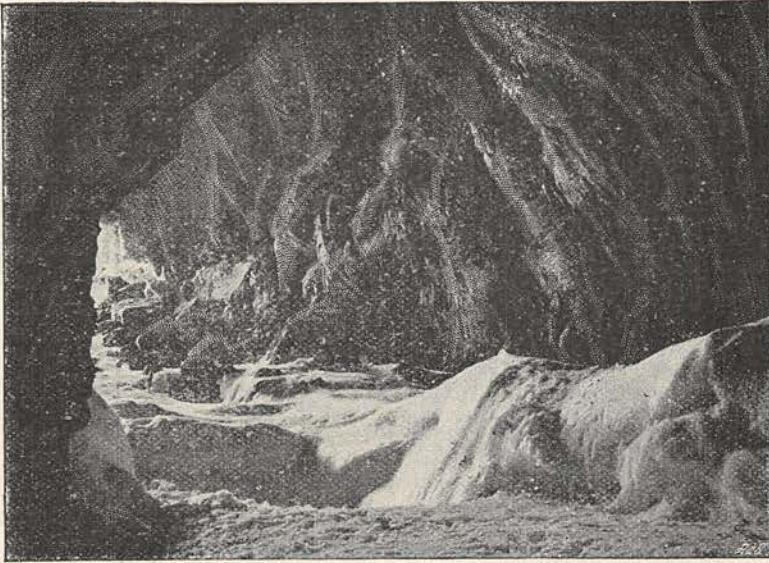


JACK FROST AS AN ARTIST.

BY J. MUNRO, C.E.

(Illustrated from photographs by Dr. Karl Grossmann.)

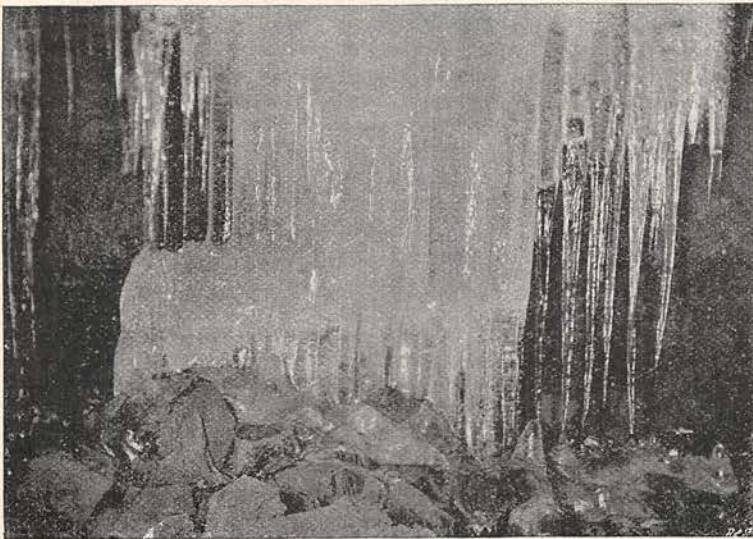


ENTRANCE TO ICE-CAVE, SURTSHELLIR.

(Taken from inside; daylight.)

THE day is cold and wintry—much colder than it has been of late—and the sky is thickly overcast with dull grey clouds, here and there tinged with brown. Afternoons are getting short

now, for it is late in the year, but this afternoon is all evening, and seems trying to pass for the "shortest day." We have a vague sense that something is in the air—something is going to happen—and we say to each other: "I think it will snow." Old memories of other days like this in the past are dimly haunting the corners of even the busiest minds. Thoughts of Christmas warm the hearts of grave and practical fathers in the City, as they pore over their ledgers, driving them to the booksellers to purchase tales of adventure in the Hudson Bay territories for their boys, and wiling them home by an earlier train than usual to their cosy firesides in the suburbs. Next morning they look out of their windows, and behold!—a miracle in the night. The



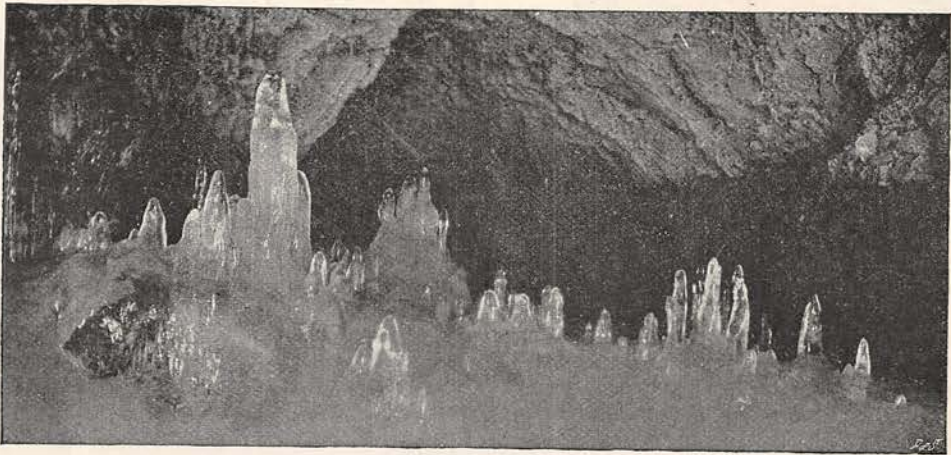
ICE STALACTITES, THE "ICE ORGAN," SURTSHELLIR.

(Taken by magnesium flashlight.)

familiar—sometimes too familiar—face of the world has been transfigured by a mask of white and glistening snow. Jack Frost has been at work.

Or, perhaps, the day has been clear and cloudless after the rains, and the wind has fallen, but the evening is chilly, and a white fog hides the stars. Next morning, behold—another miracle! The weather is bright, and every tree and shrub and blade of grass has blossomed during the night into hoary crystals that sparkle in the sunshine; every alley in

ice, hail and hoar-frost, are merely different forms of solid water, and frost may be regarded as the degree of cold which produces them. When water is at the ordinary pressure of the atmosphere it freezes at a temperature of 32 degrees Fahrenheit, which is called the "freezing-point." A sheet of water cooled by radiation to this temperature freezes on the surface into a floor as smooth as glass, for the enjoyment of the skater above and the protection of the fish below. Sometimes the cold is so intense as to freeze the water on the



ICE STALAGMITES IN SURTSHELLIR.

(Taken by magnesium flashlight.)

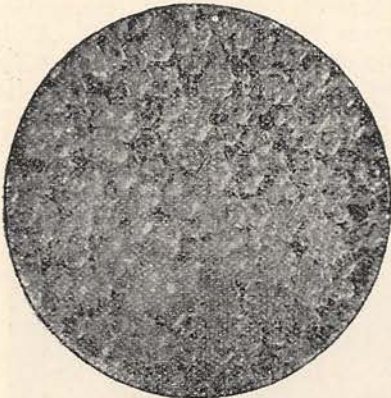
the copsewood has become like a bower of ivory and diamonds in some enchanted palace of the "Arabian Nights." Again Jack Frost has been at work.

Who is this wonderful artist that comes in winter to decorate the dismal earth with ornaments like those of Flora in the summer? Our Scandinavian ancestors regarded him as a demon. "*Frost*, the old Norse Seer discerns to be a monstrous hoary Jötun," says Carlyle; the Giant *Thrym*, *Hrym*; or *Rime*, the old word, now nearly obsolete here, but still used in Scotland to signify hoar-frost. *Rime* was not then, as now, a dead chemical thing, but a living Jötun, or devil: the monstrous Jötun *Rime* drove home his horses at night, and sat combing their manes—which horses were *Hail-Clouds* or fleet *Frost-Winds*. His cows—no, not his, but a kinsman's, the Giant Hymir's cows—are Icebergs. This Hymir "looks at the rocks with his devil-eye, and they *split* in the glance of it." The old Jötun, like the old gods, has been dethroned and sunk to the level of a plain "Jack"; but even this popular title is dying out, for science has robbed him of his personality. Snow and

bottom and form "ground ice," or to fill the body of it with a slush of crystals, as in the case of "anchor frosts." Water expands in freezing, and hence we occasionally see pillars or tablets of a fibrous ice, not unlike spun glass or gypsum, rising from the pores of the ground, or—as I have observed near London—enamelling the chalkstones. This kind of ice is probably akin to the little flags or banners of ice which furl from the cracks in the dry stems of "frost-weeds," such as the Canadian *Helianthemum* or the *Cunila Mariana*, and are probably caused by the water rising from the root of the plant. They are sometimes two or three inches long, and prettily striped with clear and opaque ice.

We are familiar with the beautiful chasing of thin ice on our window-panes; but we are not so well aware that Jack Frost is also an artist of the pavement. Some of his "frost ferns" on the London flagstones during the winter of 1892 were of the most elegant device, and nearly 2 feet long. Such arborescent figures appear when the ordinary right-lined crystals of ice are not free to form, but constrained by mud in the water, or some

other cause, and they are remarkably like the "dendrites" observed in moss-agates, and the crystals of metals formed by the electric current in solutions of metallic salts. Icicles



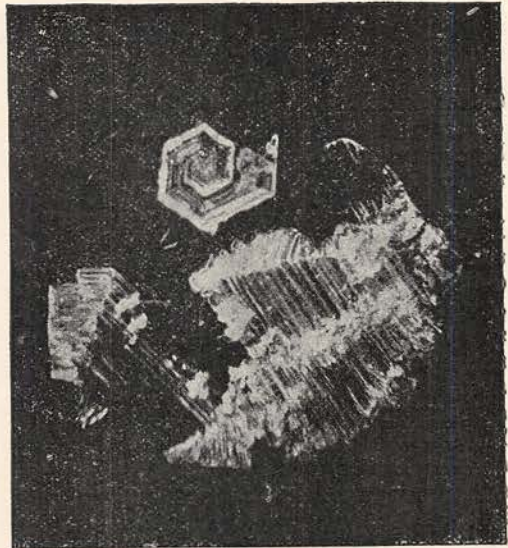
NATURAL HOAR FROST UNDER ICE CRUST.
(Microphotograph, showing hexagonal hopper crystals.)

are formed on the eaves of houses and elsewhere by a drop of water freezing and other drops trickling over it. At Surtshellir, near the Eyriksjökull, Iceland, there is a cavern in the lava about a mile long, and terminating in a chamber 30 feet high, which contains a number of fine stalactites and stalagmites of ice, for the views of which I am indebted to the courtesy of Dr. Karl Grossmann, of Liverpool, and Dr. Cahnheim, of Dresden. The stalactites, called by them the "Ice Organ," hanging from the walls, and also the stalagmites rising from the floor have been formed by water percolating through cracks in the roof of lava.

"Silver thaw" is the poetical but inapt name for "glazed frost," the *verglas* of the French, and *glatteis* of the Germans, which occurs when a warm humid wind passes over ground at the freezing-point, and deposits its moisture in a sheet of ice. A fall of rain enhances the effect; and sometimes trees and buildings, as well as the ground, are coated with clear ice. It also happens when rain has been cooled down to, or below, the freezing-point in falling through a stratum of cold air, and strikes on the solid earth beneath. Sometimes the drops freeze instantly into flat pastilles, or icicles, and that when the solid body is moderately warm, especially if it be a woollen stuff. A forest thus encased in ice and flashing in the sun, or moonbeams, as though it were strung with diamonds, is, indeed a beautiful, but rare sight; and the skeleton limbs rattling in the wind make an eerie sound by night. Occasionally the coat of ice is thick enough to break down the branches of trees or the wires of telegraph

lines. In January, 1879, for example, a *verglas* occurred in France which played much havoc with the trees of Paris, and cost the municipality a million francs. In the Department of the Loire, trees were not only stripped of their branches, but uprooted, and their trunks were split from top to bottom. A forest was so far denuded as to look like a plantation of masts. One twig of a lime-tree, 4 inches long, and weighing $7\frac{1}{2}$ grains, was coated with 920 grains of ice; a single leaf of laurel weighed 1,120 grains; evergreens were turned into blocks, and fir-trees into pyramids of ice resembling the crystal pagodas of China.

Rain is now and then frozen ere it reaches the ground; and one case is reported in which the ice-drops were clear, and fell both singly and in fantastic clusters. They are supposed to have passed through three layers of air—two below the freezing-point, and an intermediate one above it. Frozen rain is not to be confounded with hail which has a crystalline structure, and often occurs with thunderstorms. Hailstones are sometimes conical, ring-shaped, and spiked or nobbled, as well as round; and red or blue, from salts of nickel or cobalt, as well as white. They have also been found to contain the spores of plants, and one fell not long ago with a living turtle inside. We can hardly credit the legend that



ARTIFICIAL HOAR FROST: HELIX-SHAPED HEXAGONAL CRYSTAL.
(Microphotograph.)

in the reign of Tippoo Sahib, a hailstone as big as an elephant fell in Seringapatam, and took three days to melt, but they sometimes adhere into masses when they fall. It is stated, however, that hailstones as large as

cricket balls fell at the Cape during a sharp storm.

When he is in a particularly happy turn of mind, Jack Frost is known to deck the reeds and rushes of a lake or pond with sparkling bells of ice. These "frost-pearls" are formed by the tip of the rush or blade of grass bending down into the water as the breeze ruffles its surface, then rising into the cold air and letting the water freeze into a globule.

The air near the surface of the earth is charged with the vapour of water, which condenses as it is cooled into ground mist or fog. At the temperature of the "dewpoint" it liquefies into "dew," but at 32 degrees Fahr. it passes directly into the form of crystals. These are known as "ground frost" when they are formed from the vapour rising out of the ground or vegetation, and "hoar frost" *par excellence* when they are deposited from a damp mist saturating the air. Ground frost needs a calm atmosphere for its production, and is often seen in hollows; whereas hoar frost is longer on the side next the breeze that feeds it with vapour.

The crystals of ground frost are often needles, six-sided tablets, and prisms or

branching growths of ice. Beautiful hollow or skeleton crystals have been found by Dr. Grossmann, sparkling on the walls of the cavern of Surtshellir; and in particular a funnel or hopper-like crystal of clear ice, the sides built in steps, and the open mouth turned from the wall. They are called "starvation" crystals, because they appear, where the supply of moisture is limited, on one side, as in ruts of a road covered with ice or on the pipes of refrigerators; and some of them in Surtshellir were two inches long and half an inch wide. Dr. Grossmann and Mr. Joseph Lomas, who recently read a paper on the subject before the Royal Society, have succeeded in producing them artificially, by laying pieces of black velvet or cardboard on the grass.

Hoar frost is sometimes an inch and a-half long near London, but at Yes Tor, Dartmoor, a fringe on the windward side of the Flagstaff six inches long was seen on January 12th, 1885, and the granite of the Tor was clad in a thick white plumage of plates and needles, flake over flake. On Ben Nevis it sometimes grows at the rate of an inch an hour, and completely buries the observatory.



FEBRUARY.

SELDOM has Fashion so favoured the contour of a figure that has lost its youthful slimness as at the present moment. It is acknowledged by all who study the lines of the figure, and everyone to be well dressed should do so, that robe fronts, panels, and perpendicular lines generally impart height, and when judiciously applied, bestow an appearance of elegance to a figure that lacks symmetry. The successful treatment of the widths of material in the back of skirts, set into five outstanding pleats shaped or scalloped at the extreme edge in a becoming fan-shape, increases the apparent height of the wearer, and, being gored off towards the waist, does not add to the width across the back. The sleeves also,

though ample in fulness, slope away from the long shoulder seam, and may be so cut and arranged as not to unduly widen the figure either at the shoulders or the hips, the fulness terminating above the elbow, with lower part tight fitting to the wrist, where either by the addition of a cuff or the sleeve itself is cut to droop slightly over the hand. The most difficult item in arrangement is the bodice; but when an imperative necessity—a well-cut corset—has been secured, success is not impossible. Care must be taken with the form and direction of the seams; for instance, the seams of the curved side-piece next to the back widths should be as straight and long as permissible, and the space across the centre at the waist not less than three inches, the