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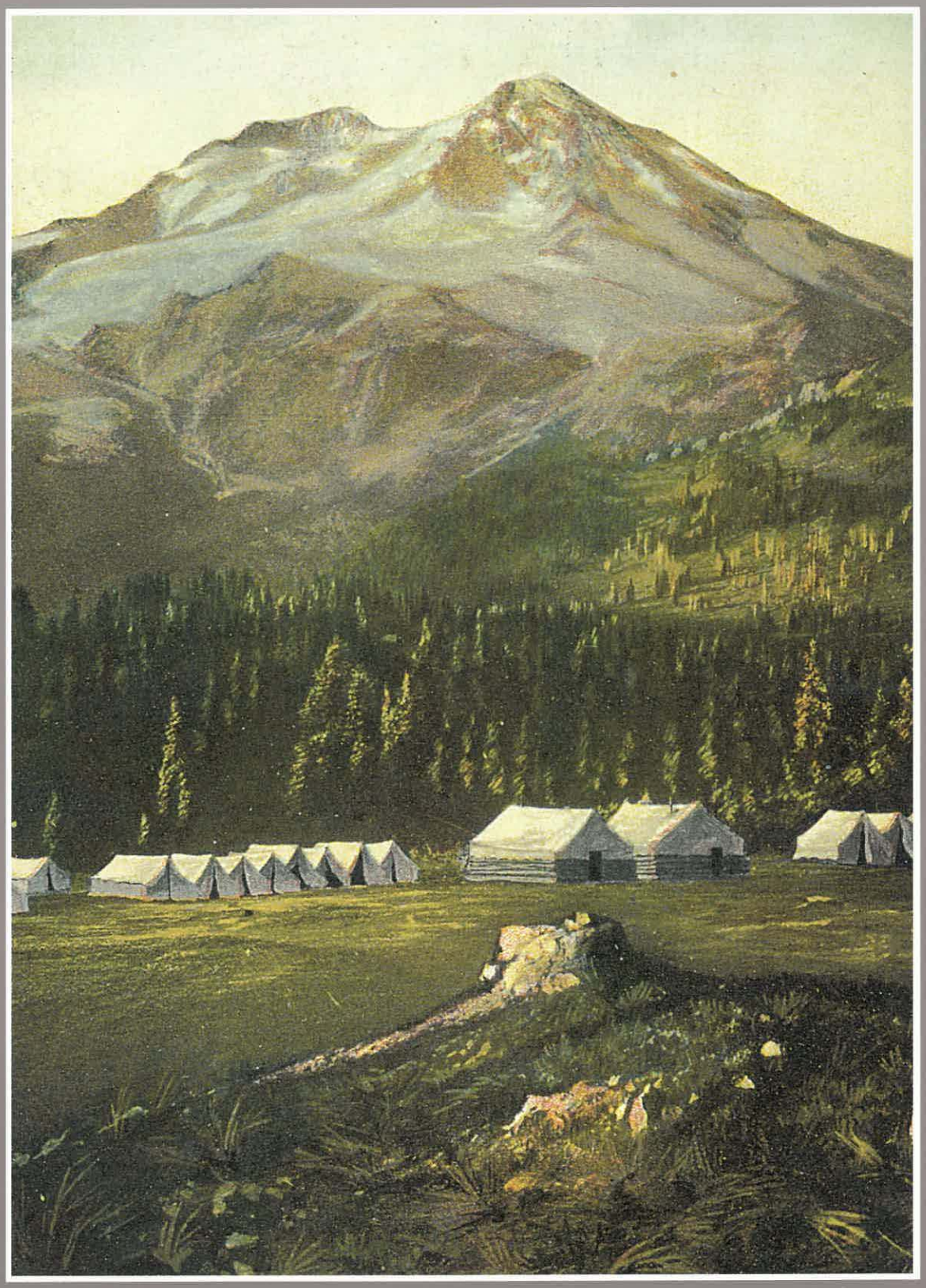

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The Glaciers of Mount Rainier—Cold, Cruel, Magnificent

BY RUTH KIRK

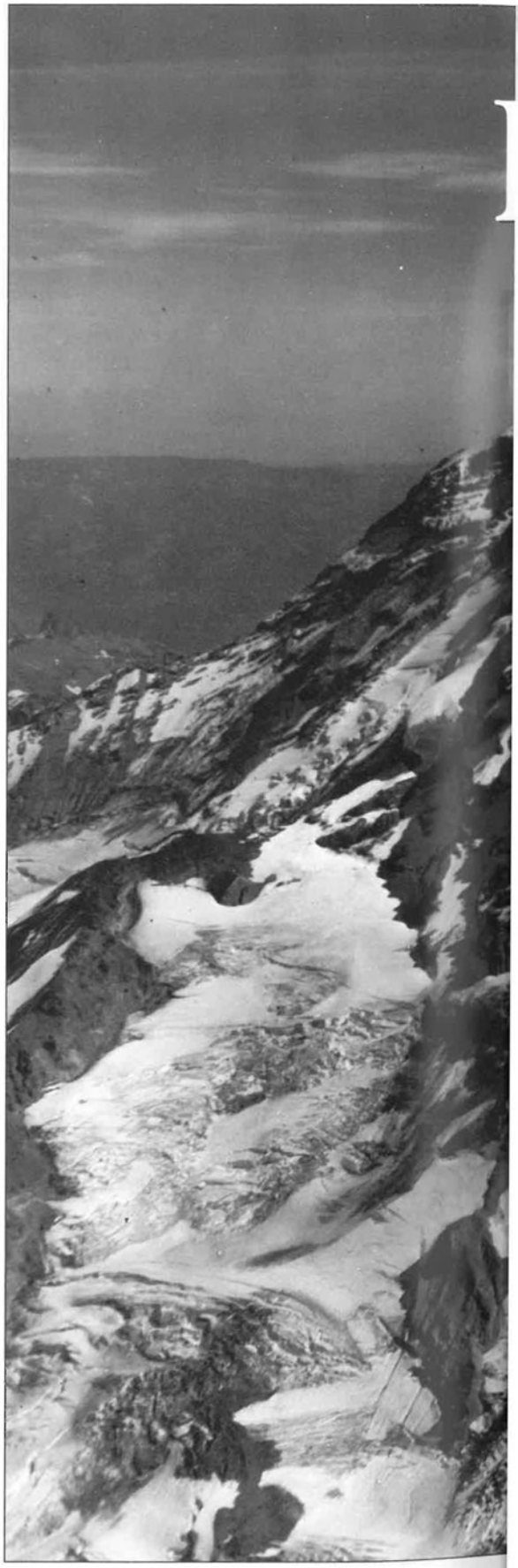
MOUNT RAINIER'S GLACIERS furnish the routes climbers use to reach the summit, today as in the past. Touted by railroad companies, they attracted tourists even before the national park was established. And they provided a major reason scientists urged national park status for the mountain in 1899.

"It would be a matter of interest to the Mazamas to contribute to the solutions of the problem of variation of glaciers by observing and recording the changes which occur among the glaciers of Oregon and Washington." So wrote glaciologist Harry Fielding Reid in the 1903 journal of the Mazamas, a Portland outdoor club. At the time, many Americans assumed that trips to the European Alps or the wilds of Alaska were the only way to see true glaciers. Yet Mount Rainier had 28 named glaciers (now dwindled to 25, owing to melt). Firsthand accounts of journeys to see the mountain's ice easily commanded attention in Puget Sound newspapers. The *Tacoma Daily Ledger* for June 23, 1883, described the impressions of a distinguished party that included United States Senator George Edmunds, Northern Pacific Railroad Vice President T. E. Oakes, and Western Division Assistant Manager J. M. Buckley. They had gone up the Carbon River valley, and they remarked on the vast forest they passed through and the house of Bailey Willis, "dimensions 15 x 30 x 9, built from the butt of one cedar, which tree was only one of many in the immediate neighborhood." But it was the ice that held their full attention. Indeed, the report concluded, the men all "agreed without a dissenting voice, that there was not a scene comparable to those glaciers [anywhere else] on this continent.... They would not have missed the trip for ten times the amount of fatigue entailed."

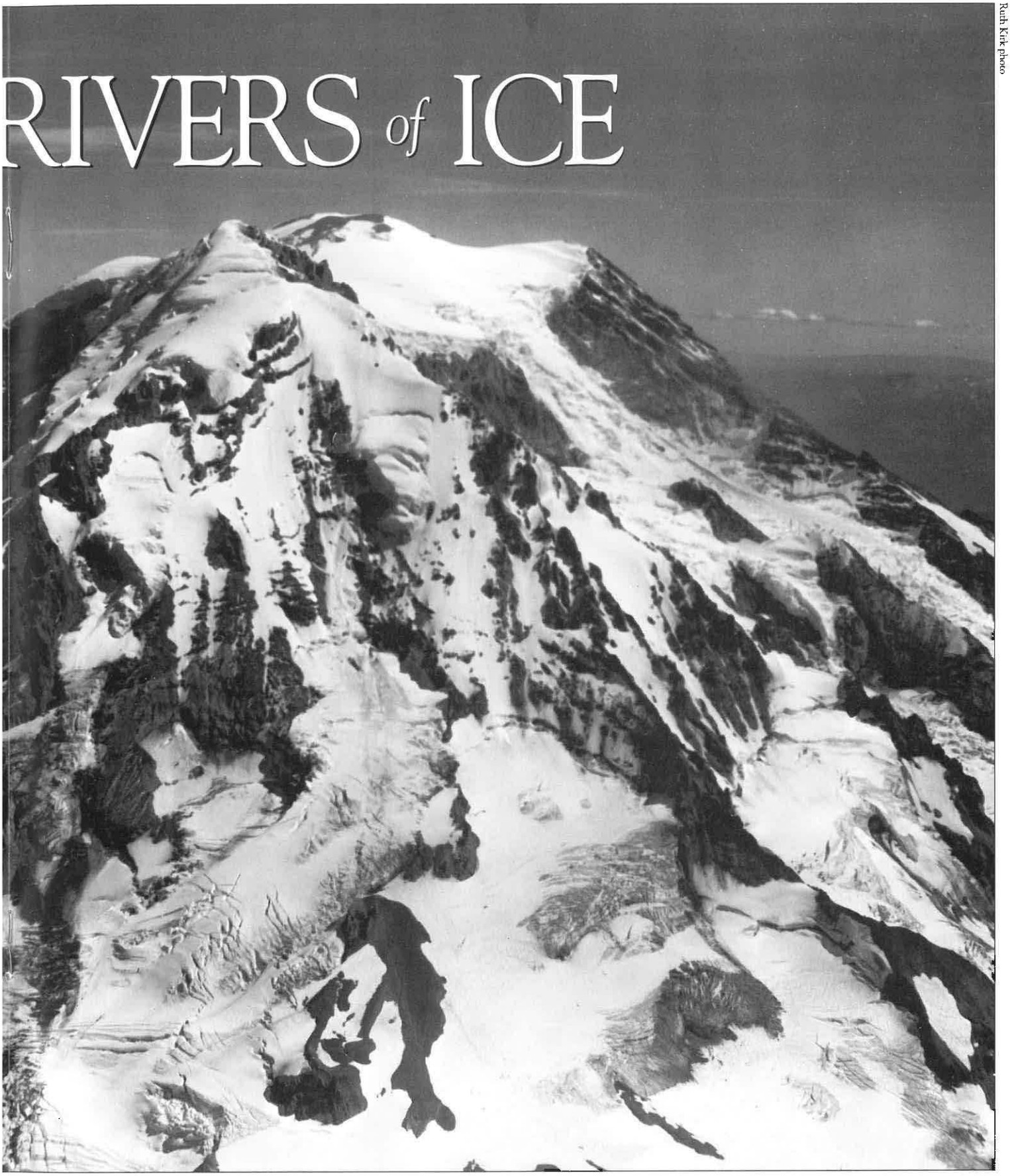
Sixteen years later the glaciers were a major reason for establishing the mountain as a national park, and they would remain its most touted feature for years. The *National Park Portfolio*, published in 1916 by the Department of the Interior to promote tourism, focuses most of its Rainier text on glaciers. It barely mentions flowers, forests and other attractions. The mountain is a "frozen octopus" with "icy tentacles." It has glaciers "roaring over precipices like congealed water falls." The Nisqually Glacier is "glistening white and fairly smooth at its shining source on the mountain's summit," but its lower reaches are "soiled with dust and rent by terrible pressure into fantastic shapes."

For a volcano to be sheathed in ice seems incongruous: heat intense enough to melt rock juxtaposed with glaciers? Yet even before the Rainier volcano finished building, glaciers began sculpting its lofty flanks. They formed not because of arctic cold but because of superabundant snowfall. Only two conditions are needed. More snow must fall in winter than melts in summer, and there must be enough time for it to compact into ice and start flowing because of gravity and its own weight. This critical depth varies from several tens of feet to 200 or more, depending on exact conditions and slope. The Nisqually moves downslope an average of 8 to 18 inches per day, and as much as 72 inches per day in its thickest and steepest portions.

Crevasses form because glacier ice flows not as a viscous fluid, like asphalt, but as a solid. It follows the same laws of physics that govern, for example, the bending of iron. Stressed too far, it splits. The splits—crevasses—are a by-product of the glacier's accommodation to rock knobs and ridges at its bed, and to different rates



RIVERS of ICE



Ruth Kirk photo

of internal flow within the ice. Bottom ice moves more slowly than upper ice. Crevasses form. They seem almost bottomless to anyone standing at the lip and peering in for the first time, but pressure actually limits the crevasses to little more than 100 feet deep. Beyond that, they squeeze shut.

THROUGHOUT THE PLEISTOCENE epoch, which included the most recent Ice Age, Rainier received vast quantities of moisture from the Pacific, borne by westerly winds and precipitated as snow. Thus nourished, glacier tongues radiated as much as 65 miles from the mountain, gouging bedrock with sharp-edged fragments of rock held in an icy grip, and grinding and polishing because of sediments frozen into the bottom of the ice like sandpaper.

In the Nisqually valley, the townsite of Elbe once lay beneath Pleistocene ice a quarter mile thick. At White River the site of the present campground once lay beneath ice a half mile thick. The glaciers produced sheer headwalls as high as 3,000 feet, and they broadened and deepened preexisting, V-shaped stream valleys. New flows of lava might destroy parts of the icy mantle, and titanic bursts of steam might fracture it, but all such events were inconsequential. Climate dictates the waxing and waning of glaciers. When it warms enough that melt-rates exceed snowfall, glaciers retreat. When it cools enough that snow accumulation exceeds melt, glaciers advance. Scientists believe that if Rainier's present ice were somehow stripped away, it would re-form. The mountain's slopes are directly in the path of clouds moving inland from the Pacific and are cold. Middle elevations actually receive more snow than does the summit. Clouds rise only as much as is necessary to clear the barrier of the Cascade range, and the mountain's top often protrudes above them. Snowfall is greatest at elevations of 5,000 to 8,000 feet, not at the top.

About 34 square miles of Mount Rainier's slopes remain white at summer's end, a greater area of ice and snow than that of all the other Cascades volcanoes combined. The Carbon Glacier is almost six miles long and is 700 feet thick at its center. It reaches farther down the valley than Rainier's other glaciers, which in 1899 made it a commercial temptation for entrepreneurs. The *Daily Ledger* on December 14th published an article with the headline: "MOUNT TACOMA ICE. A Rather Novel Plan to Bring It Here." The article that followed quoted the Northern Pacific's "Division Superintendent Horner," who announced that "prominent men of this city and a number of capitalists in New York [plan] to supply the city with absolutely pure ice" from the Carbon Glacier:

> *It is frozen way up in mid-air where no spurious gases ever corrupt its purity*

***OVERLEAF:** Mount Rainier's 25 glaciers with their mantle of snow constitute a perched, frozen volume of water greater in area than that of all the other Cascades volcanoes combined. A rise in the volcano's temperature could unleash stupendous floods. This aerial view from the northwest shows some of Rainier's glacial "arms" reaching down the sides of the mountain.*

***OPPOSITE PAGE:** The Nisqually Glacier constantly advances, but it no longer fills the valley it previously carved. For centuries it has been shortening at the snout and thinning overall, yet it still measures 400 feet thick and three miles long.*

SUNRISE TO PARADISE

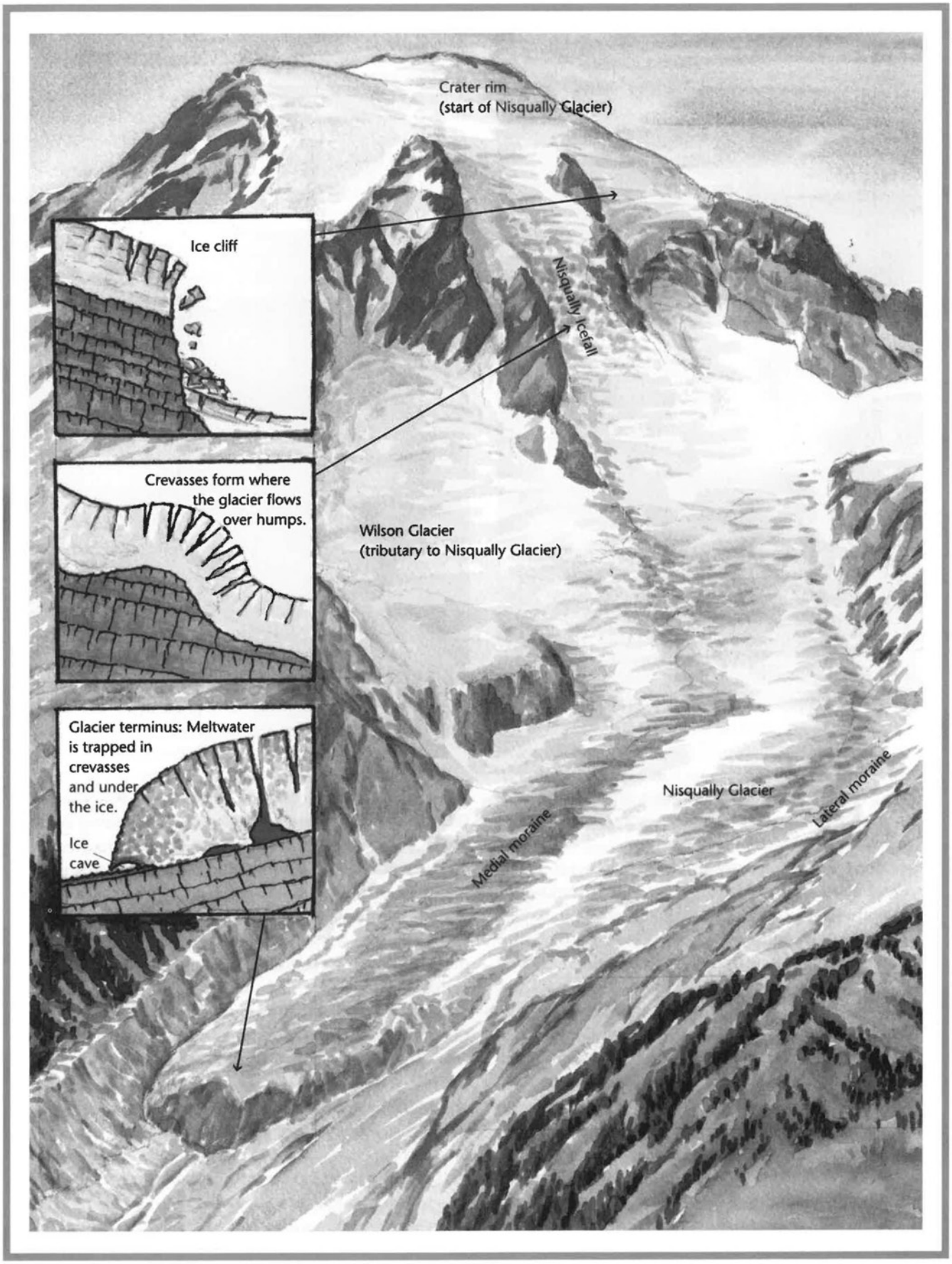
The Story of Mount Rainier National Park

ON MARCH 2, 1999, the Washington State History Museum marked Mount Rainier National Park's 100th anniversary with the opening of *Sunrise to Paradise: The Story of Mount Rainier National Park*. The exhibition, which runs through January 9, 2000, presents Mount Rainier as an active geological agent that has become an icon of the Pacific Northwest. It explores not only the natural world of the mountain but also its cultural significance throughout the ages.

Visitors can delve into the compelling stories surrounding Mount Rainier via computer animation, historic photographs, interactive displays, and a rich collection of mountain-related artifacts including items donated by the Seattle chapter of The Mountaineers, paintings by Dee Molenaar, and furniture from Paradise Lodge. The crown of *Sunrise to Paradise* is an interpretive Palomar and glass ice environment designed by renowned artist Dale Chihuly in cooperation with Flex-A-Lite Consolidated of Fife. Rather than a literal reconstruction of ice caves, the work is the artist's interpretation of the icy mountain.

The 5,500-square-foot exhibit was developed by the Washington State Historical Society in partnership with the Mount Rainier, North Cascades & Olympic Fund; KCTS Television; and University of Washington Press. *Sunrise to Paradise* features high-definition video produced by Jean Walkinshaw for a KCTS documentary entitled *Rainier: The Mountain* and text written by Ruth Kirk, author of the companion book to the exhibition (also entitled *Sunrise to Paradise: The Story of Mount Rainier National Park)* published by University of Washington Press.

Sunrise to Paradise is sponsored by TCI Northwest, Inc., at the "Pinnacle" level and by REI and the Washington State Lottery at the "Summit" level. For more information about the exhibition and related events, call 253/272-WSHS or (toll-free) 1-888-BE THERE (1-888-238-4373). Information is also available on the Society's internet web site: www.wshs.org.

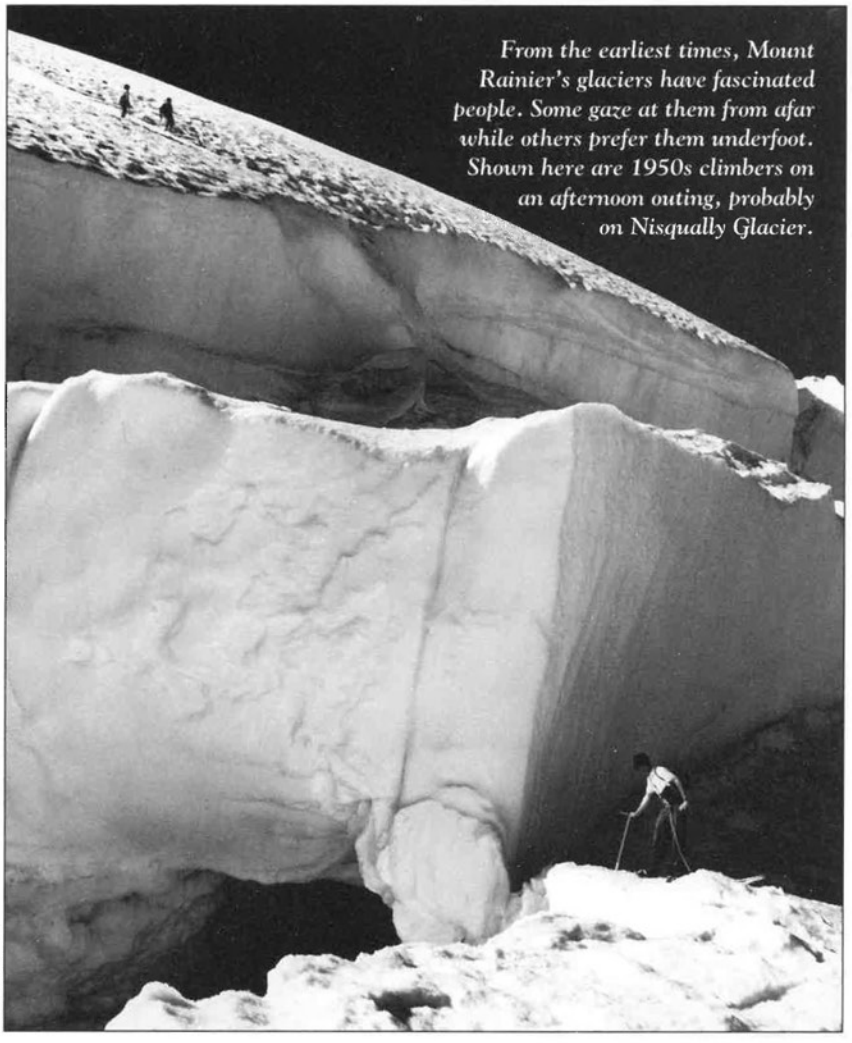


Painting by Dee Molenaar

and where it is impossible for decaying vegetation to taint it. No city in the world could get purer or better ice. . . . The company proposes to utilize the timber, which is so plentiful and can be had for nothing, and build a chute and send the ice down the side of the mountain and through the valley to Tacoma and adjacent cities and villages.

This was an era when ice supplied the only refrigeration. Delivery from the chute to the city presumably would be via Northern Pacific rails; they stretched between Tacoma and Wilkeson, a few miles from the glacier. The plan never was instituted.

RAINIER'S GLACIERS are retreating, as are temperate glaciers throughout the world. "They're going extinct," sighs glaciologist Austin Post, whose aerial photography has kept watch on ice from the Andes to the Aleutians since the 1950s. "Our prettiest glaciers are threatened." Warming climate is the reason. Perhaps as much as half of the ice present in temperate regions at the beginning of the 20th century has melted. Many glaciers have entirely disappeared. Rainier's Paradise Glacier has shrunk. It was probably the mountain's most beloved ice because of exquisitely beautiful melt tunnels formed by warm air moving along the melt stream. Now the tunnels are gone, a scenic loss, as was the loss decades earlier of ice tunnels at the snout of the Nisqually Glacier. Of greater consequence, however, is the



From the earliest times, Mount Rainier's glaciers have fascinated people. Some gaze at them from afar while others prefer them underfoot. Shown here are 1950s climbers on an afternoon outing, probably on Nisqually Glacier.

Ruth Kirk photo

RUN TO YOUR RIGHT!

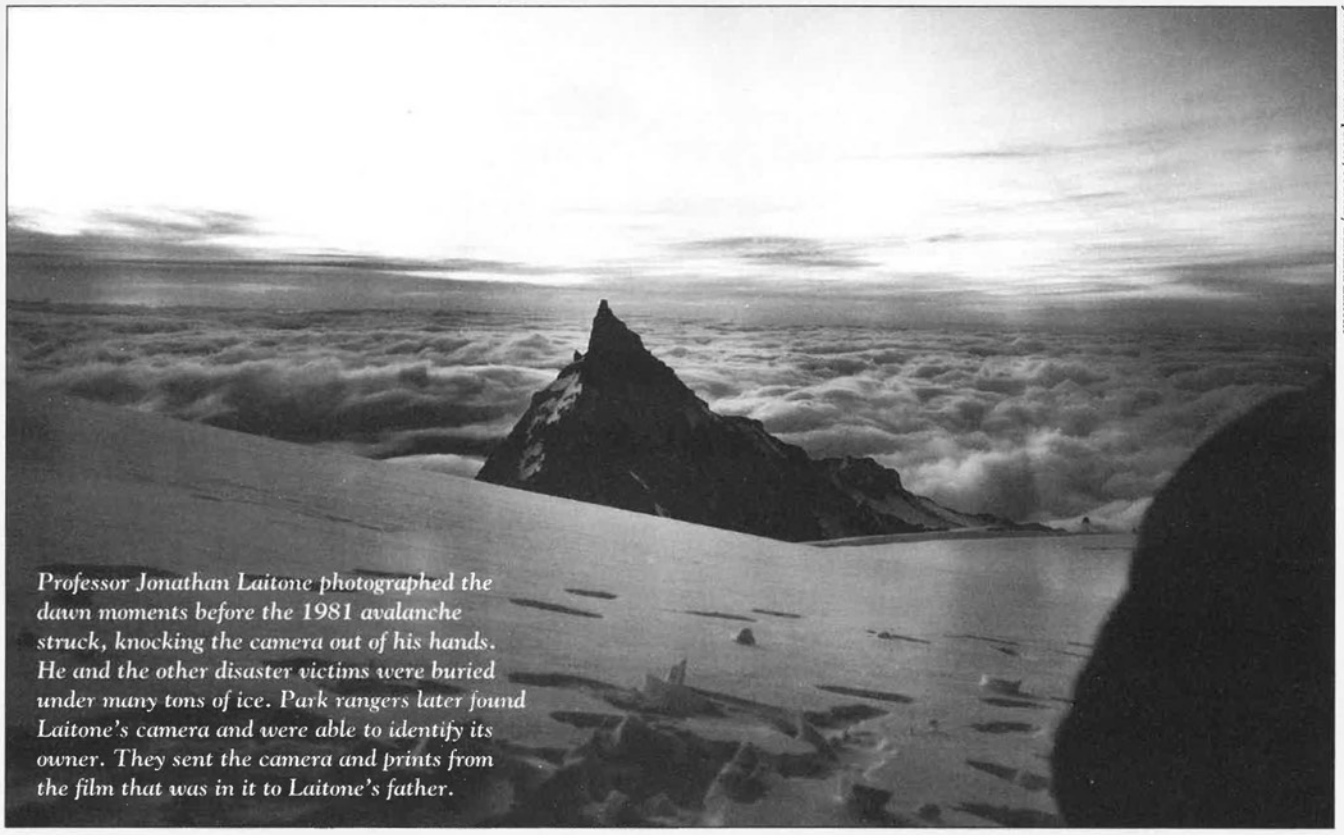
Tragedy on Ingraham Glacier

By Ted Kerstetter

THE WEATHER WAS unsettled as we hiked from Paradise to Camp Muir the day before our try for the summit. But patches of blue showed between the racing clouds and we felt at least semi-optimistic that the climb would go. What better way to celebrate Father's Day 1981 than to stand on top of the Northwest's premier mountain!

Dinner that night at Camp Muir was basic carbo-loading fare—mounds of spaghetti heaped on our plates, washed down with plenty of liquid. We were in our sleeping bags early, but sleep was slow in coming. The guides' hut was congested, jam-packed, a symphony of snores until the wake-up call at one in the morning. Departure was set for two o'clock. My wife Gayle, our 19-year-old son Greg and I sleepily pulled on layers of polyester, wool and goose down, strapped on crampons and headlamps, and tied into climbing ropes in teams of four or five (the three of us on three different ropes). Our group, 29 altogether, headed out in single file—six rope teams slowly crossing the Cowlitz Glacier toward Cadaver Gap and Ingraham Glacier beyond. After a couple hours, three climbers decided this was not for them; they returned to Camp Muir with one of the guides.

By dawn we were at 12,300 feet on the Ingraham Glacier, a long tongue of ice dropping from far up the mountain to an icefall, a tangled mass of broken ice and snow flowing over a high cliff. Partway across the glacier the chief guide halted the long string of us and, with two fellow guides, continued upslope to reconnoiter the route ahead. The rest of us sat on the snow, facing downslope and inspecting an enormous crevasse a hundred yards below



Jonathan Laitone photo, courtesy Edmund Laitone

Professor Jonathan Laitone photographed the dawn moments before the 1981 avalanche struck, knocking the camera out of his hands. He and the other disaster victims were buried under many tons of ice. Park rangers later found Laitone's camera and were able to identify its owner. They sent the camera and prints from the film that was in it to Laitone's father.

us, watching the beauty of the sunrise, and enjoying the respite.

Only a muted thunder building in intensity behind us broke our reverie. We turned almost in unison to see a wall of snow and ice plummeting down the glacier directly toward us. The icefall had given away. The sight remains burned into my memory. In that moment I knew I was dead, that my life had come to its end. But the instinct to survive takes over and a shout from far across the glacier—"Run to your right! Run to your right!"—galvanized me. I was on my feet in an instant, running clumsily, crampons and heavy clothing slowing my frantic efforts to escape the oncoming avalanche. Within seconds the first of the debris struck, tossing and rolling me downslope, pounding me with chunks of ice and snow as I went. My only thought was: "Please, make it fast. Please, not a slow suffocating death." As if in answer to my plea, a huge piece of flying ice struck between my shoulder blades, momentarily stunning me with pain. Then—quiet.

I lay face down, amazed to be alive and desperately trying to catch my breath for, what, a moment? a minute? ten minutes? Truthfully, I have no idea. But eventually, painfully, I struggled to my feet and climbed slowly upslope toward three or four other climbers looking dazed as they surveyed the aftermath. Greg was among them.

"We lost ten," he said.

"How do you know?" I asked.

"I counted. There were 21 of us resting on the glacier. Now there are only 11." (He was almost right; actually there were 22 on the glacier; 11 died.)

We spotted Gayle. She had been pushed perilously close to the yawning crevasse we sat observing only minutes ago. Now it was filled with avalanche debris and the bodies of 11 of our comrades. The guides searched frantically, shouting and listening. Only silence. Clouds descended and thickened, darkening the scene.

THE TRIP BACK down the mountain was slow, somber, painful, much of it in the zero visibility of a whiteout. Separated ribs made deep breathing impossible for me; others bled through bandages covering head wounds, and limping gaits testified to leg injuries.

Emotional wounds were worse. Friends lost friends. Two Seattle brothers went up together; one returned. The pregnant wife of a young Pennsylvania man gave him the trip as a Father's Day gift; he didn't return to her. A 27-year-old, full-professor mechanical engineer from Michigan died. He had written satirical comedy, designed a solar heating system for his church, and planned to study for a master's degree in art. An apprentice guide, 21 years old, newly graduated from college and looking forward to a year of study in Europe, was lost. We thought of these matters as we descended. I also thought of the guide who yelled, "Run to your right!" Had that saved lives? Almost certainly. Regrettably, I never identified and thanked him.

Two days later Gayle and I dropped Greg off at SeaTac airport, his expedition backpack carrying everything he would need for six months of work and travel in Alaska. Life went on—for some of us.

Ted Kerstetter, a retired zoology professor, survived the 1981 tragedy on the upper Ingraham Glacier—the worst disaster in American alpine history in terms of the number of lives lost.

Ruth Kirk photo

LEFT: Little Tahoma—in Native American stories the son of Mount Rainier—often rises above the cloud layer that obscures the mountain from lowland view.

BELOW: Louis Kirk, a ranger at Mount Rainier in the 1950s, explores the ice caves beneath the Paradise Glacier, famed for their luminous blue color. The caves now are gone—the glacier has melted.

Ruth Kirk photo

effect on future water supplies. The loss of glacier ice will be felt by urban water users long accustomed—without thinking about it—to current rates of melt.

During the 1950s and again in the mid 1970s, some of Rainier's glaciers thickened and sent waves of active ice overriding stagnant, older ice. This produced net advances at the snout, but they were short-lived responses to climate fluctuations. The overall pattern is retreat. The Nisqually Glacier has withdrawn almost a mile since Professor Joseph LeConte of the University of California made the first measurements in 1907. The record ranks the Nisqually as the longest-monitored glacier in the western hemisphere. Photographs from the late 1800s and early 1900s show the terminus about a quarter mile below the site of the present Nisqually River bridge. Now the glacier is out of sight from the bridge and its lower reaches are so smothered by rock they no longer look like ice. The trail to its terminus has long been closed, owing to the danger of rockfall.

NATIVE AMERICANS SAW Rainier's shifting white cloak and had a story explaining it. An unidentified "old Puyallup Indian" told the story to F. H. Saylor, purser on a Puget Sound steamer, who published it in 1899. The story tells that once, when the Great Spirit was readying the world, Do-ce-wallops had two wives whose jealousy upset him so much he started mistreating his people. Because of this behavior, the Great Spirit stepped in and "Taho-ma [Mount Rainier, one of the wives] was changed into a mountain as a warning to wives—a warning that would always be in view—of what jealousy would bring to them. Around her form [the Great Spirit] wrapped a mantle of white and cold, ever keeping the fire of jealousy within from busting forth to cause harm, as she had done before."

Ruth Kirk, a Lacey resident and member of the Washington State Historical Society Board of Trustees, has won numerous awards for her many books focusing on natural science and regional history, including Snow *and* Exploring Washington's Past. *With her husband, a National Park Service ranger and naturalist, she lived for five years in Mount Rainier National Park. She has climbed the mountain five times and hiked the park's Wonderland Trail.*

EDITOR'S NOTE
This article and the "Run to Your Right!" side bar have been excerpted from Ruth Kirk's most recent work, Sunrise to Paradise: The Story of Mount Rainier National Park, *with permission of the publisher, University of Washington Press.*

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***FRONT COVER:** This postcard of Camp Wigwam, in Mount Rainier National Park near Indian Henry's Hunting Ground, shows a view of the glacier-clad mountain from the southwest. See related story beginning on page 24. (Special Collections, Washington State Historical Society)*