne in full splendor. Across the sky flows the Milky Way, brilliant in the frosty air.

Now the North Star shines in bright radiance, for centuries considered the steady guiding star around which the whole bright firmament seems to rotate. Yet even this star is not constant, as the earth tipples and wavers through the ages. Thousands of years ago, the constant star was Thuban, one of the bright stars in the Dragon constellation, toward which the low doors of the Egyptian tombs were pointed. In another 12,000 years earth's constant star will be Vega in Lyra.

It was into this radiant December sky that, nearly 2,000 years ago, a "star" of surpassing beauty appeared, and seemed to hover above a manger in Bethlehem.

For centuries, astronomers have been asked to account for this light that led the Wise Men to the Messiah. They have made many suggestions. Some say it was a comet, others a supernova, a brilliant meteor or an unusual configuration of planets.

Whatever it was, it forever remains in Christian thought as a beloved symbol of Christmas, a symbol of light, returning life and hope for Peace on Earth.

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CHEMISTRY

Gel Aids Crystal Growth

➤ A NEW METHOD is being added to the large number of techniques already at the disposal of the crystal-growing technologist: crystal growth from gel.

It is under development by Dr. Heinz K. Henisch, professor of applied physics in the Materials Research Laboratory of the Pennsylvania State University, and Dr. Rustum Roy, professor of geochemistry and head of the laboratory. The method is especially suitable for use with some of the materials which defy established growth processes, such as those which resist all plausible solvents or cannot stand heat.

In its basic form, the gel method is simple enough to find a place in high school science fairs. It depends essentially on the diffusion and reaction of chemicals within a silica gel. A simple form of gel can be made by adding acid to commercial "waterglass."

Under proper control, the process yields crystals of high optical perfection. Some had never been seen and studied before; others, though known, have been grown in larger sizes and greater perfection than hitherto possible.

Among the materials investigated thus far are lead iodide, lead hydroxyiodide, mercuric iodide, various thallim iodides, lead sulphide, calcite, aragonite, silver oxalate and a variety of tartrates and citrates, all in pure form or with controlled additives of various elements which modify the crystal properties. Several show light sensitive electrical properties which may be of practical interest.

For many years the growth of artificial crystals of a great variety of materials has been important in the electronics industry.

The gel used is, in effect, a three-dimensional network of quartz which plays no important chemical part in the reaction. Because it is jelly-like, it yields to the growing crystals and permits them to grow without external restraint. The gel also prevents turbulence which is often a disturbing factor when crystals are grown in a solution.

Before a crystal can grow, it must "nucleate" or form a center core on which new layers can be deposited. Light can influence nucleation. Growth tubes kept in darkness develop few crystals.

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