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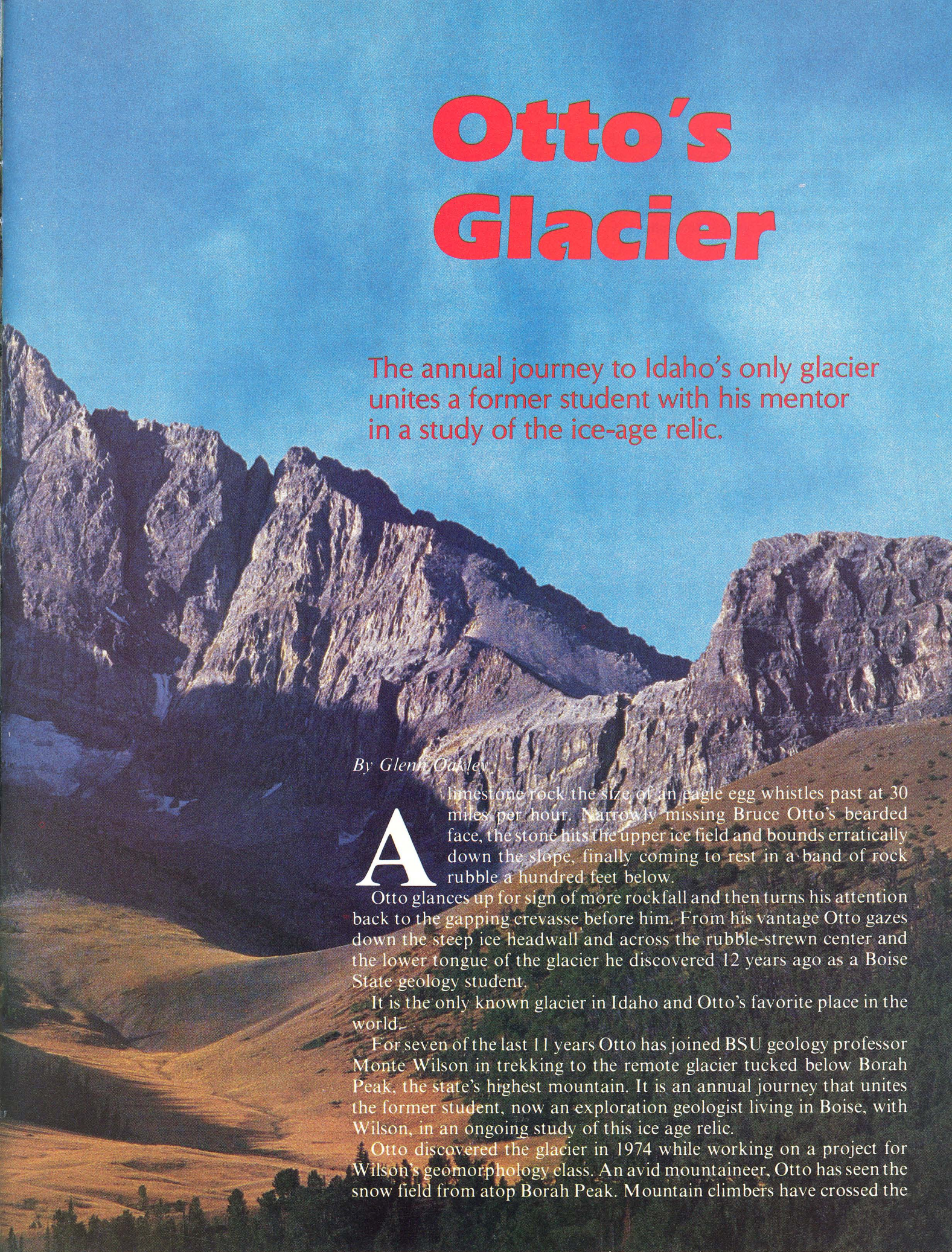
An excursion to Idaho's only glacier

Otto's Glacier

The annual journey to Idaho's only glacier unites a former student with his mentor in a study of the ice-age relic.



By Glenn Oakley

A limestone rock the size of an eagle egg whistles past at 30 miles per hour. Narrowly missing Bruce Otto's bearded face, the stone hits the upper ice field and bounds erratically down the slope, finally coming to rest in a band of rock rubble a hundred feet below.

Otto glances up for sign of more rockfall and then turns his attention back to the gapping crevasse before him. From his vantage Otto gazes down the steep ice headwall and across the rubble-strewn center and the lower tongue of the glacier he discovered 12 years ago as a Boise State geology student.

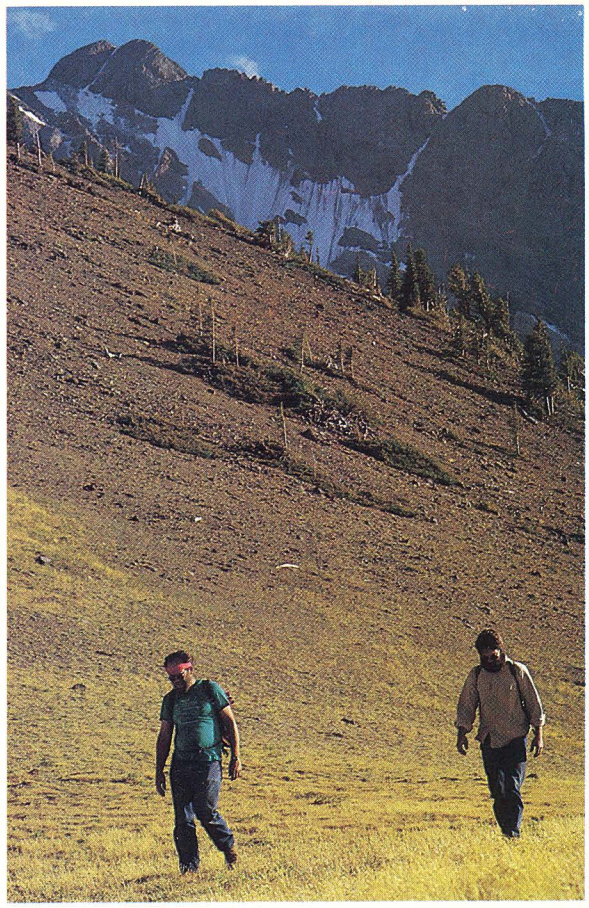
It is the only known glacier in Idaho and Otto's favorite place in the world.

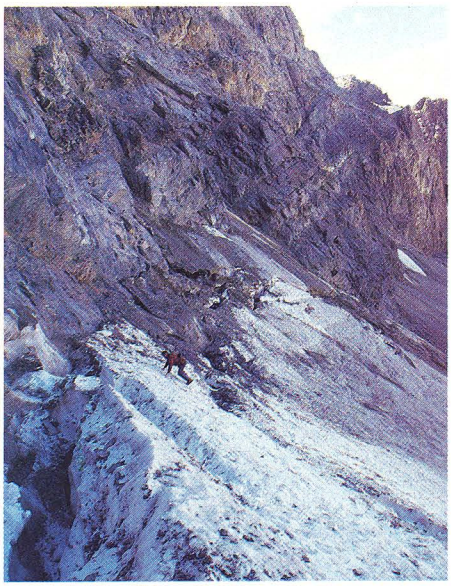
For seven of the last 11 years Otto has joined BSU geology professor Monte Wilson in trekking to the remote glacier tucked below Borah Peak, the state's highest mountain. It is an annual journey that unites the former student, now an exploration geologist living in Boise, with Wilson, in an ongoing study of this ice age relic.

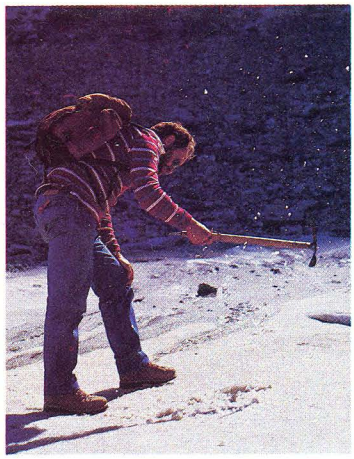
Otto discovered the glacier in 1974 while working on a project for Wilson's geomorphology class. An avid mountaineer, Otto has seen the snow field from atop Borah Peak. Mountain climbers have crossed the

Overleaf: Otto's glacier lies tucked below the walls of Borah Peak, in this view from the northeast. Below, left to right: Bruce Otto climbs to the head of the glacier. Monte Wilson uses an ice axe to dig through snow to the glacier's ice layer. The snow layer remaining at the end of summer will metamorphose to ice, becoming the new ice surface. Otto and Wilson hike back in the late afternoon sun, Borah Peak in the background.

Photos by Glenn Oakley







snowfield for years on their way to climb the northeast face of Borah, but it was considered just that — a snow field. Otto's class project, he says, was to determine how close the snowfield was to being a glacier. But on closer inspection he discovered great black cracks running across the snow field. The snow field was actually ice . . . ice so thick that the entire mass could — and did — flow plastically downhill. Otto had just discovered the first — and perhaps only — true glacier in the state. "I got a lot more than I bargained for," he recalls.

Otto returned to the glacier the following year with Wilson, a specialist in the study of glaciers. Wilson has studied glaciers and their effects on the land in his native Alaska as well as in Canada, the Alps, Iceland, Norway and the coastal ranges of Washington and Oregon.

With the aid of a helicopter provided by the Challis National Forest, they spent over a week on the glacier, installing a precipitation gauge, making micro-seismic soundings to determine ice depth, and measuring length and breadth of the ice sheet. Otto also descended some 150 feet into the bergschrund crevasse where he saw stalactite-like icicles rotated by the movement of the glacier. "It was beautiful," he says. The bergschrund is a German term for a crevasse located where the top of the glacier meets the mountain.

Seismic testing — done by pounding on the glacier's surface with a ten-pound sledgehammer and recording the reverberating sound waves on a seismograph — revealed a maximum ice thickness of 64 meters. The glacier is nearly 300 meters at its widest and 400 meters in length. It has created a massive terminal moraine — the ridge of rock rubble bulldozed to the foot of the glacier — 80 meters in height and 45 meters in width.

From the moraine the glacial ice extends gently uphill, then rises abruptly in a sheet of ice that climbs up against the flanks of Mount Borah. At the base of this ice headwall is the band of rubble, where rocks falling from the mountain have accumulated.

At the very top of the glacial headwall, where the ice meets the bare rock of the mountain, runs the bergschrund. This crack in the ice, five meters to a few centimeters in width, extends virtually across the entire width of the glacier. However, various sections of the crevasse have opened and closed from year to year. The crevasse opens into large rooms within the glacier. It was in these icy rooms that Otto saw the rotated icicles.

In early September Wilson and Otto made their 11th annual pilgrimage to the glacier. Wilson camped at the end of a dirt road that leads up Mahogany Creek from the Pahsimeroi Valley. Striking out early in the morning. Wilson began the cross-country hike to the base on Borah Peak. Otto would arrive later with friends and rendezvous at or near the glacier.

The chill of mountain air quickly gave way to the heat of exertion. Beneath the twisted, barkless hulk of a limber pine Wilson stopped to shed his sweater. Tying a red bandana around his head to catch the sweat, Wilson noted that bore samples he had taken of several trees in the valley below the glacier revealed the trees were 500 years old. The larger trees, Otto would later guess, were perhaps 700 to 1,000 years old. Ancient in human time . . . a brief flicker in geologic time. Wilson believes the glacier is of approximately the same age: 500 to perhaps even a few thousand years old. A warming period known as the hypsothermal, dating from 5,000 to 9,000 years ago, would likely have melted the glacier, according

to Wilson.

Following game trails down steep grades, then working across the tongue of an avalanche chute, Wilson hiked with an eye on the rock. The huge folded layers of sedimentary rock bands that formed the mountains would prove an interesting geologic mapping project, he said. He stooped over to pick up a chunk of dolomite. turned it in his hands and then tossed it back. The series of semi-forested ridges ended at an ancient moraine at the foot of a vast dry meadow.

A high pass at the head of the meadow provided a view of the glacier. "It's really there because of fortuitous location," Wilson said, climbing higher on the ridge for a better view. Shaded beneath the nearly vertical north wall of Borah Peak, only the lower tongue of the glacier ever receives direct sunlight, and then only briefly. The rock face above the glacier is also the primary source of the snow that has created the ice sheet. Otto noted in a 1976 report on the glacier that "avalanche loading is the most important means of snow accumulation on the glacier."

Snow drifting was determined to be the second most significant contributor, with direct precipitation "the least significant." Slab avalanches plummet off Borah Peak and frequently come to rest at the base of the north wall.This accumulation of avalanches, drifting, snow and rain has created a glacier over 200 feet thick.

Dropping over the side of the pass, side-hilling across loose, sharp talus slopes, Wilson descended to upper Rock Creek. This virtually dry stream bed looks as though a hundred bulldozers drove down it. Huge boulders and cobbles are piled sporadically down its steep grade, the product of catastrophic cloud bursts.

In this dry channel of boulders an orange plastic bucket rested, shattered and bottomless. Wilson examined the broken pail and climbed on. Several hundred yards further, resting on a ledge above the stream channel, was what Wilson had feared he would find: the broken remains of the precipitation gauge. Like a long black missile, the finned fiberglass tube lay in two pieces nearly a quarter mile from where Wilson and Otto had anchored it 11 years earlier.

"Sonofabitch," Wilson said quietly while climbing up to the wreckage. Then he picked up a rock, pointed out the fossilized coral embedded in it, and walked over to the broken gauge. Lunching on bagels and cheese, Wilson waited then for Otto and his friends to catch up.

Otto led the way, his ruddy face framed by a thick black beard. "Has Mother Nature been playing games with us?" he called out to Wilson as he clambered up the ledge.

The gauge had withstood the blizzards and avalanches of ten winters, and it had remained intact and upright through the 1983 Borah Peak Earthquake. But one catastrophic avalanche had ripped it from its frame and at least temporarily halted Otto's and Wilson's precipitation study of the glacial cirque. Their initial response was one of interest — plain curiosity in where the avalanche originated and amazement that it had deposited the two halves just a few feet apart after hurtling them so far from the original site.

Then they began to think about where the gauge would be better protected —

"Sometimes I think I'm in geology just to have an excuse to be out here."

Monte Wilson

and how they could replace it. The cost of a new gauge may run a few hundred dollars; but the real expense comes in getting a helicopter to carry the tube up to the glacial cirque.

While the avalanche destroyed one part of the study, it presents an opportunity for a new and different study. Small rocks carried downslope by the avalanche have been deposited on the top of large, flat boulders. As Otto and Wilson note, those boulders were bare the year before. The frequency of such catastrophic avalanches, then, is over a long enough period of time for those rocks to be washed and blown off the rocks. They may well serve as a sort of avalanche clock.

Below the glacial moraine, at 10,000 feet in elevation, Wilson and Otto stopped to collect the fossils of prehistoric sea creatures — brachiopods, crinoids, corals. Casts of the animals were eroded out of the softer limestone in such detail that they could be identified by species. Wilson said he likes to give them to public school teachers for their classroom work.

Five hours after leaving the truck, Wilson climbed down the moraine onto the snow-covered tongue of the glacier. Crusted snow flew as he chopped into it with an ice axe. This snow would become part of the glacier, metamorphosizing into ice. But the headwall of the glacier — the steep ramp climbing up the face of the Borah Peak, was clean of snow. Its surface was hard gleaming ice. The avalanches of the previous winter had done the opposite of all previous years. Instead of depositing snow against the headwall, avalanches had carried snow away from the glacier. "The glacier doesn't look healthy this year," Otto commented.

Still, he noted that the events of one year were probably insignificant in the life of a glacier. Wilson says their research indicates the glacier for now is static. "What we've found is there isn't any profound increase or decrease." The ice mass increases some years, decreases other years.

Aside from detailing the life of the glacier, Wilson notes that the ice mass can serve as a barometer of climatic change. Trends in glacial growth or shrinkage might give credence to whether the greenhouse effect (of pollutants warming the earth by creating a thermal tent) is occurring or whether the next ice age is upon us. It may take years of study, involving geologists not yet born, to gather enough information to determine trends in the ice sheet, says Otto.

Wilson and Otto strapped crampons onto their boots and climbed the headwall, the sharp steel cleats spitting sparks of ice. At the top Otto climbed into the maw of the bergschrund crevasse. "When I was here before," he said, placing his hand against the ice, "I could feel the glacier move. I could feel the vibrations."

At the end of the day Otto and Wilson are hiking back across the open meadow, the late sun slanting golden. The discussion is of rocks and ice — and of a cold beer waiting at the truck. They pause at the crest of the ancient moraine, two miles from the glacier. "Sometimes I think I'm in geology just so I have an excuse to be out here," says Wilson. Otto agrees. "I belong in these mountains," he says. They look back toward Borah, then hike into the trees, leaving the glacier until next year. □