

THE THERMAL CAVES

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In common with nearly all our volcanic peaks, Mount Tahoma has steam issuing from the crevices in the vicinity of the crater. This thermal region is not confined to the crevices bounded by the rim of the main crater, but extends outside of that circle and includes a small crater which lies west of the main one, together with additional territory to the north of both. Snow and ice have filled both craters nearly full. As the season advances this ice mass gradually settles down leaving a well defined rim ranging in height from twenty-five to one hundred feet. As the center is filled with ice to an unknown depth, no steam can force its way to the surface. The diameter of the large crater is about sixteen hundred feet. The circumference or region of thermal caves would therefore, if confined to the rim alone, extend about a mile in length. The large crater dips down toward the east. It is far from being level, while the small crater dips only a few degrees toward the west. The rims of the two craters meet at the dome of Columbia's Crest.

On the northwest slope of the small crater the steam has melted all the snow off so there can be no caves formed on the outside of the rim for the space of a quarter of a mile. There are, however, some excellent ones within the rim. All around the rim of the large crater are found large dome-shaped caves where the ice is melted by the slumbering heat beneath. As a party approaches the large crater from the south side, these caves are often a source of great danger unless the party is warned by some experienced leader or guide. Often there is only a thin shell of the roof left, through which the novice may fall to the depth below, either to get a very cold reception or a very warm one or perhaps both, depending on the nature of the cavity. When the crater rim is reached, the danger from caves is over so long as the party climbs over the rocks which form the rim. These caves do not extend far on the outside on the south. On the north side the heat is so intense that the

snow is melted off for a long distance down toward North Peak. When viewed from the prairies south of Spanaway Lake this region appears black in striking contrast to the spotless white of the surrounding part of the summit.

The hottest caves are found on the northeast slope of Crater Peak. In one of these ice-water was boiled in exactly three minutes. At times there are passageways for several hundred feet from one large dome-shaped chamber to another. In short, one can pick out a suite of steam-heated rooms adapted to his needs. This is fortunate, for the ascent from the east side is long and strenuous. Here a party can stop for refreshments. On our ascent of the mountain last summer warm drinks, bouillon, etc., were prepared in short order. There is usually a stream of water flowing through some part of the floor. Water also flows from some of the ridges on the roof in such quantity that a cupful can be obtained in a short time. It is folly to pack water up to the summit. It can always be procured in some of the caves if one understands the summit and where these caves are. There is one just east of Columbia's Crest down in the large crater where the writer has passed two nights. There is plenty of water flowing down the slope of the floor, which is rather steep at this point. One of our party had to go down into this cave for a distance of about eighty-five feet after an alpenstock that was accidentally knocked down and bounded into the darkness. We put a rope on the young man while he went after it. After he secured it he rolled stones down for a long distance. We could hear these plunge into a lake or pond. If this were not the real Styx it at least reminded us of the classical description.

There are no deleterious gases nor sulphurous odors connected with the steam issuing from this mountain. Both Mount Baker and Mount Adams belch forth poisonous gases of a sulphurous nature. None of the party felt any bad result from sleeping in these caves. The slope of the crater is always the floor. Sometimes this is so steep that one is liable to slide down, perhaps into the lake above referred to, or at least take several jolts over jagged cliffs which might have an injurious effect on his anatomy. In order to prevent this we drove an alpenstock through the thin shell of ice above the entrance and through into the slanting floor. Our rope was fastened to this. Then each man fastened himself to the rope. Strung out

in this fashion we tried to sleep on the steep angle of the crater. Fortunately there were several large rocks above which we made our beds. We were careful not to push too much against these rocks for we were afraid that they might break loose. Bad as were these conditions the night was passed more comfortably than a night is spent at Camp Muir or Camp Curtis in a cold wind.

Strangers would not think that the small openings under the crust of snow or ice could lead into such large chambers within which several hundred people could find warmth and shelter. At times the roofs of these caves must collapse to the floor, just as the ice caves do where the water rushes out of the end of a glacier. This uncertainty makes a man feel rather uncomfortable when he realizes what might drop on him while he is within. The steam comes quite fast, at fixed intervals like the breathing of a large animal. The steepness of the slope, the danger of collapse, the puffing of the steam, the pitch darkness, and the general hell-like surroundings all taken together make indeed a novel situation which one will remember for a long time.

Near these caves are several kinds of moss and the common liverwort (*Marchantia polymorpha*). These have never been observed in the fruiting condition.

These thermal caves formed between the ice and the crater rim or on the slope of Crater Peak must not be confused with the lava caves which are so common to the south of Mount Adams. The cause of their formation is entirely different. There are no lava caves in the vicinity of this mountain. They are caused by the cooling of the outer surface into a crust while the inner portion remains liquid and flows on, leaving an empty shell often half a mile or more in length. They are more permanent than the thermal caves which have only ice for a roof. These thermal caves vary as the snow varies from year to year. They can only be formed where the steam issues forth and the snow accumulates in such quantity as to form ice.