THE AMERICAN WEST

COVER: Animal, vegetable, and mineral combine to create a desert still life near Humboldt Lake, Nevada.

(Photograph by Thomas H. Hunt)

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Reminders of a lost era line the walls of a blacksmith shop in Virginia City, Montana.

BOB & MIRIAM FRANCIS

When Smoke Blotted Out the Sun

U.S.D.A. FOREST SERVICE

More than three million acres of timber, part of it in the Lolo National Forest (above), burned on August 20–21, 1910.

by James G. Bradley

THE WEATHER all over the United States suddenly was chaotic. In Cheyenne, Wyoming, the August heat mysteriously vanished, and the town shivered at 38°. In Denver the temperature plummeted nineteen degrees in ten minutes and a forty-plus-mile-per-hour gale swept through the streets, covering the city with ashes. Five hundred miles off the West Coast, the British ship *Dunfermline* reported that the entire crew smelled smoke. Three thousand miles to the east, Bostonians rushed outdoors as mysterious dark clouds billowed over their city. For five days during the late summer of 1910, smoky skies blacked out the sun throughout the northern United States and southern Canada. Businesses

Remembered as the worst forest conflagration in American history, the Great Idaho Fire of 1910 sparked sweeping forestry reform

closed and transportation halted. People all over the country wondered what tremendous force had created an environmental shake-up as awesome as the fiercest hurricane or most shattering earthquake.

News from a small mining town in northern Idaho ended the mystery. At. 9:22 P.M. on August 20, the telephone operator at Wallace shouted over the phone to nearby Mullan that the city and surrounding mountains were ablaze, that flames were now only fifteen feet away, and that he would have to run for his life. Then the phone went dead.

A courier hurried over from Mullan, six miles to the east, to investigate. Fleeing back within the hour, he gasped that the canyon between the two towns was a "seething furnace." Abruptly, all further news from northern Idaho ceased. Wallace, Mullan, and a dozen other towns in Idaho and Montana were trapped in the largest forest fire in the recorded history of North America.

In a period of only forty-eight hours the Great Idaho Fire of 1910, burning from the Canadian border to the Salmon River, desolated a vast semicircle of forestlands 160 miles long and 50 miles wide. Three million acres of timber, four towns, and possibly a hundred lives were lost. But the story of the disaster is more than a simple tale of Northwest tragedy. The fire's background included a continuing political controversy that had nearly destroyed the U.S. Forest Service and that had kept Congress bitterly debating for years. The fire itself was met by the first organized resistance ever given to a forest conflagration. And the public outrage that swept the country after the disaster stimulated the development of forest fire protection laws and policies that are the basis of fire control today. Intertwined with the political and environmental significance of the tragedy were the deeds, both heroic and infamous, of the men trapped in the burning woods.

No single spark starting a single fire caused the Idaho disaster. Rather, the fire was the culmination of more than a thousand small blazes exploding out of control almost simultaneously. Without the bizarre weather conditions of the spring and summer of 1910, these fires would never have ignited. Normally, heavy rains drench the Northwest each spring, but from April of 1910 until the fire blowup on August 20, hardly a drop fell. By July northern Idaho was the victim of the worst drought in twenty years. On July 23 the enemy that frightens even today's Northwest foresters struck. Dry lightning pierced the forests. Without spilling a drop of rain, dark clouds hurled hundreds of lightning bolts into the dried out, highly inflammable timberlands. Again and again dry lightning storms passed over the forests, igniting thousands of fires.

At first the U.S. Forest Service successfully fought back. District One, now known as Region One, had its headquarters in Missoula, Montana, and included ten national forests in Montana, Idaho, Washington, and the northwestern tip of South Dakota. District forester William B. Greeley mobilized loggers, the first U.S. Army troops ever used in fire fighting, and finally drunks and hoboes right off the streets to combat the fires. By mid-August ten thousand men, led by professional forest rangers, were scattered in remote areas of the forests. Frantically digging trenches around each fire, the men labored in choking smoke and enervating heat to contain the flames. By August 19, they had extinguished three thousand small fires and controlled all ninety of the existing large ones. Many other small fires still remained, but because of the imminent arrival of the autumn rains, most Forest Service officials predicted the end of the fire crisis within a week. Sighing with relief, rangers prepared to demobilize their crews.

But why, on the very next day, did northern Idaho and western Montana explode into one huge conflagration? What destructive force ignored the labor of ten thousand men? Drought and dry lightning were not enough. The Forest Service had vanquished these foes. But in the West there is another phenomenon, known as the chinook. On rare occasions, chinooks—hot, dry winds of near-hurricane force—blow furiously from the Southwest. On August 20, 1910, what proved to be the most disastrous chinook in the region's history howled through Idaho and Montana. Blowing for two days, hot winds knocked down fire fighters, evaporated what little moisture was left, and fanned over a thousand existing small fires into major holocausts.

In only forty-eight hours after the first blast of hot air, the resulting fires had burned through 160 miles of forest, leaving little but ashes and smoke behind them. Moving at as much as seventy miles per hour, flames rushed up hillsides and leaped across even the largest rivers. Extreme heat and great masses of burning gases created whirlwinds that wrenched up two-hundred-year-old forest giants and tossed them into the air like toothpicks. Often entire mountainsides of trees were hurled to the ground far in advance of the actual flames. Crown fires raced through the treetops 150 feet above the forest floor. The roar of the fiery onslaught was likened to "a thousand freight trains passing over that many steel trestles." The inferno destroyed men as effortlessly as it annihilated trees. Smoke suffocated many even before the flames reached them. It blinded others by gumming their eyes with dried tears and ashes. Almost as dangerous to man as the smoke and flames were falling trees.

U.S.D.A. FOREST SERVICE

Forest service ranger Joe Halm (left), himself a near victim of the Idaho disaster, visits the scorched mine shaft where fellow ranger Ed Pulaski and thirty-five fire fighters narrowly escaped death.

Facing an overwhelmingly superior enemy, the Forest Service and the people of the region bravely made a stand. Abandoning the trees, district forester Greeley organized his forces in a desperate attempt to save towns and rescue trapped fire fighters. Messengers rode to remote homesteads and villages to order evacuation. In larger towns, the Forest Service mobilized the populace to protect their homes. Elk City, Idaho, for example, was rescued by its women. With their men trapped in the forest, wives and daughters struggled all night on rooftops to extinguish blazes started by wind-borne firebrands.

THERE WAS LITTLE that could be done to save the lives of some trapped fire fighters. Relief expeditions failed to reach more remote disaster areas until long after the fires had done most of their damage. Many other lives, however, were saved through the heroism of forest rangers. The most famous of these heroes were Joe Halm and Ed Pulaski. In 1910 Joe Halm became a ranger in the Coeur d'Alene National Forest. Late that summer, supervisor Weigle sent Halm with a crew of eighty-five men to control a large fire known to be raging deep in the St. Joe wilderness. Leaving civilization behind at Iron Mountain, Montana, Halm and his men hiked sixty-five miles over the Bitterroot Mountains. Then, abandoning the existing trail, they slashed for days through dense forests until finally locating the fire near the headwaters of the St. Joe River. There they established a camp on the banks of a small stream, then hurriedly built an encircling fire line to contain the blaze. On August 18, confident that the fire was quickly dying out, Halm ordered all but eighteen of his men to return to Iron Mountain.

On August 20, Halm departed for the supply camp several miles away, instructing his men to spend the day patrolling the fire line. When he returned late that afternoon, he heard excited shouts in the forest. Suddenly his entire crew dashed into camp. The foreman screamed, "She's coming! The whole country's afire! Grab your stuff, ranger, and let's get out of here!"

Gasping, the foreman hastily explained what had happened. The air had become heavy and oppressive and the smoke

darker and more dense. Then the astonished men had watched helplessly as the dry wind fanned sparks into leaping flames. Soon trees lit up like torches, and the conflagration leaped across the fire line. As the men dropped their tools and fled, they were pursued by "a great wall of fire coming out of the northwest."

Halm later wrote:

"As the wind now stirred the treetops overhead, a faint, distant roar was wafted to my ears. The men heard it; a sound as of heavy wind, or a distant waterfall. Three men, believing safety lay in flight, refused to stay. 'We're not going to stay here and be roasted alive. We're going.'

"Things looked bad. Drastic steps were necessary. . . . I slipped into my tent and strapped on my gun. As I stepped out a red glow was already lighting the north.

" 'She's jumped a mile across the canyon,' said the foreman, who had been talking quietly to the men. Stepping before them, I carelessly touched the holster of the gun and delivered an ultimatum with outward confidence, which I by no means felt. 'Not a man leaves this camp. We'll stay by this creek and live to tell about it. I'll see you through. Every man hold out some grub, a blanket, and a tool. Chuck the rest in that tent, drop the poles, and bury it.'

"The men did not hesitate. . . . Some ran with armloads of canned goods to the small bar in the creek, an open space scarcely thirty feet across. . . . Meanwhile the wind had risen to hurricane velocity. Fire was now all around us, banners of incandescent flames licked the sky. Showers of large, flaming brands were falling everywhere. The quiet of a few minutes before had become a horrible din. The hissing, roaring flames, the terrific crashing and rending of falling timber was deafening, terrifying. . . ."

All of the men with Halm survived. A week later they staggered back to Iron Mountain to discover that days before, newspapers across the country had listed them all as having been killed.

Another great legend also emerged from the Idaho disaster. To old-timers, ranger Ed Pulaski was the fire's greatest hero. Born in Ohio in 1868, Pulaski had immigrated to Idaho as a prospector at the age of fifteen. Finding little gold, he eventually joined the Forest Service and by 1909 was ranger of the Wallace District.

In early August of 1910, supervisor Weigle received word of a large fire on the divide between Big Creek of the Coeur d'Alene and Big Creek of the St. Joe. Anxious to control the fire before it burned any closer to Wallace, Weigle dispatched Pulaski with 150 men to the area. Immediately after the August 20 blowup, Pulaski and 40 of his men found themselves cut off from the town. Only the ranger's intimate knowledge of the countryside saved his crew. Remembering an old mine tunnel from his prospecting days, Pulaski led a hurried flight to the War Eagle Mine, seven miles away.

But so fierce was the fire that even the protection of the tunnel was almost not enough. As flames roared up the surrounding hillsides, air was sucked out of the shaft and heat, smoke, and poisonous gases poured in. The mine timbers smoldered and then flamed. Terrified men bolted for the entrance. But like Halm, Pulaski stopped a panic that would have killed everyone. Threatening to shoot anyone who disobeyed, he ordered all of the men to lie on their faces in the small trickle of drain water that meandered through the shaft. While the others prostrated themselves, Pulaski hung up wet blankets over the mine entrance. One by one all the blankets burned. Fighting alone, he frantically hurled hatsful of water at the invading flames. Finally overcome, Pulaski collapsed to the ground unconscious, not to revive for many hours. Pulaski and thirty-five of his men survived.

Not all fire fighters were as fortunate as those led by Halm and Pulaski. The St. Joe wilderness was the setting of the fire's worst tragedies as well as its greatest heroism. On the west fork of Big Creek, nineteen men refused to follow ranger Hollingshead to the comparative safety of a previously burned-over area. Instead they fled to a nearby cabin. Soon the cabin exploded into flames, and as the roof collapsed, the men rushed outside and dashed madly through the flaming woods until all but one were consumed. The sole survivor reached St. Joe with the skin of his face and hands burned off.

On the middle fork of the same river, ranger Bell ordered his fifty fire fighters into a small stream when fire overtook them. Only twenty obeyed. All of the others perished. One man was on the verge of plunging into the protection of the stream when a tree collapsed and fell across his leg. Only a few feet away, singed survivors watched as the prisoner tore at his foot and dug into the ground. Helpless to assist, they heard his screams and prayers until he fell into a coma and died in the flames.

Instead of leaping into the stream, seven other men crawled into a nearby homesteader's five-foot-square root cellar. When smoke replaced the oxygen, they realized too late their mistake. Desperate for air, men struck each other with their fists in the struggle to be first to reach the entrance. Soon all were dead.

Forest Service employees were not the only ones threatened by the Great Idaho Fire. Scattered throughout northern Idaho and western Montana were townspeople, loggers, prospectors, and homesteaders. During the crisis, railroad companies ran free trains to vacate endangered towns.

Because of its size and particularly hazardous location, Wallace, Idaho, was the first town evacuated. With a population of five thousand, Wallace was the largest settlement in one of the richest lead-mining districts in the world. With close-packed buildings in a bowl-shaped basin surrounded by mountains, Wallace was easy fuel for a rampaging forest fire. Its only exits led through three narrow canyons that formed perfect runways for approaching flames. Realizing the terrible danger, mayor Walter Hanson on August 20 ordered all of the women and children evacuated and all of the men to stay behind to fight fire.

U.S.D.A. FOREST SERVICE

A row of brick buildings and a change in wind direction enabled the people of Wallace, Idaho, finally to turn aside the 1910 fire, but only after the railroad depot, a hotel, an iron foundry, two breweries, and 150 homes had burned.

But the mayor underestimated the effect fear would have on many of the town's male population. By 9:00 P.M. a large horde of women, children, and fainthearted men mobbed the Northern Pacific depot. When flames appeared on the surrounding ridgetops and the train still did not arrive, women screamed and children sobbed. Finally someone saw the train; it had stopped below the depot by mistake. The hysterical mob panicked and ran for the boxcars and coaches. Knocking down women and children, men were the first inside. Pursued by flames which burned the trestles behind it, the train escaped to Missoula with six hundred refugees.

Meanwhile, the remaining men of Wallace courageously fought for survival. At 9:15 P.M., the fierce winds dropped a flaming stick between two buildings on the east side of town. Both buildings quickly exploded into flames. Within fifteen minutes the entire neighborhood was on fire.

For some inhabitants, the fire brought special tragedy. Missing the refugee train, one terrified mother leaped into a well with her one-year-old child. Both were drowned. An elderly man died when he reentered his burning house to rescue his pet parrot. Burning buildings behaved as eccentrically as people. Flames consuming the Sunset Brewery exploded hundreds of bottles and kegs, causing a veritable river of beer and froth to flow down King Street.

Miraculously, only one-third of the town burned. A providential change in wind direction and a barrier formed by three large brick buildings slowed the fire's momentum enough for fire fighters to control it. By morning the danger had passed. Nevertheless, Wallace had suffered extensive damage. One hundred and fifty homes were reduced to charcoal. Lye from ashes contaminated the water supply, and for days everyone including small children drank nothing but beer.

WHILE THE DESTRUCTIVENESS of the Great Idaho Fire was immense, its life-span was short. Within two days after its birth, the holocaust began to die. Soon after midnight on August 22, the humidity began to rise and the winds shifted and calmed. During the following two nights, light rain and snow, the first since April, fell throughout Idaho and Montana. On August 31 the hoped-for autumn rains began and the fire season of 1910 ended. If the hurricanelike winds of the chinook had delayed only five days, the Northwest never would have burned.

No one will ever know how many people perished in the two-day inferno. Old-timers insist that there were prospectors, homesteaders, and loggers about which no one knew, far up in the mountains. Scores of them could have died without being missed. Officially, the Forest Service listed eighty-nine lives as lost.

The 1910 disaster drastically altered the environment. In forty-eight hours, three million acres of forest—an area about two-thirds the size of New Jersey—became a wasteland. Six billion board feet of lumber, today worth more than $150 million, were in ashes. Comprising 2 percent of the total stands of National Forest timber, this wood could have kept a large sawmill operating for a hundred years. The resulting lumber could have built 55,000 five-room houses.

Four towns in Montana were totally destroyed. Little more than ghost towns today, Haugen and Deborgia have one or two rebuilt homes and a gas station. Taft and Tuscan are uninhabited.

The fire's worst effects were indirect. The invasion of inferior species of trees, an epidemic of bark beetles, uncontrolled erosion, and recurring fires all stemmed from the 1910 disaster. Even today, the fire's damage is apparent. Thick brush instead of trees covers large portions of the Clearwater Forest. Lodgepole pine, almost worthless economically, has replaced the valuable white pine throughout the upper St. Joe and St. Regio River country. Large expanses of the Clearwater and Lochsa River canyons have lost their soil and today are bare granite.

But not all results of the Idaho fire were negative. Ironically, the holocaust benefited American forests by bringing about the revolutionization of fire control policies in America. There had been other great fires before. Wisconsin's Peshtigo Fire in 1871 killed over one thousand people. But none of these other tragedies equalled the Idaho fire in its effect as a catalyst for fire protection. For the first time, people realized that a huge forest fire was a national disaster as well as a local one.

The public outcry reached a peak when Gifford Pinchot, the retired chief of the Forest Service, accused Congress of being responsible in part for the Great Idaho Fire. Pinchot stated that by refusing to allocate needed funds for the Forest Service, legislators were as much to blame as the drought and dry lightning. Without adequate funds, forest rangers in the Northwest could not effectively prevent, detect, or suppress fires. They had not been able to build roads, trails, and telephone lines to remote parts of the forests. They were unable to stockpile tools and equipment for emergencies. They lacked the manpower to patrol the forests for the enforcement of fire safety precautions and the detection of fires.

Led by Senator Weldon B. Hayburn of Idaho, a radical anti-conservation coalition in Congress had for years been strangling the Forest Service financially. Western congressmen were strongly opposed to Theodore Roosevelt's establishment between 1901 and 1909 of 148,000,000 acres of national forests; they resented the arbitrary removal of such huge portions of their states from development. They felt that the resources of the West belonged expressly to the people of the West to develop and profit from.

The ultimate goal of these anti-conservationists had been the destruction of the Forest Service. Heyburn and his colleagues hoped to return all national forest lands to relaxed control for private citizens to exploit freely. As a step toward this goal, in March 1910, only a few months before the fire, they managed to slice the annual Forest Service appropriation to one-half the sum allocated the previous year.

After Pinchot's exposure of Congress's neglect, articles appeared in popular magazines such as *Collier's* and *Harper's Weekly* urging Congress and the state legislatures to act to prevent future fire disasters. Not only did Congress increase the Forest Service's appropriation, but soon all the western states established fire prevention codes. Today such codes authorize the state forester to halt logging operations when the fire danger is high and compel loggers to clean up the debris their timber harvesting creates.

More important, however, was the Weeks Act of 1911. Introduced in 1909, before the Idaho catastrophe, the bill's major provision authorized the federal government to acquire land to protect the watersheds of navigable streams. Before the fire, western anti-conservationists bitterly opposed the bill, and political analysts predicted its defeat. Following the disaster, forester Greeley convinced Congressman Weeks, the bill's Massachusetts sponsor, to add a fire protection clause. This clause appropriated funds for the cooperation of the federal government with states and private landowners in protecting forests from fire.

With this addition, there was a sudden surge in western support. On February 15, 1911, the bill triumphantly passed in the Senate fifty-seven to nine. In its zeal to prevent forest fires, Congress had also enacted one of the most far-reaching conservation bills in history. The Weeks Act established the precedent leading to the founding of the first national forests in the East and the enactment of Franklin D. Roosevelt's soil conservation and water power programs. In two fiery days, the largest forest fire in American history had not only reshaped the Idaho environment but had altered the future of forest conservation as well.

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Stirrups or Pedals?

The Colonel of the First Cycle Infantry

by Frederic Remington

With an introduction by Ted C. Hinckley

FREDERIC REMINGTON could be as deft with pen as with paintbrush. Proof of this once again has been demonstrated in the volume, *My Dear Wister: The Frederic Remington–Owen Wister Letters* (American West, 1972). Quite properly, however, it is for his artistic craftsmanship that Remington is honored most today.

Fame had not come easily to the onetime Yale man turned western roamer. There were long years of acquainting himself with the myriad aspects of America's fast-vanishing frontier. But Remington's persistence eventually washed away the sour wine of professional rejection, and by the mid-1880s he began to savor success. Within a few years such national magazines as *Century, Outing Magazine,* and *Harper's Weekly* regularly featured his vibrant and compellingly authentic illustrations. Having labored long to achieve prominence, Remington had few compunctions about promoting his pictures. One result was a series of Remington-authored picture books, tomes that today either command sky-high prices in rare bookstores or are cannibalized for their valuable prints. Less familiar to the general reader are the artist's wide-ranging magazine articles. Remington evidently enjoyed writing. Yet, as in his books, his literary vignettes were essentially backdrop scribbles composed to feature his sketches.

In 1890 Frederic Remington and his devoted "Missie" took up residence in New Rochelle, New York. Midst a studio cluttered with Indian crafts and pioneer hardware, Remington's artistic maturity combined with his Far West sojourning to create the romantic scenes with which he will forever be identified. Nothing took shape on his easel more frequently than the horse. Indeed, the phrase, "He knew the horse," has become *the* Remington trademark.

Equaling Remington's facility in portraying the horse was his ability as an equestrian—a skill developed from youth through the encouragement of his father, a former Civil War cavalry officer. Thus imagine Frederic Remington's shock when in the mid-1890s he first heard that the United States Army was considering replacing horseflesh with bicycles! The bicycle, it will be recalled, was an astonishingly popular component of Gay Nineties America. Indeed, historians now credit the bicycle craze for accelerating public advocacy of better roads and thereby stimulating the onrush of the automobile age. But in 1895 Detroit's dream machine was only a dim, as-yet undefined vision on the far horizon.

Another enormous challenge to turn-of-the-century mechanized America, one already ominous, was class war. Regrettably, at the same time America was performing miracles and becoming the world's preeminent industrial power, millions of workers were not receiving a fair share of the socioeconomic benefits. In 1894 *Harper's Weekly* assigned Remington to portray one volcanic result—the Chicago Pullman Strike that was then sending shock waves coast to coast. Many citizens thought it was only the arrival of the United States Army that

prevented anarchy. Remington's Chicago illustrations of disciplined soldiers restraining desperate strikers certainly helped convey this impression.

At about this same time, the army began its experiments with the bicycle. Whether Remington greeted this radical innovation with disbelief or with philosophic resignation is impossible to say today—and the following short story, written and illustrated by him, is consequently open to various interpretations. It first appeared in the May 18, 1895, issue of *Harper's Weekly* and is reprinted here in its entirety. Pacifists who read it will bemoan Remington's fascination for martial adventure—a quality that he so jingoistically revealed four years later in his coverage of the Spanish–American War. Some readers, with memories of an Asian war yet uncooled, will discern the artist-author's easy confidence in the machine. Like the technologically superior American troops sent into the Vietnamese War, Remington's bicycle-equipped soldiers supposedly can't lose; their machines assure them an inexpensive victory.

Who in fact is the enemy of this tale? Is it the Indians, western bandits, or Hispanic people (what Remington loosely called "Dagoes")? No, the enemy is composed of fellow Americans. Like Theodore Roosevelt, William Dean Howells, Jack London, and too many other contemporaries, Remington seemed to presume that the disastrous Pullman Strike was but the beginning of a series of urban uprisings by American workers. But all of our conjecture regarding Remington's motives here may well be useless. Perhaps he was simply spoofing those who dared believe that steel and rubber could ever supplant horseflesh.

It was not long, of course, before mechanized cavalry would in fact replace the supple, graceful creature of old. Remington, however, did not live to witness the great World War I holocaust. His last military campaign was the "Splendid Little War." And the versatile Remington imagination might have failed even then had it tried to catch Col. Theodore Roosevelt, pedaling furiously, leading his Rough Rider cyclists in a charge up San Juan Hill.

THE COLONEL OF THE FIRST CYCLE INFANTRY

by Frederic Remington

YOU CERTAINLY are a tough outfit, Colonel—you and your nighthawks of the First Bikes—and I am not sure you could not have us cavalrymen going to bed with our boots on if we were on the other side," said Major Ladigo, as he bit at the end of a fresh cigar.

"Yes—bless me!—Pedal's outfit might come into camp on top of yours, Ladigo, and where would my guns be then? I can't have my gunners sitting on their trails all day and all night too," sighed the big gunner, from the other end of the tent.

"It was good work," continued the old brigadier—"here, boy, pass those glasses—and I have always thought well of the possibilities of that machine in a certain sort of military operations. I don't think you can chase Apaches with it—in fact, the only way to chase Apaches is to agree to pay about $500 a head for them; and also, I don't think, Colonel Pedal —with all due respect for your enthusiasm—that you could ever become of all-absorbing interest in great operations between organized armies; but I do not want to commit myself, since you seem to accomplish such feats these days. If we had not had a really progressive man at the head of the army you would not have had this opportunity; but now, Pedal, all these fellows want to hear about your outfit, and especially how you conducted that affair at North Colville—they all want to know. Go ahead now—we have plenty of time to listen"; and Colonel Pedal, of the First Bikes, twirled his forage-cap in his two hands and grinned pleasantly.

"Well—it was simple enough," he said.

"Oh yes—it's simple now, but how did you get at it?" was the remark of encouragement from somewhere.

"Oh, well, you know, when I had organized and drilled this regiment, the people up at headquarters used us in a fussy way as orderlies, messengers, and in light outpost work, until my outfit was scattered all over this country, and that was not my idea at all. I knew by long experiment that bicycles were perfectly mobile in any country not strictly mountainous, and my idea was that I could fight my outfit in a new way; but fight it—and that was my idea—and march it too. I wanted a few holes in that flag, and so I used to go up and labor with the general. I pleaded and begged to be turned loose. So one afternoon the general sent for me, and I went to headquarters.

"He said that a big band of insurgents were gathering and organizing up at North Colville, and that he wanted them destroyed or dispersed, and asked me if I could do it without asking for supports. I knew the old man had all he could do to open the communications to the west, and that he was going to give the bikes a try to prove what they were good for, so I said 'Yes, sir,' right away, though I did not know the situation thoroughly; but I wanted a job of that sort, and I was in for it. So he gave me orders to that effect, and after some inquiries I left him. Through spies he knew of this condition, and that all the communications were cut except the marine cable, which he had laid in the bed of the Kaween River to Northport, and that was thirty miles from North Colville. I knew that all those upper counties were in a state of insurrection, and my orders were to destroy the rendezvous at North Colville and then to retreat; so my chief concern was to get through the country without being stopped or engaged seriously by intervening bodies of the enemy which I might encounter, and says I to myself, says I, 'Old man, show 'em what bikes are good for.' Pardon me if I become enthusiastic. I started down to my command, fell in my men, with two days' rations and one hundred and fifty rounds. I made my inspection, for of course, you know, bike soldiers have a very complicated equipment; what with bombs, telegraphic apparatus, tools, and the extra parts of wheels, one must look well

"I began the retreat as I intended": having soundly trounced a large corps of insurgents at North Colville and burned down the town, Colonel Pedal's troops commence an orderly withdrawal toward friendly lines with their wounded.

to his inspection. They have the Rice equipment—combined cartridge-belt and garment—which enables them to carry almost anything on the shoulder-belt. At five o'clock we pulled out, and at dark found ourselves at our extreme outposts, as I had calculated. I did not want the enemy to see me, as I was afraid of the telegraph, but as I proceeded I tapped the wires and cut them again and again. In fact, I cut wires all night, for fear that they might not have been destroyed, or that they might have been repaired. I ran smoothly through little hamlets, and knew that I could not be overtaken. I made a slight detour around villages of any size, such as Wooddale, Rockville, and Freeport, for fear that the insurgents might be in force enough to detain me. Back of Wellsville I got awfully tangled up in a woods, and, in short, was lost; but I jumped an old 'cit.' out of his cozy bed, put a .45 on the cabin of his intellect, a flash lantern in his two eyes, and he looked sufficiently honest and intelligent to show us the road, which he did, and we were not detained long.

"I felt fear of Emmittstown, as I had information that the insurgents were in force there. We picked up a man on the road who seemed to be one of our sympathizers, and he informed us that there were pickets all along the road which we were travelling, and also mounted patrols. He said that there was a terrible lot of insurgents in Emmittstown, but mostly drunk.

"Captain Bidewell, who was in command of the advance, did a rather clever piece of work here. He suspected that he would find a picket at a certain place, and sent a dismounted squad on either side of the road, which was bounded by meadowland with stone walls, brush, and trees on either side, and he himself walked down the road with two men. They talked loudly, as though drunk, and, sure enough, were shortly

held up by the picket. They surrendered, and expostulated in a loud voice, and offered their captors a bottle of whiskey. The advance closed in on them, and even got in their rear, and, of course, held up the picket without a shot. A six-shooter argument used on these people shortly disclosed the conditions, and we advanced."

"Say, colonel, I know that Bidewell; he is organizing a bike regiment out West now—met him as I came through," interpolated a medical major.

"Yes—nice fellow—held the ten-mile record for two years before this trouble," replied Pedal; "but, as I was saying—

"Here is *How!* gentlemen!"

WELL, TO CONTINUE—to show you a curious phase of bicycling—my advance ran a picket farther along the road, and were fired on, but, bless me! they had gone through so quickly and silently that they were not hurt, and the sergeant, who was very wise, dismounted and blew his whistle for us to advance. Bidewell dismounted and immediately advanced; and the picket, hearing his men smashing brush, retreated, and the sergeant turned a pistol loose in their faces, and bellowed for them to go out in the road, throw up their hands, and surrender, which they did. You see, Colonel Ladigo, it is very hard to estimate bike forces in the night, they go so silently—they simply flit; and when you first notice them you wonder how many have gone before. A sleepy picket is waked up by a lot of bellowing and shots and smashing of brush, and he doesn't know anything, especially if the row is half in his rear. Well, the shooting must have aroused the village of Emmittstown, and I made up my mind to run right into the town. The moon was rising, and we could see fairly well; but first I tried a little ruse with the captured picket. We advanced down the road a piece, and the men ensconced themselves in the brush, while one of the captured men stood in the middle of the road. We heard quite a party coming up the road rapidly, and the picket called out to them that it was nothing—that they had fired at some shadows, and that they might go back. Two men actually advanced to him, but he insisted that all was right, and that they might return; in fact he protested too much, since he knew that he was lying for his life, and that the date of his demise was fixed at the instant he told the truth. We gave the town half an hour to settle down, and then started on a down grade—coasting silently. All was silent. There were lights in a few saloons, and a half-dozen men, who were immediately held up and disarmed. There was evidence of a great many people in the village, since wagons and horses stood about, and tents and huts were everywhere, except on the main street. I stopped in front of the hotel, and, do you know, my column got three-quarters of the way through the town before we were discovered. My column is three-quarters of a mile long, you must remember, and that was very fortunate. Some one fired a shot from a darkened window of the hotel, and I ordered my men to use their revolvers. A man can shoot a revolver with great accuracy from a wheel, as it glides so smoothly. Well, there was a deuce of a popping, and it must have fairly riddled the town. The fire was shortly returned, but in a desultory way which did not seem to do any damage, and shortly the tail of the column passed down the street. I had set the hotel on fire before we left, and I really do not think that those fellows know what really happened there yet. I immediately cut the telegraph line, and now had nothing to interfere with my march to North Colville. I had two bikes ruined by shots, and abandoned the riders; but they made their way to our lines later. As we proceeded the country grew more flat, and we made the pedals spin; at times we overtook night prowlers—tramps, for the most part—and one rather large party of drunken insurgents, all of whom we disarmed and left tied to trees and fences along the road. Do you know, Ladigo, that one cannot hear my whole regiment on a road until it is right on top of you. I have frequently seen men ride a bicycle right up beside a man, who never heard a sound until ordered to throw up his hands."

"Oh yes, Pedal—I'd like to catch your outfit at the foot of a long hill; I would fire yellow-legs into you in a way you would despise," interpolated the impetuous cavalryman, as he blew smoke at the ridge-pole and slapped his one leg over the other in a satisfied way.

"Yes, you might, Ladigo; but I'm going to spend my life trying not to let you catch me at the foot of a long hill; and if you do, you will find about one hundred bicycles piled up in the road, and it makes bad travelling for horses, especially with unshaken infantry pointing at you from behind. Well, in this case, Ladigo, I did not have any of your enterprising yellow-legs to bother me. As I was saying, we went along swimmingly until we struck Cat-tail Creek, and found the bridge burned. It was rather chilly, but I knew there was no help for it, so we got out our air-cushions and did our little swimming-drill right there."

"What are your air-cushions?" inquired the medical officer with the long pipe.

"They are made of rubber, and blow up, and will sustain five equipments, and weigh fourteen pounds. Every five men have one," explained Pedal.

"Oh, I see—a quaint scheme!"

"Yes; bikes are perfectly mobile," continued Pedal, with satisfaction. "As I was saying—oh yes, we got over the river all right, but," and here he glanced apprehensively at Ladigo —"but I forgot to mention that we lost fifteen bicycles in the passage."

"Ha—ha! oh yes—there are your dismounted men," and Colonel Ladigo beamed.

"I think horses would have stuck in the mud of Cat-tail Creek, Ladigo; fact is, horses are not perfectly mobile. I also neglected to mention that the bicycles were all fished up and joined us later. We halted on a hill off the road an hour before

Continued on page 58

THOMAS H. HUNT

California-bound emigrants turned south from the Oregon Trail near the City of Rocks, Idaho; wagon traces may still be seen.

The California Trail: *A Personal Quest*

by Thomas H. Hunt

During the past several years California backpack and photography enthusiasts Thomas H. Hunt and Robert V. H. Adams have hiked and driven more than twenty thousand miles across the mountains and deserts of Idaho, Nevada, and California in a systematic search for traces of long-forgotten emigrant trails into California. This account and the photographic portfolio that follows tell us something of the motivations and rewards involved in these amateur historians' quest—and provide insight into the courage and fortitude of the pioneers who preceded them more than a century before.

ONE CANNOT spend as many years as this writer has camping and backpacking in the high country of the Sierra Nevada without quite soon and surprisingly often coming across a notation on a topographic map, or a granite-and-bronze marker, or a resin-beaded carving on an ancient blaze on a gnarled pine tree, or a faint trace up a prodigious mountain slope, all of which echo the passing of the California-bound emigrants. I suppose our general curiosity about the how and why and whither of that epic migration —a curiosity that has grown into an ever widening pursuit of

elusive facts—began with such scattered and fragmentary encounters with these mute testaments.

Early in our quest it was decided to make every effort to follow out the emigrant routes as accurately as they could be established from contemporary emigrant journals, maps, and guides, as well as from the various subsequent scholarly studies and modern topographic maps. Each of these fields of study has proved helpful in its own way but also evermore addictive, and what started so casually to be at most a summer or two of pleasant rambling in familiar places has somehow turned out to be a serious project of six years' duration and extending to some of the least known and seldom visited regions of our country. Over the years it has meant a great deal of research and reading, a great deal of puzzling over maps and journal entries, and some twenty thousand miles of driving and hiking. It has often been exasperating, occasionally tedious, and sometimes downright unpleasant, but it has never been uninteresting or unrewarding.

Often we have stood at some point along the trail that we or others had established to our satisfaction to be correct and asked ourselves: "Now why did they come this way, and where did they go from here?" As to the why of it, we may never know for certain because some of these routes seem to us, from our present vantage point in time and with our modern topographical references, to be capricious and sometimes even foolish. As to the where, only careful examination on foot and a reversion to the realities and logic of nineteenth-century travel can provide an answer.

The first thing one learns is that one certainly cannot hope to be too successful in predicting the course of a wagon-and-oxen track on the basis of an automobile-and-gas-station mentality. The prerequisite energy for our means of mechanical locomotion comes ever so conveniently to us these days through the ubiquitous gas pump at the side of a freeway. In emigrant days, the means of transport had to travel to its fuel supply, and this fundamental difference in our mechanical—as opposed to their animal—transportation serves to explain a great deal. Basically, all of the emigrants' decisions as to routing had to take into consideration the availability of grass and water for the stock. After these essentials were provided for, there could be consideration as to destination and time.

But even taking these factors into account, the question still often presents itself: "Why didn't they just veer off to the right up that other valley and take what to us would seem to be the easier, shorter, more logical route?" Beyond the supposition that such random choices of trail-making must owe a lot to chance and ignorance and habit, it is probably best just to accept the facts of a given trail for what they are, with perhaps the outside hope that someday a still unknown manuscript may come to light and add a tasty morsel to the diet of us who delight in supping on such exotic footnotes and historical minutiae.

Setting aside, therefore, all such futile, albeit tantalizing speculations, we must simply follow out with as much accuracy as possible the record of all the major segments which went to make up the whole of the California Trail. Since 1841, when those first few California-bound wagons turned south and west away from the faint traces of a horse trail to Oregon, in the vicinity of Idaho's Sheep Rock on the Bear River, there have been just too many changes wrought upon the land by man to permit total precision in locating their paths. Cities and towns have grown up along the way; farms have been laid out, forests felled, streams dammed, and railroads and great freeways cut through valleys and across mountains. Indeed, when one stops and considers the immense physical changes made in the landscape by the descendants of those early emigrants, the miracle is not that there are so few traces left to be found, but that there are so many.

FOR THE FACT IS THAT, despite the inroads of civilization, there are still miles and miles of emigrant traces left to follow out if one has the mind to do so. There are desert valleys where one can stand waist-high in the pungent sagebrush and see the ruts of wagon wheels curve up a draw and out of sight behind a screen of piñon pines. There are alkali flats and sandy wastes where rusty barrel hoops, crockery shards, and the bleached bones of oxen can yet be found. There are high mountain passes where—with only the slightest exercise of one's imagination—one can picture the ragged forty-niner, ebullient at having reached the final summit of the Sierra, letting his pack mule nibble at the wind-shriveled grasses while he takes out the small canteen of good old "Kaintuck" whiskey that he had so carefully hoarded all across the endless plains and deserts just to have it at this moment of personal triumph to toast his own good fortune, courage, and perseverance. There are alpine valleys where one can conjure images of travel-battered wagons drawn up beside the gurgling, crystalline waters of snowmelt streams, while beyond them bony oxen fairly groan with pleasure and contentment in swales of knee-deep mountain grass, grass still green and succulent even in the months of late autumn. One can hear the metallic bite of the ax into pitchy, resonant trunks of whitebark pines and the voices of children happily at play across the meadow, and smell the salt pork bubbling with freshly picked wild onions in the blackened kettle over a crackling fire. And one can see the pioneer father take out his whittling knife and carve his name and the year of passing into the still fresh blaze on a convenient tree—a testament to achievement, a writing under the bark for future generations to ponder upon when they, too, pass through these meadows, not driven by any imperative need to conquer, not forced to

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This article and the photographic portfolio that follows are both adapted from material in Ghost Trails to California: A Pictorial Journey from the Rockies to the Gold Country *by Thomas H. Hunt with photographs by Thomas H. Hunt and Robert V. H. Adams, to be released this month by the American West Publishing Company.*

prevail or perish, but merely seeking to enjoy this wilderness and perchance to find a bit of personal renewal.

Yes, miraculously enough, these spots are still there to be seen and experienced by those who find such things stimulating, even moving. They were places won only after tough, brutal miles, and they were won by a tough, resilient people.

These emigrants weren't angels; they weren't martyrs; they weren't some special breed of demi-gods, and it would be wrong to picture them as such. But no one of any sensibility can walk even a few miles on a blistering September day across the Forty Mile Desert beyond the great sink of the Humboldt, or crawl up those final five hundred feet above Red Lake to the first crest of the Sierra on the Carson Pass Trail, and not know that these were indeed a special, extraordinarily tough breed of people, taking part in one of the truly heroic events in human history. They bridged a hostile continent and rounded out a continental nation, and they did it step by step by dust-filled, unglamorous step.

If they had to throw away everything of value and sentiment from their past back in the States in order to win out over desert sands, they did it; regretful but resolute, they did it. If they had to tear down a wagon completely and carry it piece by piece to the top of a mountain, where it was reassembled to continue the journey, well, they did just that; and such heartrending decisions and toilsome efforts were the full measure of their ultimate triumph, too. Theirs was a record of fortitude and determination and truly monumental achievement.

In our years of retracing the California Trail we cannot claim to have discovered anything of startling historical moment; we do not even have an exciting little tidbit of western memorabilia to chronicle. The value to us of this effort lies rather in another direction; it lies in the direction of personal satisfaction. We have seen rare and beautiful country that only a handful of people even know exists within the public domain. We have, over the years, collected a few rusty barrel hoops, a corroded nail or two, an occasional bottle, and a cupful of shards of emigrant crockery. We must also admit to having on occasion experienced that sort of perverse pleasure (which must be allowed those of us who become too interested in narrow historical pursuits) which arises from discovering that professional scholars have made some mistakes concerning the route followed by a particular journalist. And through it all, we have been impressed, and deeply so, by the will and vitality and courage of the emigrants, and we have constantly marveled at their accomplishments.

When one looks back on all of this, one might be inclined to say that these little satisfactions and petty triumphs were small indeed—perhaps too small to repay one for all the time and effort expended. It is not so, and we can only hope that somehow the alchemy of words may work some little magic on our readers' imaginations and let them join us in a very special sort of feeling.

It is a feeling that is hard to put precisely into words. It is a feeling that one gets in the middle of the desert, in that absolute stillness which is always to be found there but which seems most marvelous and portentous just at twilight, as the naked mountains lose completely all feeling of spatial dimension and flatten out to the quality of cardboard silhouettes on some vast stage set. You stand between two faintly defined wheel traces colored somewhat darker with volcanic pebbles than the alkali soil through which they stretch away from you toward the horizon. And then suddenly the thought hits: "My God, this is really it! I'm standing right here on the spot where all those heretofore paper people traveled through so many long years ago in their own personal searches for something other, or better, than what they had left behind them."

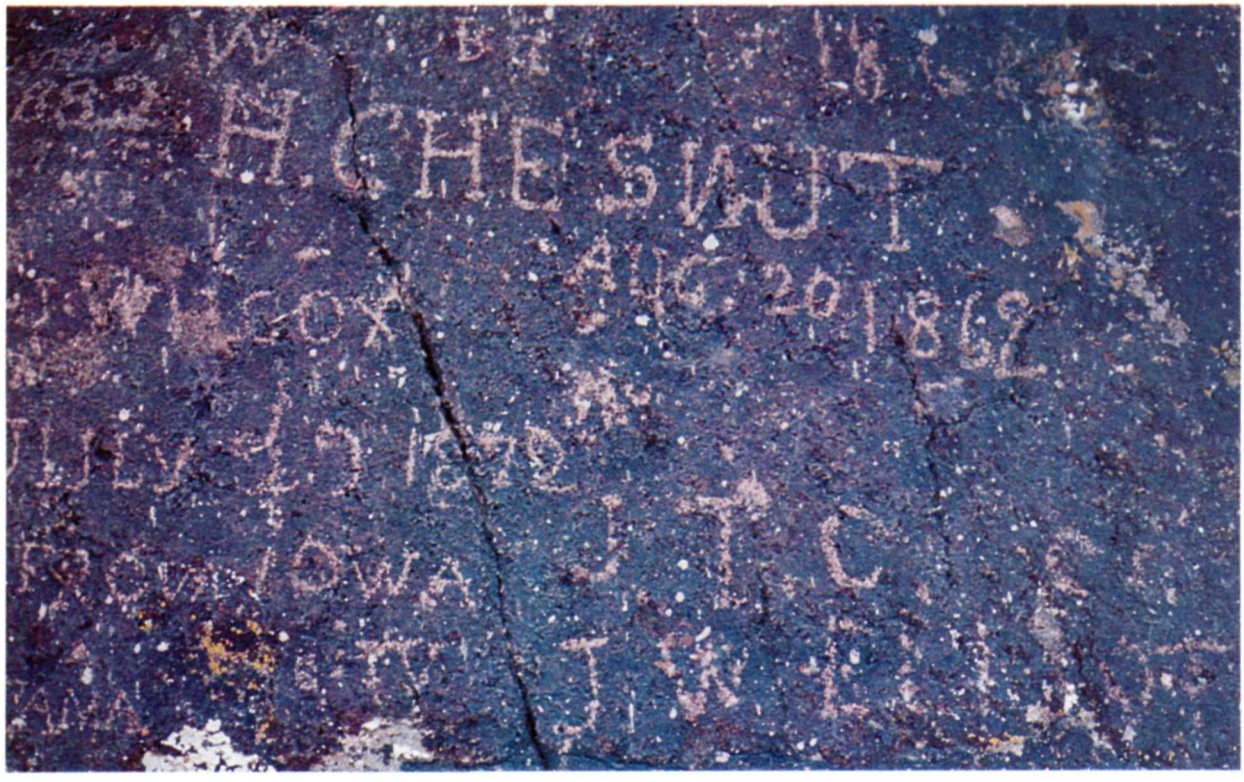
AND SUDDENLY they are not just words on paper, and the horizon is no longer cardboard. Those people come alive; the whole thing ceases to be an abstraction, a mere exercise in pedantry. That particular horizon out there might not be *your* horizon, but it was as real and challenging as any you will ever set out for, and to the emigrants it was an imperative thing. They had to make it. They had no automobile parked just over the sand dune in which to speed effortlessly over concrete highways through the blistering heat of the God-forsaken barrenness. They had no motels to stop off at if fatigued or if the weather should suddenly turn too cold and threatening to sleep in the open. They had no restaurants and no supermarkets from which to assuage the pangs of hunger or refill the depleted larder. Here they were—just here, where you now stand—with no water for miles and miles, and stock so weak that it was highly questionable whether they could make it to that river that someone or some rumor *said* was truly out there somewhere ahead.

To go on was an act of faith—faith in the word of their fellow man, faith impelled by necessity. But it was also a faith fully supported by self-reliance and determination. So they took that next step, and another, and another. They held to their faith even while pondering the awful question from which there could be no escape: if the stock did not make it to water this time, what would be their own chances of making it? Each day that was becoming a question of ever slimmer and slimmer margins. It was a matter of prevail or die. The truly remarkable thing is that along the California Trail so many did prevail.

You stand in their tracks now, alone in almost painfully silent wastes, and if you have any sort of feeling at all for the human species, you can't help feeling awed by the experience—awed and humble and proud. Those feeble but tenacious traces through the alkali dust at your feet are still there before you after more than a hundred and twenty-five years of winds and storms and unrenewal. They not only lead out of the past, but they stretch out into the future. Your feet renew them. You are here because they *were* here; it is as simple and grand as that. And in the pebble-paved continuity there is a beauty all its own, which words can never hope to approximate.

In the Footsteps of the Pioneers . . .

An eight-page photographic portfolio of the California Trail today, with corresponding excerpts from emigrant diaries



Register Rock at Rock Creek, Idaho

Oct. 14—I am suspicious that thousands have crossed these tremendous heights the present year, who will not acquire immortal honor by the exploit. One thing, however, is certain; that is, if the names of the California emigrants should not chance to be inscribed in the records of fame, you may yet see countless thousands of their names, very legibly written with chalk, wagon grease, or paint, upon the everlasting rocks that compose the towering ranges of these mountains. Volumes might be filled with these elevated names. Here are monuments that will stand until the "rocks fall to dust," though the inscriptions upon them will soon fade away.

Franklin Langworthy, 1850

Sept. 11—Forenoon's drive across a broad alkali desert; face of it glazed and cracked white earth, (had been, in wet season, mud) filling the road with an impallpable [sic] white powder. . . .

J. Goldsborough Bruff, 1849

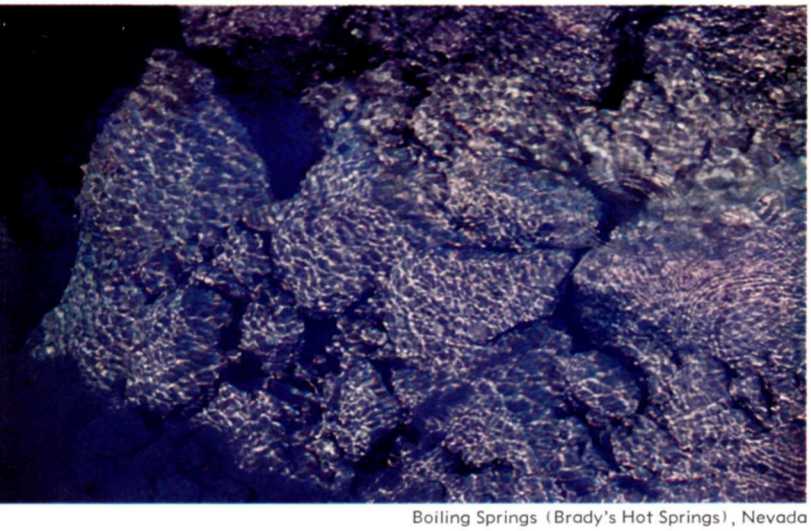
Sunday, July 15—A march of five hours brought us to the vicinity of the Sink of Humboldt River, at about nine o'clock; and continuing over a well beaten sandy trail until noon, we encamped on the edge of the Great Desert. Of late the region through which we journey had been growing more and more desolate; but here was reached what might be aptly termed "the valley of the shadow of death," and over its portals might be inscribed: "Who enters here, leaves hope behind."

Wm. G. Johnston, 1849

Alkali mud on the Humboldt River, Nevada

Humboldt Sink, Nevada

Wagon traces on the Forty Mile Desert, Nevada



Boiling Springs (Brady's Hot Springs), Nevada

The desert! You must see it and feel it in an August day, when legions have crossed it before you, to realize it in all its horrors. But heaven save you from the experience.

E. S. Ingalls, 1850

. . . when within 8 or 10 miles of the river I lay down several times to rest, it did not seam as though I could go any farther but it was death to stay their so I had to budge along as best I could through the burning sand till I reached the water. water was all my wants I would have given all I possessed for a drink of cold water my tongue and lips was parched and fured over so it took one hour to soak it of

Charles Tinker, 1849

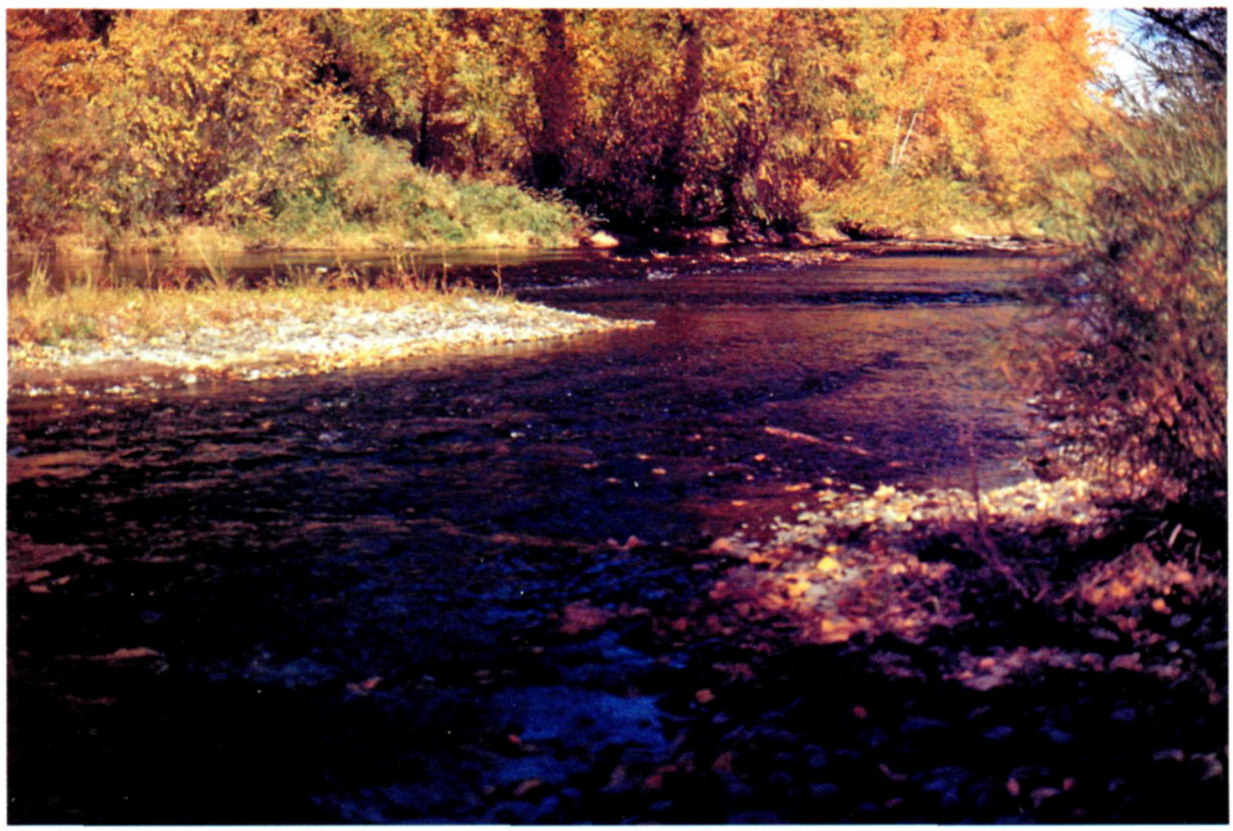
. . . & was gladdened by the sight of large majestic trees. The Salmon Trout [Truckee] being lined with the finest cotton woods I ever saw. No one can imagine how delightful the sight of a tree is after such long stretches of desert, until they have tried it, we have seen very few of any Kind since leaving the Platte, & what a luxury after our mules were taken care of, to lay down in their Shade & make up our two nights loss of sleep, & hear the wind rustling their leaves & whistling among their branches.

Elisha Perkins, 1849

. . . If ever I saw heaven, I saw it there.

Lydia Waters, 1855

Morning dew on the Truckee River, Nevada



Truckee River near Wadsworth, Nevada

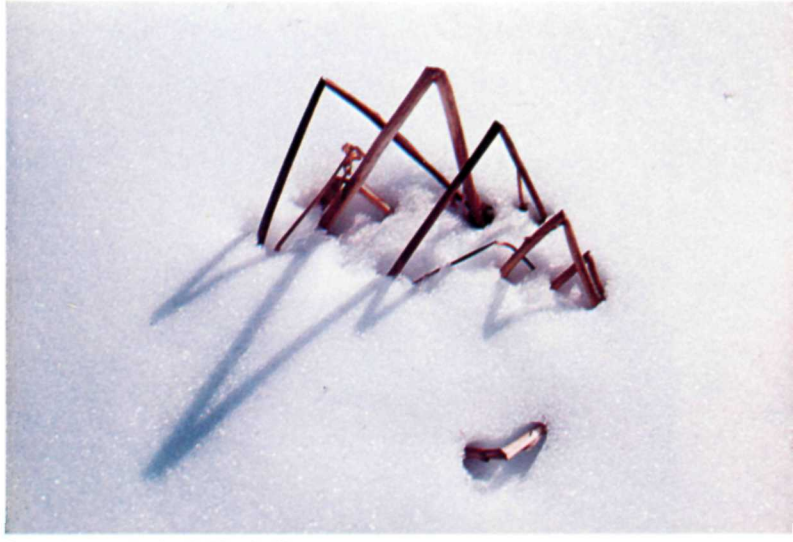
Friday, Sept. 14—We ascended some 4 miles & attained the top from whence we had a fair view of the valley we had left & on yesterday's travel and mountains in the distance, looking immense from our elevated point of observation. . . . The contrast to our level sandy dreary roads & parched sage bushes of the last few weeks. Made our morning previous exhilirating & delightful & we scrambled on over the mountain road shouting & singing like schoolboys set free.

Elisha Perkins, 1849

Dog Valley, California

Saturday Sept. 15—The ascent to the pass from Donner cabins is about 5 miles over rocks & steep bluff & through majestic forests of fine cedar. . . . Up, up, we toiled . . . until at 3 p.m. we arrived at the foot of the terrible "Passage on the backbone." For half an hour before arriving we could hear the shouts of teamsters urging their cattle up the steep & when we were near enough to see through the forest we could look up nearly over our heads & see wagons & cattle looking like pigmies, & as if almost suspended in the air. The "Pass" is through a slight depression in the mountains being some 1500 or 2000 feet lower than the tops in its immediate vicinity. As we came up to it the appearance was exactly like marching up to some immense wall built directly across our path so perpendicular is this dividing ridge. . . .

Elisha Perkins, 1849



Stems in snow in the California Sierra

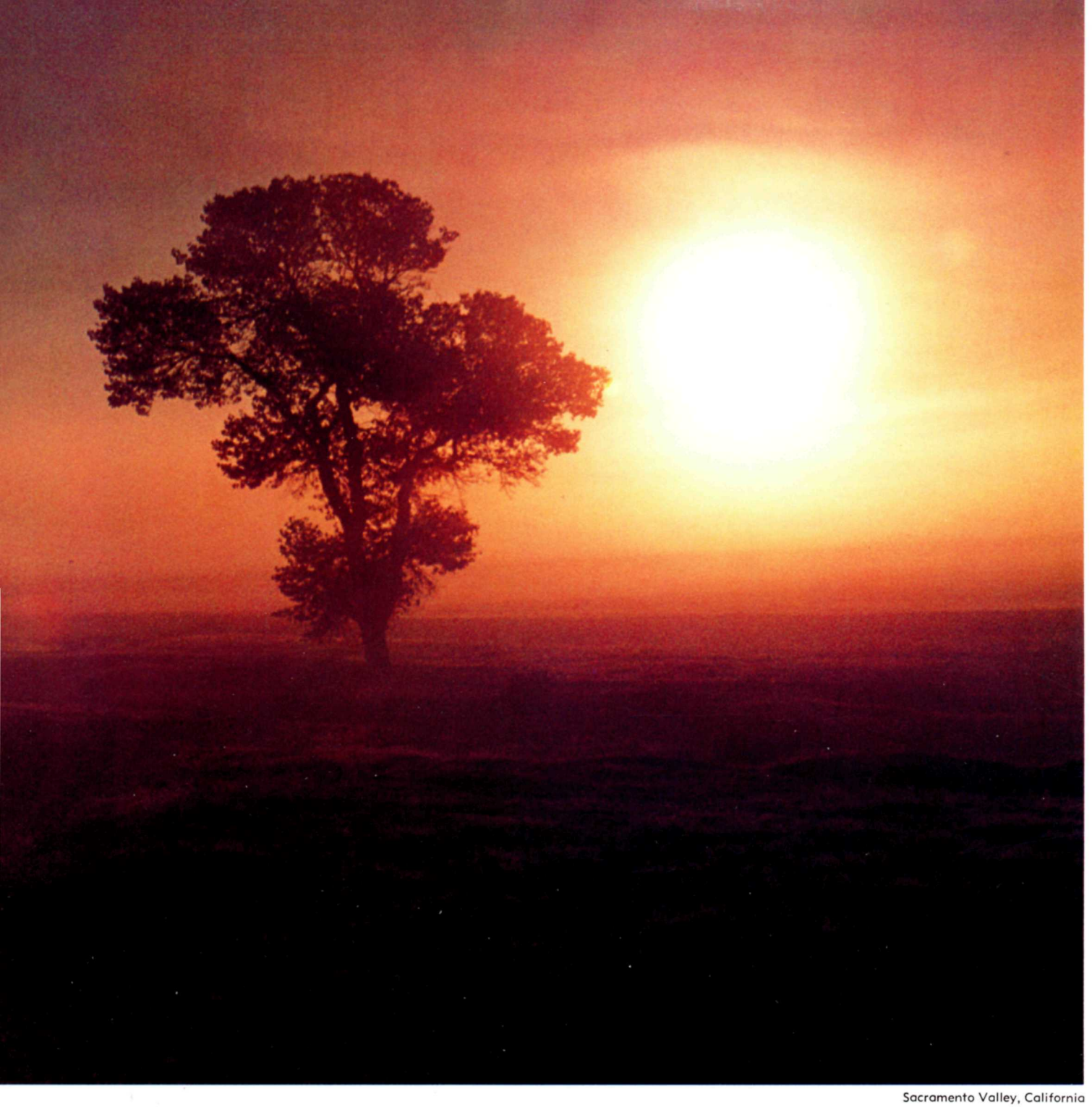
Donner Pass, California

Bear Valley from Emigrant Gap, California

Pond near Cisco Butte, California

The emigrant wagons of last year were let down this precipice, on the northern side, with ropes. With considerable difficulty we got our mules down it. A descent of two miles brought us into a handsome, fertile valley, five or six miles in length, and varying from one to two in breadth. This is called "Bear valley." Vegetation is very luxuriant and fresh. In addition to the usual variety of grasses and some flowers, I noticed large patches of wild peas. We found a small stream winding through it, bordered by clumps of willows. We encamped near this rivulet of the lonely mountain-vale, under some tall pines.

Edwin Bryant, 1846



Sacramento Valley, California

. . . I had purposely hastened, that morning, to start ahead of the rest; and not far from noon, I was rewarded by coming out, in advance of all the others, on a rocky height whence I looked, down, far over constantly descending hills, to where a soft haze sent up a warm, rosy glow that seemed to me a smile of welcome; . . . and I knew I was looking across the Sacramento Valley.

California, land of sunny skies—that was my first look into your smiling face. I loved you from the moment, for you seemed to welcome me with loving look into rest and safety.

Sarah Royce, 1849

EPILOGUE: If you think that after the ordeal was over—the dust and thirst and hunger, the deserts and mountains, the doubts and fears and anguish all left behind—the emigrants all liked what they found at the end of the rainbow, well, you aren't granting them their true measure of humanity. Young Elisha Perkins took one quick look at his hard-won Garden of Eden along the Sacramento and fairly roared forth his disillusionment:

"Never was there such misrepresentation as about this country, both as to the futility, fertility or capability of cultivation, & richness of the mines, & all that a few men might make fortunes. Among the Emigrants you will hear Bryant, Frémont, Robinson & others whose published accounts were the chief inducement to many to leave their comfortable homes, cussed up & down, and loaded with all kinds of opprobrious names. They have all amassed fortunes off of the Emigration they have induced. This valley presents few attraction to any one who has lived in the states. . . . everyone without exception is disappointed both in the appearance of the country & the richness of vegetable or mineral productions."

And yet, how resilient youth is! After a good night's sleep and a decent meal or two, without the awful pressure of the journey, Perkins could regain his perspective and good humor, and concede:

"On a review of our journey & its incidents now that it is all over & our sufferings & privations at an end, I would not have it differ in any respect from what it was, we saw everything of frontier travelling that could be seen & struck the life in all its varieties, with wagon, packs & on foot, & the harder the times we had the pleasanter the retrospect, by contrast. Dearly have I paid for my experience to be sure, both pecuniarily & physically, but I should know now exactly how to go back by the same route both pleasantly & speedily, & at much less expense, & consider myself pretty well qualified to give advice to any of my friends who wish to try the same journey."

Yes, the thing was done, and much had been learned by trial and tribulation. Perkins can be excused the pride which shows through his words. He had been one of the many who had successfully taken part in one of the great feats of American history. It took a lot to do it—determination, perseverance, faith, lots of brutally hard work, a little luck now and then, and one other thing that should be fully recognized: the adaptability of the human animal. Franklin Langworthy takes up this theme toward the end of his journey in 1850:

" 'A man may get used to anything,' is an old saying, the truth of which is pretty clearly demonstrated on this journey. Traveling in constant clouds of dust, dirty faces, hands and clothes, become less and less offensive, so that as we draw towards the termination of the journey, we see for a general rule, a dirty rabble. Men have stomachs that are far from being squeamish. I have seen a man eating his lunch, and gravely sitting upon the carcass of a dead horse, and we frequently take our meals amidst the effluvia of a hundred putrescent carcases. Water is drank with a good relish, into which we know that scores of dead animals have been thrown, or have fallen. . . . Graves of emigrants are numerous on this side of the Desert. The usual mode of burying the dead on this route, is to dig a very shallow grave, inter the corpse without coffin, and set up a narrow piece of board by way of monument, on which a brief description is cut with a knife. Many, however, have only a split stick set up, into which a paper is put, on which the inscription is written."

For some did die. They died and were consigned to the sands of the deserts or the shallow sod of alpine meadows. The hardest thing was to leave someone behind that way, shallow in the soil and with only a flimsy wooden plank to do the remembering. It wasn't right, but the trail was just too long to be a properly tended cemetery. The markers would fall before the winds and not be set up again; the coyotes and birds and ants would do the rest. Everyone knew that this wasn't proper, but it was needful, and what was needful man could steel his heart and do. William Warner said it for them all when he said, "Who would have thought that I could have endured such a journey besides standing guard every third night and sometimes I have stood guard four successive nights—but of all animals that cross the plains man is the toughest and can endure the most."

AND ENDURE THEY DID. For every one left along the trail, hundreds came on, and a continent was spanned and a nation filled out. And many of those people reached the shores of the Pacific, or the fields of Monterey or Sonoma or Santa Clara, or the boisterous goldfields of Hangtown or Coloma or Sonora carrying a well-thumbed little book called Ware's *Emigrant's Guide to California,* a guide which closed with this parting exhortation:

A word before we part, you are now in a country different from that which you left. Recollect that you are a component part of the country. Oppose all violations of order, and just law. Unite with the well disposed to sustain the rights of individuals whenever incroached upon. Introduce at the earliest practical moment, those institutions which have conspired to raise our beloved country to the highest elevation of Nations: Let schools, churches, beneficial societies, courts, &c., be established forthwith. Make provision for the forth coming millions that shortly shall people your ample valleys, and golden hills—and above all, recollect that "righteousness exalteth a nation."

We don't cotton to that kind of language much any more. These are sophisticated times. Such rhetoric is a little too old-fashioned, too pompous, too moralistic, too stilted for our ears. Values change; things move on; much is lost. Perhaps the loss is ours.

Thomas H. Hunt, *who prepared the text for this article and for the forthcoming* Ghost Trails, *is a professional mosaicist in Palo Alto, California.* **Robert V. H. Adams,** *who shares the photographic credits for both article and book with Mr. Hunt, is a teacher in Cupertino, California.*

Surrounded by tree-ring samples—his guideposts to the past—Dr. Douglass works in his laboratory in 1949.

The Man Who Told Time by the Trees

Dr. Andrew Ellicott Douglass: Father of the Science of Dendrochronology

by Daphne Overstreet

DR. ANDREW ELLICOTT DOUGLASS was a man molded after Darwin, Einstein, and Pasteur. Though the stars were his first study, his main achievement was the interpretation of certain glyphs and signs written in the rings of western trees. A man of inexhaustible mental and physical energy, he pioneered a science which he called dendrochronology—the use of tree rings to date the events of the distant past.

When little Andrew, the child of an Episcopal minister, was born July 5, 1867, in Windsor, Vermont, he inherited astronomical instruments—and the environment of a name—from his great-grandfather, Andrew Ellicott. The inherited apparatus, which Douglass used and cared for in his youth, included telescopes employed by his astronomer ancestor in laying out the city of Washington, D.C., and in determining boundaries of many of the original thirteen colonies. The legacy of his namesake influenced him to take up astronomy as his own work.

When Douglass graduated from Trinity College, Connecticut, in 1889, he fervently hoped the Harvard College Observatory would accept him as an assistant. About this same time, William H. Pickering of Harvard was considering placing a telescope in the high altitude and pure air of the Peruvian Andes to further the study of Mars. Funds were set aside for a three-year South American expedition, and when the S.S. *Colón* steamed out of New York harbor early in 1890, the young, inexperienced astronomer was aboard.

The site chosen for the observatory was a hill overlooking Arequipa, a town of thirty thousand residents on a plateau surrounded by towering snow peaks. Though the observatory and its staff were generally well accepted, the Cholo Indians living nearby were highly suspicious of the activities in the peculiar dome. On their way home from the market at night they often threw stones at the building. "This continued for some time, until one night I heard a rifle bullet whiz by," Douglass once recalled. "We sent down for the police garrison and they sent up a little troop of cavalry whose officers called the Cholos together and reprimanded them for their unfriendly acts."

The next day some priests brought a number of influential Indian farmers to the observatory and explained the problem to Pickering. The natives believed that the photographs being taken of the heavens would snatch the stars from over their heads. Furthermore, rumors had spread among the Indians that the telescopes had devils in them. Something had to be done to prove the instruments were harmless.

Pickering thought quickly and pointed a telescope toward El Misti, a neighboring nineteen-thousand-foot peak. He invited the visitors to take a look. Great relief spread among them at once, for there unharmed at the summit stood an old iron cross erected a hundred years before by a bishop.

For Douglass, this incident brought insight. "Real acquaintance with foreigners and primitive people consists in seeing these invisible and intangible forces which they do not exhibit to casual visitors. That experience in South America packed more education in me than two or three years studying in Europe ever could have done. It gave me contact with a completely different way of life, and made me understand the depth and importance of culture."

This same understanding was to help him thirty years later in gaining cooperation from other Indians thousands of miles away in the American Southwest—a cooperation essential to the new science he would eventually pioneer.

The Peruvian expedition came to an end late in 1893, and the adventuring astronomers returned to their quiet New England homeland. But Pickering was disturbed by unanswered questions raised by the South American studies and was impatient to continue his research of Mars. Two questions plagued him. Was there life of some degree on the planet? Were there truly canals?

Seeking a sponsor to build another observatory, Pickering captured the attention of Percival Lowell of Boston. Lowell was financially independent. His life of travel and adventure was no longer enough to satisfy his active mind, and he plunged into astronomy with an energy that astounded his colleagues. The possibility of life on Mars intrigued him, and he agreed to finance the observatory.

Pickering explained that the two best sites in the Americas for observing the heavens were in Arizona and Peru, where the air was pure and the sky clear. Lowell chose Arizona, and Douglass was appointed to scout sites. Pickering lent him a telescope for carrying out his tests, and on the last day of February in 1894, Douglass boarded a train for the week-long trip to the Southwest.

The environment of the Arizona Territory must have seemed strange to the young man so used to the green hills and genteel ways of New England. Tombstone was a brawling infant, Prescott was burning with gold fever, and Flagstaff was still a row of wooden shanties lined up against the frontier. From these and other places, Douglass peered through his telescope, jotting down esoteric notations. He could not have yet known that this was the land where he would fulfill his destiny.

One morning as he sat in the Flagstaff railroad station waiting for a train for the southern part of the territory, a telegram arrived from Lowell. It was short and to the point. Though Douglass was not yet satisfied that the south had been adequately tested, Lowell would not consider it and preferred the high elevation and "great pine oasis" of Flagstaff. So Douglass selected a site for the observatory one mile west of the little town, and on June 1, 1894, observing began atop Mars Hill.

DOUGLASS spent most of the next seven years making observations of the red planet and recording data at the observatory. But the land around him was beginning to grip his imagination, and he longed to explore. On horseback he traveled to the Grand Canyon, stood in awe at its rim, and hiked down into its depths. He visited the Hopi village of Oraibi during the Snake Dance ceremonies, then headed by wagon to Beaver Creek, Montezuma's Well, and the red rock country of Sedona.

In November of 1901, he traveled with two friends to the Kaibab Plateau of northeastern Arizona. The party passed through the great timberlands near Flagstaff, and it was on this trip that an inkling eventually grew into a new science; for the trees were beginning to talk, and Douglass was learning their language.

The buckboard bounced and heaved over the rough six-hundred-mile-trail for twenty-six days, and the scientist's mind throbbed with activity. "We went down the precipitous east side of the Kaibab," he later wrote, "passing from the well-timbered top to the barren and desolate House Rock Valley about three thousand feet below. Sitting beside the driver, I realized the remarkably sudden change from the moist forest down to dry desert, and that this change was analogous to the changes in rainfall from year to year in the

NEIL M. JUDD

A keystone in archaeology: with this ancient roof beam, unearthed in 1929 at Show Low, Arizona, Douglass completed a tree-ring chronology dating ruins throughout the Southwest.

seven years I had spent in Arizona. So, it would be possible to find in the rings of trees growing in that forest, a history of those annual changes in rainfall."

But Douglass's main concern at that time was the observatory. Because of illness, Lowell had been in Boston for the four years preceding 1901, and Douglass was left in complete charge. On cold winter nights he skied from his house in town to Mars Hill, swept the snow from the dome to keep it from caving in, and worked on well past midnight. His silent companions were the stars which "winked at me," he said. Without realizing it, he was slipping into lonely scientific isolation.

Then Lowell returned. He briskly swept aside any of Douglass's findings which contradicted his pet theories.

On March 12, 1901, Douglass penned a confidential letter to Lowell's brother-in-law and charge d'affairs in Boston, W. L. Putnam. The letter warned that Lowell's scientific reputation was in jeopardy because he insisted on publishing before his findings were properly substantiated:

"He devotes his energy to hunting up a few facts in support of some speculation instead of hunting numerous facts and then publishing the unavoidable conclusions as all scientists in good standing do. His method is not the scientific method and much of what he has written has done him harm rather than good. I fear it will not be possible to turn him into a scientific man.

"I have always been intensely loyal to Mr. Lowell and have served him faithfully. I am deeply attached to him and would like to see his name in the highest renown. It shames and pains me when scientific men say things derogatory of him. Please urge him to go slowly with the real scientific writing, and limit the bulletins to the positive facts that have nothing to do with speculation."

The facts indicate Putnam took every step to influence Lowell, even to showing him the confidential letter after five fruitless months of persuasion. But Lowell was adamant and stuck to his life's motto, "Never admit you've made a mistake." In August, Lowell called Douglass in and discharged him without a word of explanation.

THE SEVERANCE WITH LOWELL seemed a bitter setback. One minute Douglass was an aspiring astronomer—the next, an outcast scientist divorced from his all-essential tools. But further connection with his former mentor would only have delayed his ultimate destiny.

Douglass had always been a careful student of nature. Deprived of his telescopes, yet determined to continue in research, he turned to the trees as living indicators of astronomical occurrences. In particular, he was interested in the apparent interaction between the eleven-year cycle of sunspots and weather. To Douglass, the trees were messengers bearing news of this solar influence on climate, especially rain. He observed that "through long past ages and with unbroken regularity, the trees have jotted down a record at the close of each fading year—a memorandum of how they passed the time; whether enriched by added rainfall or injured by lightning and fire. By learning to read these records, specifically those of pines, we have discovered a magic key to open mysterious books and interpret the meaning of their writings.

"In the arid regions of our Southwest, the most important thing to man and trees is rainfall. So, in the rings of the talkative pines, we find lean years and fat years recorded. The same succession of drought and plenty appears throughout the forest."

Thus began dendrochronology. An inquiry into the secrets that trees could tell about sunspots and their relation to weather had opened up a new science.

For several months Douglass mused on his hypothesis and studied stumps of felled trees in the forests, but by early 1902 he realized he would also have to earn a living. And Douglass yearned for companionship. He feared his long years of self-inflicted isolation would make him into a permanent recluse incapable of varied interests, a spectre he abhorred. So, with the advantages of his own handsome and dignified appearance and the prestige the astronomers had enjoyed in town, he decided to run for probate judge of Coconino County. To prepare himself, Douglass made a rapid study of legal methods and texts, and became an almost permanent fixture in the courtroom during trials.

Douglass's political strategy was direct and sincere. He was personally agreeable, and, having a great memory for names, would address the townspeople individually as he met them on the street.

His campaign carried him away in a buckboard again, and many of his stops were at logging camps, where voters were fascinated not only with his genuine warmth, but with his talk of tree rings. He loved to share his observations and did so in a way that everyone could understand. Lumbermen gave him log ends and stumps, and suggested places to find old trees to study.

Douglass quickly gained in popularity over his farmer opponent. His supporters joked that they could choose between a "hog raiser or a star gazer." The *Coconino Sun* warmly endorsed Douglass, saying, "There isn't a cowpuncher or lumberman in the whole section with whom he is ashamed to rub shoulders. He is here because he likes the people and the country, and there is no question but those who know him heartily reciprocate the liking."

He easily won the election and subsequently was elected to a second term by popular demand.

Douglass's new job left time for other interests. He opened up an assay office and became involved in mining interests. And tree rings remained of consuming interest. At odd hours of the day, he could be seen in the yard of the Arizona Lumber and Timber Company, his nose pressed against the logs and a hand lens to his eye.

In 1905 and 1906, he taught at Northern Arizona Normal School in Flagstaff, where he met a music teacher, Ida E. Whittington. The two were later married in Los Angeles. In 1906, Douglass joined the faculty of the University of Arizona, where he was to remain in active service for fifty-five years. He served as professor of physics and astronomy, then as acting president of the university, and later, as dean of the College of Letters, Arts, and Sciences.

For years he worked toward establishing facilities for astronomical studies. When Lavinia Steward gave sixty-thousand dollars for a memorial observatory, the university annexed an abandoned ostrich farm near the campus and in 1922 dedicated Steward Observatory, with Douglass as director. Under this domed roof, wood samples and telescopes sat side by side as the astronomer followed his two strangely compatible pursuits.

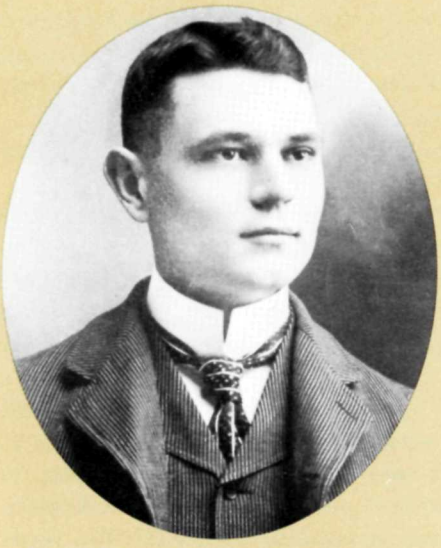
A high point of Douglass's tenure at the university was the solar eclipse of 1923. Douglass convinced the university president to sponsor a modest expedition to photograph the sun's corona during the eclipse, which was expected at noon on September 10.

With a scant five-hundred-dollar allotment and with instruments begged and borrowed, Douglass and seven party members set out for Port Libertad, Mexico, an isolated desert spot on the Gulf of California and in the path of totality. Libertad lay 255 hot, nearly uninhabited miles to the south over the roughest wagon roads in the region.

Just below the border a storm blew up, and the party missed the right road. Later the cars became stuck in a gushing arroyo and in numerous sandy spots, but after four grueling days the caravan of five stripped-down Fords and a Dodge touring car reached the gulf and Port Libertad. But proximity to the sea only increased the discomfort. "We were tortured by the heat and a fearful cloud of gnats," Douglass later recalled—and the humidity was suffocating.

Shortly after arrival, to his utter dismay, Douglass discovered that an essential lens, too delicate to pack with the other equipment, had been left behind. Someone would have to return to get it. Two young men took off almost immediately in the best of the Fords. When they reached a town they wired the university to have someone meet them at the border

Continued on page 60



John Whiteclay Chambers in 1902.

Under Steam for the Gold Rush

from the diary of John Whiteclay Chambers with commentary by John Whiteclay Chambers II

IN THE YEARS just before the turn of the century, one of the richest gold strikes in history sent thousands of fortune-seekers dashing north to the Klondike region of Canada's Yukon Territory. During the first two years of the great rush that began in the summer of 1897, lucky miners shipped some $51 million in raw gold and bullion out of the area. But soon, with the shallowest diggings worked out and with big mining companies consolidating the richest claims and bringing in heavy machinery, restless prospectors began to abandon the boomtowns of Dawson, Skagway, and Forty Mile. Yet the gold fever refused to die so quickly.

Far to the west, on the windswept, treeless plains of Alaska's Seward Peninsula, a handful of hardy prospectors had discovered not only yellow tracings in the creekbeds, but in 1899 found an entire Bering Sea beachfront peppered with gold dust and nuggets. Here men equipped only with shovels, buckets, and crude wooden rockers quickly made fortunes extracting gold from the sand where rushing creeks had deposited it over the ages. During their first summer on the beach, miners culled over $1 million from what has been called "the greatest poor-man's diggings ever found."

In the fall of 1899, steamers bearing the gold and news of the new strike arrived in Seattle and San Francisco, and reports of the fabulous "golden sands of Nome" fired the imagination of the country. Eager thousands prepared to set out for the Arctic in the spring of 1900 when the Bering Sea ice pack broke up and reopened the Seward Peninsula to the world. By summer, more than fifteen thousand gold-seekers poured into the burgeoning settlement, spreading an enormous tent city for fifteen miles along the beach. During the five short months of warm weather, they worked out the dark sands, then began placer-mining the Anvil, Ophir, Banner, and other creeks that fed them. Before winter again froze the earth and streams with temperatures that dropped to sixty degrees below zero, miners had harvested nearly $5 million more of Nome's glittering bounty.

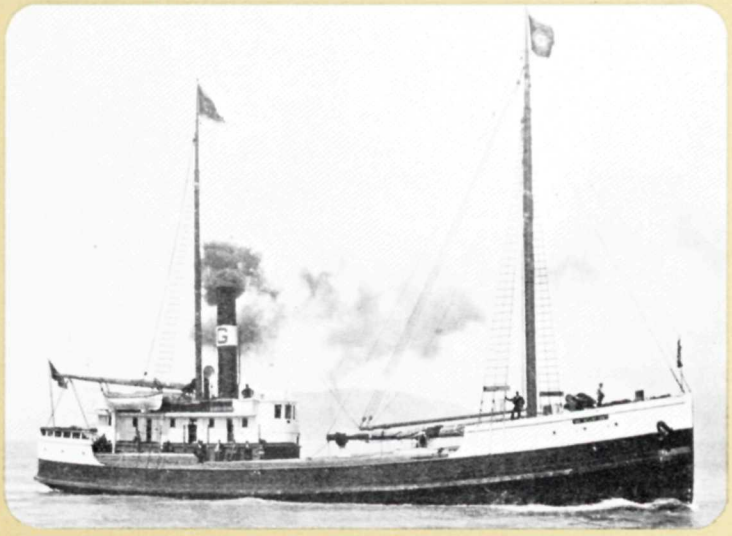
Gold fever soared once more in the spring of 1901 as new hordes of adventurers prepared to head for the Nome gold fields. To accommodate the onrush, shipping companies chartered every available vessel to carry miners and their equipment, food, clothing, lumber, and other necessities to the Arctic tundra. Old ships were refurbished and newer ones enlarged and refitted for what promised to be a lucrative trade.

The wooden-hulled steam schooner *Ruth* was one of the ships drafted for the gold rush trade. Built in 1898 in San Francisco, she normally ferried four-hundred-thousand-board-foot loads of lumber down the coast from the forests of the Pacific Northwest. By adding a temporary superstructure to the *Ruth*'s midships section, her owners converted the 155-foot, 377-ton cargo vessel into a passenger ship. Fitted with four small lifeboats and with crowded accommodations for 130 paying passengers and a crew of nearly 20, plus room in the hold for supplies, the little coastal steamer made ready in May of 1901 to leave San Francisco for the voyage up the West Coast and thence across the northern Pacific to Nome.

AMONG THE CREW MEMBERS preparing for that voyage was John Whiteclay Chambers, a young Pennsylvania Quaker with a restlessness that already had taken him halfway around the world. It may have been a family trip to the World's Fair in Chicago in the summer of 1893 that kindled the lad's wanderlust; in any event, two years later at the age of nineteen he set out to see the world.

It was said that the beach sands at Nome were littered with gold dust—but for at least one adventure seeker, the thrill was in getting there

SAN FRANCISCO MARITIME MUSEUM



The steam schooner Ruth, *rigged for the lumber trade.*

Working for his passage and sometimes selling farm equipment, Chambers traveled by ship to England, then to South America, then around Cape Horn and back again. Entries he kept on the flyleaves of an old Spanish dictionary tell us that the young wanderer later worked his way by railroad across the North American continent, first from New England to Canada, then west on the Union Pacific to San Francisco, where he arrived in October of 1900. Caught up in the excitement of the rampant gold fever, the twenty-five-year-old adventurer decided to see Alaska.

A copy of John Chambers' diary of that voyage, originally sent in letter-form to his mother, was discovered recently among family papers. Edited for clarity and accompanied by explanatory notes, it provides an interesting first-person account of the tribulations, excitement, and adventures found in a crowded ship en route to the gold fields:

John W. Chambers. Diary on steamship *Ruth*, San Francisco to Nome, Alaska, 1901.

May 26th, 1901. Signed on the ship's articles as pantryman's waiter at $30 per month. I went uptown in the evening, got my clothes, said goodby to everybody, and returned aboard at 11 P.M. I am to have a first-class room and first-class board.

May 27th. Got up at 6 A.M. Got along fine in my new work; the passengers came aboard. We sailed at 2 P.M. and a big crowd came to see us off; we passed through the beautiful Golden Gate shortly after. Fine scenery but pretty rough outside; I turned in at eight o'clock feeling queer.

[The *San Francisco Chronicle* reported that the steamer *Ruth*, with a Captain Higgins in command and with 100 passengers and a hold full of supplies, sailed on May 27 for Nome and the nearby mining port of Golovin Bay by way of Seattle. During the two previous days, three other steamers had also set out for the diggings: the *Valencia* with 125 passengers and cargo; the *Conemaugh* with 2,600 tons of freight worth some $600,000, and the *Portland* with 400 passengers, three tons of mail, and a hold full of cargo. John Chambers' salary of $30 a month plus room and board were typical in a period in which the cost of living was less than one-quarter of what it is today, and when one could buy round steak in a market for 14¢ a pound and have milk delivered at 7¢ a quart.]

May 28th. Arose at 5:30 sick, but I stuck to my work, vomiting all day. I would carry out a plate of soup, then go back and vomit, and then serve more soup. At the table, the steward said, "Don't give up the ship." I told him that I was just giving up my breakfast. The vessel was rolling and pitching violently but rides over the seas like a cork. We arrived at Eureka [California] at 8 P.M.

May 29th. Left Eureka at 8 A.M.; weather still rough. The passengers were complaining about the milk not being pure; I told one that if he would rig up a wireless instrument I would call up the farms and let him hear the cows lowing in the pasture. I was sick again . . . but still kept on my feet.

June 1st. Arrived at Seattle; I went ashore in the evening, and bought some lemons, a pair of shoes, blankets, etc.

June 2nd. We're still at Seattle. I got $5 from the captain on account . . . as I only am to go to Nome, and they sometimes hold wages back to make you stay with them. [Most of the miners on board the *Ruth* planned to disembark at Golovin Bay, seventy-five miles east of Nome.] Am getting along all right with work. I went uptown in the evening; this is an awful tough town.

June 3rd. We took on supplies and livestock, also passengers; we now have 132 first and second class, with two of us waiting

BY E. A. HEGG; THE BETTMANN ARCHIVE

Gold-rush Nome's first photographic portrait: prospectors staked claims on nearby Anvil Creek in the fall of 1898; by midsummer of the following year a tent city of 2,500 fortune-seekers had sprung up along the shore of the Bering Sea.

on 45 first-class passengers. We sailed at 8 P.M.; a big crowd was at the wharf to see us off.

[Prospective miners from Seattle crowded aboard the Nome-bound vessels, lured by reports that claims were paying out at least $100 a day and by publication in the *Seattle Post-Intelligencer* of an illustration showing the largest nugget ever found in Nome: a five-by-six-inch chunk of gold and quartz weighing twelve pounds and valued at $896. First-class passage for the 2,400-mile voyage cost $100, but many miners were willing to pay $50 just to obtain cot space in the ships' passageways. One Seattle newspaper predicted that ten thousand persons would sail to Nome during the summer season. Along with passengers, the *Ruth* carried 500 tons of freight.]

June 4th. Stormy seas running high, with the vessel pitching and rolling terribly. I was sick again—sick all day but working. I would not give in and finally turned in at 8 P.M.

June 5th. I got up at six in the morning feeling better. The weather is still rough, with dishes jumping all over the table, and the vessel shipping water through the portholes. I mixed up lemonade throughout the day for seasick passengers.

June 6th. I'm feeling all right again. Some of the passengers are kicking about the service on board. One of them was very impudent, and because I ventured to say something, talked of thrashing me. I promptly invited him to come out on deck; this ended the controversy, although he complained at intervals about putting up $100 for the kind of living he was getting and said we evidently thought he was working aboard ship. I mixed up some more drinks for seasick passengers and was well tipped. This is a very slow boat, making only about six or seven knots.

June 7th. The weather has moderated considerably. I bathed myself and washed up my clothes. Everything is going along smoothly, although passengers complain about the living compared with other ocean travel. One of them came down with a Kodak and photographed the table at meal time, which affronted us and we told him he had never lived so well.

June 8th. Everything was running on smoothly until noon when the chief steward and chief engineer engaged in quarreling. The engineer wants to run the steward's department. . . . The weather is fine and the little old coffee mill of an engine [which rated 350 horsepower] is grinding out about seven knots.

June 9th. This is the first day we did not hear any complaints. We expect to stop at Dutch Harbor to coal up and will reach that place in a few days; our course is west by north. After leaving Unalaska we will be in the Bering Sea.

DUTCH HARBOR on Unalaska Island in the Aleutian chain offered a haven by the frozen Bering Sea. Insurance companies prohibited ships under their coverage from entering the Bering Sea until June 15, when the ice pack would be sufficiently broken up for safe passage. The *Nome Chronicle* of June 14, 1901, reported that nine steamers were riding at anchor in Dutch Harbor while awaiting clearance.

June 10th. The weather still continues fine. We have seen no land or ships since leaving Seattle. About two this afternoon we signaled a steamer also headed north; it is probably the *State of California*, bound for Nome. It soon passed out of sight. . . .

June 11th. We passed a school of whales this morning, some of them only a few yards from the ship and fully thirty feet long. They were headed north, blowing and spouting at a great rate. I am told that they come around by Cape Horn every year from the Atlantic, mate, and go back north to the Arctic

BY DOBBS; BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA

Finding the creeks staked out, one late-arrival at Nome tested the beach sands; color panned out and a new rush was born. The beach was soon so crowded that by common agreement each miner had claim over diggings a shovel's length from where he stood.

through the Northwest Passage and into the Atlantic again. The weather is remarkably calm.

I had my first accident today; I dropped a mutton chop onto a lady's lap and broke a plate. She called me a stupid farmer; I told her she might be thankful that she had ordered chops instead of soup. The captain and passengers all laughed, and she looked as if she would like to scratch me.

June 12th. The engine gave out today and we were detained for several hours, but it is fixed all right again. The sea is very rough and the ship rolling.

June 13th. Land was in sight, but we were twenty miles too far west and had to go back, with the wind against us. We made the harbor all right and pulled up to the coal dock.

June 16th. I wrote thee some time ago [Chambers did not mail his diary until the end of the trip but wrote to his mother during the voyage] about the captain being arrested at this place, and he retaliated by arresting the engineer, but they got all their disputes settled and we pulled out of the harbor at 2 P.M. The captain said he always thought Seattle was a hard place, but nothing to compare with Unalaska. He stopped the vessel twenty miles out and let us fish for cod; we caught a lot of them, many weighing over thirty pounds each, and we have fish every meal now.

June 17th. The weather is calm and the sea as smooth as glass. We met a schooner in the morning which reports large quantities of ice ahead, and a dense fog coming up. We were afraid to go forward and had to anchor, which is probably about the best thing we can do, as the ship is not provided with water-tight compartments, and has only four small lifeboats aboard. If the ship should strike an iceberg it would be all up with us; we would not live an hour in this icy water. There are small particles of ice drifting by but no masses as yet.

June 18th. Heavy fog but calm weather, with cold icicles on deck. We passed an iceberg at 10 A.M., five hundred feet long and fully one hundred feet high above the waterline, and of course many feet under water. We were within a quarter of a mile of it as it surged by. We soon sighted an immense ice field and had to change our course to keep out of its way. It was fully two miles long, with large masses of ice all around us, and the crushing and grinding can be heard for miles. The days are very long now. It commences to get dark about 11 P.M. and light again at three in the morning. Some of the passengers fish whenever the boat stops but are not catching anything but bad colds.

June 19th. We are making very poor time now, the ship continually stopping on account of ice, large mountains of which are on every side of us. We stopped fully twenty times today. One day is the same as another now. No sails [the *Ruth* evidently employed steadying sails in favorable winds], only the noise of the engine and the noise of the grinding ice as it crushes together.

June 20th. The same old thing, drifting about all day and making no attempt to go ahead on account of ice. We passed right close to a large mass of ice with penguins [since penguins do not inhabit the Arctic, these were probably ptarmigans, a form of grouse that abounds in the region, in winter white plumage] on it, fifty or sixty. A passenger shot one and wounded it in the wing. This drifting about is getting monotonous; I wish the captain had a little more courage and would push ahead. Everybody is kicking about the delay. [The captain apparently had no previous experience in the Arctic and was naturally hesitant about piloting a small coastal schooner laden with passengers through extremely hazardous waters.]

June 21st. Heavy fog in the morning. We bumped into an

BY E. A. HEGG; SPECIAL COLLECTIONS, UNIVERSITY OF WASHINGTON LIBRARIES

In June ships crowded with eager miners en route to Nome picked their way through the melting Bering Sea ice; here the steamer* Sealandia *is temporarily halted by close-crowded floes.

iceberg, or rather one bumped into us as we were only drifting and the shock shook the ship up considerably, but no damage was done.

We heard a whistle blow at about 10 P.M., and the *Ruth* answered. The fog lifted about then and we saw a steamer bound south and headed right for us, only a quarter of a mile off; it ran close up to us and stopped, and the two captains talked from the bridges of their respective vessels. The steamer was the *Humboldt* of Eureka, California, and bound for Seattle. She had left Unalaska two days before the *Ruth*, had been to Nome and was making her return trip, having pushed right through the ice while we were drifting around. The *Humboldt's* captain reported a clear passage through the ice as far as Cape Mohican and clear from there on. According to the map, we are now only 250 miles from Unalaska and still 550 from Nome. After a few minutes the *Humboldt* headed off towards the south, and we all gave her three cheers. Both vessels blew three blasts on the whistles and we headed N.N.E. at full speed. Everybody now is in good humor, and there is no more kicking. At 4 P.M. we passed another steamer headed north but too far off to speak to. It was probably the *Conemaugh* for Nome. . . .

June 22nd. We got stuck in the ice early this morning; we could not go forward, backward, or even turn around. We lay still until about noon when they started the engine again and managed to crack the ice and, after two hours of hard work, force a passage through. Toward evening the captain sighted clear water ahead, and at about eight we could not see any more ice.

June 23rd. Land is in sight; it is the island of Nunivak. The shore is covered with snow and ice. We are now running full speed, course North by East. We lost sight of land at 10 A.M. The sea is as smooth as glass.

We expect to reach Golovin the day after tomorrow, where we will land nearly all of the passengers. They have eaten us about out of everything on the ship, and we will have to stock up again at Nome.

It is now a quarter to eleven, and I have just come down to my room after seeing the sun set, a magnificent sight and one of the most beautiful I have ever seen. I do not know just when the sun rises now, but when I woke up this morning at three o'clock, it was light. . . . We are now about off the mouth of the Yukon River but out of sight of land. . . .

June 24th. We passed a large mass of ice covered with walruses; there seemed to me thousands of them. The captain ran the ship up to within twenty yards of them, and some of the passengers opened fire on them with rifles, wounding several and covering the ice with blood. Some of them were very large, and it certainly seemed a shame to wantonly kill them for the mere sake of killing, as no effort was made to capture them. A couple of passengers shot a mother with a baby by her side, and the captain then ordered full speed ahead, and the other passengers wanted to mob the ones that shot her. She looked up in a surprised sort of way when first struck with a bullet, and as soon as she realized the danger covered the baby with her own body. A couple of bullets struck her as she was getting the baby toward the water, and the last we saw of her she was swimming away with the baby on her back. . . .

June 25th. We arrived at the entrance of Golovin Bay at 10 A.M. and found it so packed with ice that the captain immediately headed for Nome, and after a ten-hour run arrived at that place. Now, I thought, this is my destination and I will go ashore by the first lighter, but no, it was not to be. We had not been there half an hour when a gale sprang up suddenly, and before long we had a regular hurricane on our heads. As there are very few

BY E. A. HEGG; SPECIAL COLLECTIONS, UNIVERSITY OF WASHINGTON LIBRARIES

With no port facilities at Nome, ships had to stand well out to sea and send passengers and freight ashore by barge. On the beach all was confusion as arriving supplies piled up.

places around Nome where there is a harbor or protection of any kind from a storm, our captain headed for the open sea. We had the sorrow of witnessing a two-masted schooner dashed on the beach before we got away; I hope the crew were saved. Their chances are good as it is a sandy beach where they ran ashore. . . . We were at sea all night riding out the storm.

June 26th. The storm still continued, our vessel rolling and pitching about more than I ever saw it do before. Sick? Well, I guess so. We arrived at Nome at 8 P.M., the storm over, and landed the Nome passengers. Then I asked the captain for a settlement, as this was my destination and I expected to stay here. He told me that if I would go to Golovin Bay with him and stay until rid of freight and passengers, he would then settle up in full when we returned to Nome, which he thought would take about four days. As there was something over $30 coming which had been held back, I gladly accepted his proposition.

[Arctic gales were common and shelter scarce along the harborless Nome coast. With no docks available, ships anchored in the roadstead and sent passengers and freight ashore in flat-bottomed, motor-driven barges called lighters. On July 19, 1901, the *Seattle Post-Intelligencer* reported that the three-day storm off Nome had torn the schooner *Prosper* from her moorings, dashed her onto the beach, and smashed chunks of ice against her; fortunately no lives were lost.]

BY MID-JUNE, Nome was shaking itself out of its winter hibernation, when the only link with the outside world had been a month-long journey by dogsled across the peninsula to the ice-free Gulf of Alaska. The first cry of "steamer in sight" rang through the streets of the town on June 16, and that afternoon, the first two thousand "outsiders" of the season came ashore bringing newspapers, fresh fruit and vegetables, dry goods, mining supplies, horses, cattle, and hogs and sheep. "The rush this season," the editor of the *Nome Chronicle* reported to his readers, "exceeds the wildest expectations of sourdoughs."

Melting snows gradually uncovered the fortunes and tragedies of the previous winter. Hardly a week passed without the body of a miner frozen during a blizzard being discovered on one of the trails. Between the howling storms, men up on the creeks had cut through the ice and taken out nearly $500,000 in dust and nuggets which they now carried down to the banks of Nome to be melted into bullion to be shipped back to the United States.

With warm weather the town came alive. According to one prospector, Nome—with not many more than one hundred permanent buildings in 1901—had fifty-seven saloons, each with card games and whiskey in the front room and with women in the back rooms. During the warm summer months when the sun barely set, the streets were constantly filled with milling crowds of men speaking a hodgepodge of languages: Norwegian, Russian, Polish, French, Greek, Chinese, and English.

Yet some men had brought their families to Nome, and the town sought respectability. By 1901, over 120 children attended the school, and Nomites had a civil government, several newspapers, a few churches, and even a hospital. The city council paid to have wood-plank sidewalks constructed and were looking for a site for a city hall.

John Chambers' account continues:

June 27th. We sailed again for Golovin Bay; the weather was fine. We arrived at Golovin about 9 P.M. I lay on my back reading a long time by the light that came into the cabin through the

BY E. A. HEGG; SPECIAL COLLECTIONS, UNIVERSITY OF WASHINGTON LIBRARIES

As John Chambers and the crew of the* Ruth *were to discover, violent storms often swept across the shallow Bering Sea, endangering ships along the lee shore. Here the* Catherine Suddon *breaks up off Nome.

portholes. There was no lamp and the electric lights were out; I looked at my watch; it was nearly one o'clock in the morning and as light as midday in Philadelphia. I was surprised as the sun had gone down at eleven o'clock, but all through the night it is almost as light as day, much lighter than a cloudy day in Pennsylvania. You can sit on deck and read the finest print all through the night. The winter must be long and dreary though.

June 28th. Our captain, becoming impatient at the delay, started early this morning to force his way through the ice into the bay. He succeeded and we anchored a half mile off Chenik. Early in the afternoon, I noticed a steam schooner a mile off signaling to us as she was going out, and I informed the mate of the fact, but he took no notice of her. I hardly think there was anything the matter with her as she was heading for the open sea and moving along rapidly. We lay there all afternoon waiting for the tide to take the ice out. At about six o'clock, the tide turned and all the ice that had gone out came back with terrific force; our rudder was snapped off like a pipestem, rendering us helpless. The ice kept pushing us toward the shore, and we struck at about 8 P.M. broadside. Ice kept piling up on the side farthest from shore, and the boat finally rolled over on her side at an angle of about forty-five degrees. Then commenced excitement and confusion: frightened passengers asking ridiculous questions, some climbing the rigging, others grabbing life preservers, and one man coming up with a preserver tied around his neck. Great as the excitement was, I could not stand that and sat down and laughed until the tears came. . . . We had to fight back one crowd that wanted to take a lifeboat all to themselves; some commenced pillaging the ship, forcing open the storeroom and carrying off blankets and anything they could get. We cut away the lashings of the lifeboats and in a couple of hours had all the crew and passengers safely on land, even their baggage. I slept on shore that night under a tent that someone had brought along with him; I was afraid to go back to the ship as I thought it might turn over altogether if ice should get under the keel.

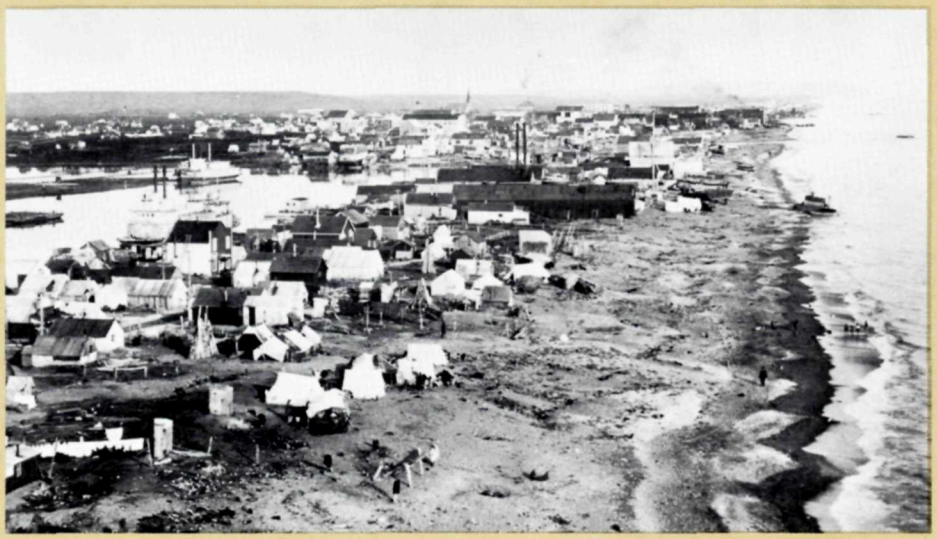
June 29th. I rose early in the morning and went back to the ship; so much ice had drifted in that one could go out without boats. We wanted breakfast but could not set the table, as it resembled a toboggan slide. We all were on hand by about the middle of the forenoon, and the carpenters patched up a hole made by the ice in the port bow. The pumps were started and run continually. We could walk all around the ship on the ice which was jammed up against her, but when the tide came in the ship gradually righted itself, and we do not think it will be a total loss.

[News of the mishap reached Seattle on July 15 when the *Post-Intelligencer* reported that an ice flow had snapped the *Ruth's* rudder and stove in her bow, and that she had been taking water into her hold at the rate of six inches an hour. Witnesses reported that since she was up on the beach she was not considered to be in danger. The same ice jam had also driven another steamship, the *Saint Paul*, aground at Saint Michael, some sixty miles south of Golovin Bay.]

June 30th. The bay is gradually getting clear of ice, and the *Ruth* floated at high tide and is now in deep water; scows are busy taking off the cargo, and carpenters are busy constructing a temporary rudder. We will start for Nome in a couple of days, calling at Bluff City and Solomon River on the way there.

July 1st. The bay is almost clear of ice now. The weather is calm and the *Ruth* lying at anchor with carpenters still working at the rudder. It is a clumsy-looking affair which they have made out of a boom and some two-inch planks, but I guess it will do until we get to Nome where the captain expects to get some

BY DOBBS; SPECIAL COLLECTIONS, UNIVERSITY OF WASHINGTON LIBRARIES



By the time Chambers arrived in Nome in 1901, the town had passed its peak. Its population of 10,000 was about half that of the previous summer, but tents and frame buildings ran for miles along the beach.

party to tow him back to Seattle.

July 3rd. The ship's rudder is finished at last, but the weather is rough and threatening, and the captain will not risk the open sea with a clumsy rudder and the ship leaking.

July 4th. The captain is very patriotic: he ordered the flag raised this morning. All are ready to go to sea again but the weather will not permit this just yet, so we will wait. . . .

July 6th. Sailed this morning in fine weather. We reached Top, Cod [probably Bluff City, with its cliffs towering hundreds of feet above the sea] at 4 P.M. and unloaded freight for that place; we also landed two passengers.

July 7th. We sailed at 4 A.M. for Solomon River to unload the balance of our freight and the three passengers remaining on board. The barometer was falling fast, threatening a storm; we arrived at Solomon, halfway between Nome and Golovin, and unloaded nearly all of the freight. The storm broke on us about noon, before the last two passengers could land, and the *Ruth* sailed out to sea in a hurry in the direction of Cape Nome.

July 8th. We were out of sight of land again. The storm broke upon us in all its fury. First the rudder went, and then the engine broke down, and we were helpless again. The weather seems very uncertain on this coast, and storms are frequent and violent. Some idea of their violence may be gathered from the fact that the spar which held our rudder—being eighteen inches in diameter and made of oak—was snapped off as clean as a lead pencil broken in two.

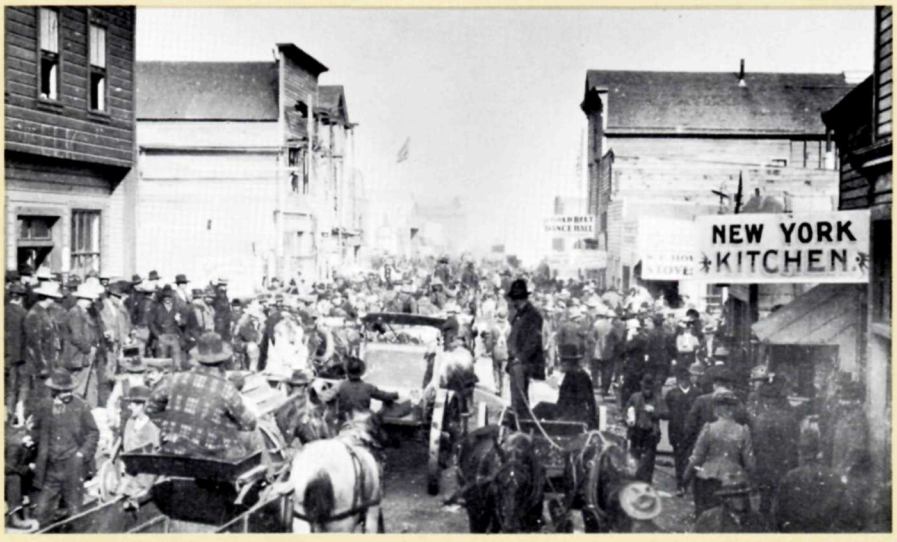
The captain came down to my room at about 6 A.M.; I was asleep. "For God's sake, get out of this," he said, "We are going to abandon the ship." I dressed quickly and was soon on deck. There was twelve feet of water in the hold and it was leaking badly; the sea was so rough it was impossible to man the lifeboats. The ship was rapidly drifting toward the beach, and we were about two miles off Cape Nome. The captain described the storm very accurately when he said it seemed as if all the elements had been let loose. The anchor was down but would not hold, and the breakers were roaring and dashing on the beach. It certainly looked for some time as if we were lost, and I guess we had all about given up all hopes of being saved. We realized that if we struck there, the ship would not last long, and we would be dashed on the rocks. I grabbed a plank and stood by the railing prepared to make one desperate effort when we struck, which I calculated would be in about fifteen minutes. Then we felt a heavy shock and a pull, and we knew that the anchor had at last caught and held on something, and if it would only hold until the storm was over we would be saved.

The anchor held and we lay there six hours, not a half mile from the surf. The storm went down in the afternoon, and the sea became comparatively calm, and then we saw a steamer in the distance, headed for home. A signal of distress was raised, the flag upside down, and long blasts blown on the whistle. We were seen and the steamer altered her course and headed slowly for us. It proved to be the *Santa Anna*, and after some difficulty got a towline on us; the anchor was raised and she towed us to Nome.

SIX WEEKS and two narrow escapes after leaving San Francisco, John Whiteclay Chambers finally stepped ashore onto "the golden sands" of Nome. His diary contains little mention of his stay there, but a letter he wrote home at the time indicates that while he found the mining camp fascinating, opportunities there were somewhat less attractive than he had anticipated:

The city of Nome is situated about eighteen miles from Cape

BY E. A. HEGG; SPECIAL COLLECTIONS, UNIVERSITY OF WASHINGTON LIBRARIES



During the long summer days Nome's Front Street was crowded with sourdoughs and hopeful new arrivals. With the creekbeds already taken and the beach sands quickly playing out, the best most could hope for was workmen's wages on someone else's claims.

Nome and about 250 miles from the most eastern point of Siberia. Four years ago it was almost unknown and unexplored; today almost any commodity can be bought there. The city is built right on the sea shore, being laid out in squares. The principal street is about 1½ miles long. During the summer about two-thirds of the population live in tents, the remainder in log cabins or frame houses. The population . . . varies considerably. Last summer it numbered thirty thousand. During the winter which followed (which was an unusually severe one) but four thousand remained. This summer it is about ten thousand. . . .

The climate is very pleasant and agreeable in summer, about 65° above, but in winter they claim that 60° to 80° below is a common occurrence. Last winter it was 85° below for a few days. . . .

Regarding the prices of Nome, they vary each season. Last year they were high, while this year everything is comparatively cheap. Coal oil was in demand last year and brought a fabulous price, while this year the warehouses are all overstocked with it. The "old resident" will never forget that year and whenever he gets into a conversation with a "Cheechawker" (late arrival) he shakes his head in a mournful way and tells him of the time when coal oil cost more than whiskey.

You can get a good, plain meal for 50¢; ham and eggs or Venison steak and coffee or coffee and doughnuts, 25¢; hot cakes and coffee, 25¢. Eggs cost 50¢ per dozen and other things in proportion. . . .

They say that the proportion of men who make their fortunes in Alaska are about three out of a hundred. This seems like a small proportion, but when one finds out the difficulties to be contended with it does not seem so strange. Every inch of ground has to be thawed out before being washed. Fuel is expensive in Nome, and when the pay dirt lies under twelve or fourteen feet of almost solid ice, mixed with rock and gravel, it becomes quite a task, especially when provisions have to be packed forty or fifty miles from Nome.

The beach has been worked out long ago. Worked over three or four times with rockers and pans. A man can always get work, however, but it is the hardest kind of work and the season is so short that by the time you subtract your expenses from your salary you are not so much ahead as would at first appear. The wages this year are $5 to $6 a day and board for a new hand, while an experienced man gets $8 to $10 per day and board.

The country around Nome is about as wild and desolate as one can imagine. The sea on one side beating and pounding on a gravel beach, with two wrecks still in sight (both sailing ships), and the tall white mountains a few miles inland, on the other side, while the intervening land is covered with tundra, with here and there a profusion of bright gay colored wild flowers, almost making one think he is in a tropical country.

Except for this, there is nothing but a wild waste of rocks, ice, and snow. The sun never thaws out the ground more than a foot or so through all the summer and this freezes up again as soon as winter sets in, so the frozen earth and gravel must be hundreds of feet thick.

The 1901 thaw in the Arctic was late, and in mid-July ice and snow still blocked tributaries of the Solomon River east of Nome. With little mining yet in progress, John Chambers decided to sail in the *Ruth* when she returned to Seattle. He apparently left before news came of a rich new strike on Pease Creek where, with no muck atop the gravel and bedrock at a shallow depth, tailings ran as high as thirty cents a pan.

The *Ruth* left Nome on July 11 under tow from another steamer, the *Brunswick*. After a three-day stopover at Dutch Harbor, the two ships headed east with the *Ruth's* pumps

BY F. NOWELL; THE BETTMANN ARCHIVE

Operating a scraper and hydraulic hose, miners clear away the overburden on a claim near Nome. Most mining had to await the summer thaw, and in July of 1901 John Chambers found little work. Like many others, he turned back toward Seattle with dreams of riches unfulfilled.

manned constantly to keep the badly leaking vessel afloat. When she docked at Seattle eighteen days after leaving Nome, two feet of seawater still sloshed in her hold.

July 30. Seattle. I am back here again. We did not stay long in Nome; winter was scarcely over, and everything was frozen up and no work being done up the creeks. Our ship fared so badly that most of the help had run off, and the captain would not pay me all that was coming as agreed to. He said he must have help to get back to Seattle. He promised, however, that if I would get him a man to act as assistant steward, he would pay me. I hunted around but did not find any that cared for the job. I finally went up to the jail and consulted the sheriff who gave me a man on condition that I would guarantee that he left the country. I took him down and introduced him to the captain, but not being of a prepossessing appearance, he was rejected without very much ceremony. But with me having filled my part of the contract, the captain was ready to do almost anything. He said that although he could not have such a looking chap as that for company, he would make me chief steward and raise my wages to $60 per month—and so I came down with him. He is very gentlemanly and we get along nicely. He still owes me some $30 which I will get in a few days, and I have about $140 more than when I started and have seen many sights that I will never forget.

THE PLACER MINING around Nome continued to produce some $5 million worth of gold a year until 1907, when the output began to slump. As the gold—Nome's lifeblood—drained out, the town gradually declined. A fire in 1905 wiped out the notorious red-light district, and in 1913 the worst storm in the town's history devastated many of the remaining buildings. Nome never fully recovered, and within a few years less than a thousand people walked its plank streets.

The *Ruth* returned to the coastal lumber trade but soon met with a final disaster. In November of 1903, a sudden storm rose while the ship was being loaded with railroad ties in an unprotected cove 120 miles north of San Francisco, and she was smashed upon the rocks. The crew escaped but the relentless surf battered the ship into a total wreck.

For John Chambers, the future brought new adventures and, in time, prosperity. After arriving in Seattle he continued his wanderings, traveling down the coast to Los Angeles, then back to Pennsylvania, back west across the country once again, and then to Central America. When work began on the Panama Canal in 1905, Chambers signed on as a foreman for a squad of painters. For six years he worked on the canal, earning—in addition to his pay—a small lifelong pension. Then, after a tour of Central America in 1913, he returned to the United States and established a residence in New York City. There he spent the next twenty years as a master painter applying gold leaf and doing other ornate painting in public buildings and offices, and for a time, working as an interior decorator for publisher William Randolph Hearst. Living frugally as a bachelor, he saved and invested his earnings in stocks and bonds, and after weathering the crash of 1929, decided to retire when the Great Depression plummeted wages and eliminated jobs. Still only in his fifties, Chambers devoted himself to investing, and by the time of his death in 1948, had accumulated an estate valued at over $100,000—a fortune any prospector in gold-rush Nome might have envied.

John Whiteclay Chambers II, *great-nephew and namesake of the subject of the above article, is an assistant professor of history at Barnard College, Columbia University, New York.*

Midcontinent in Transition

The Great Lakes Region

Formed less than fifteen thousand years ago, the world's largest inland seas are still undergoing dynamic change

by William Donohue Ellis

FROM THE MOON, they are visible to the naked eye. By satellite camera they dominate interior North America, photographing stark black among the soft earth hues of the continent. They are the largest area of inland sea on the planet—the Great Lakes.

A satellite view of central North America verifies in seconds a concept not really grasped at the age one usually studies geography: the picture of the vast watery heart of the continent flowing in three drainage patterns, north, east, and south. Thousands of long, narrow lakes in Canada aim their lengths at Hudson Bay like lines of force; other thousands are drawn into the southbound Mississippi; thousands more, lined up nearly parallel, pour into the Great Lakes–St. Lawrence outflow. Yet, the headwaters of these three massive concourses are separated by only a short day's portage.

The Great Lakes watershed appears more sharply defined, less sprawling than the other two. Its tributaries do not meander but dump abruptly in short, parallel lines off the steep Canadian shield and the Allegheny foothills into the Great Lakes flow.

An uncluttered view from space uncovers another insight no map quite conveys—the Great Lakes as a continental hub with the Lower Peninsula of Michigan as its center, and with Lakes Michigan and Huron forming its two halves. Highlighting this view of the bowl-shaped center of the continent is a ring of hard Niagara dolomite reinforcing the lake's shapes, resisting erosion by these powerful seas, and keeping them separated—the same rock lode that defies the thrashing pressure of the water of four lakes pouring over the brink of Niagara Falls and lashing at the walls of the Niagara Gorge, which holds Lakes Erie and Ontario apart.

This narrow Niagara River takes the downhill pressure of the waters as they sweep down the stairway from Lake Superior's surface 600 feet above sea level through the lower levels of Michigan, Huron, and Erie, to Lake Ontario's 245 feet.

The lakes decrease in size, too, compressing the waters through constricting channels over the major stepdowns. The drop from Superior to Huron at Sault Ste. Marie is 22 feet. The Niagara River descends 60 feet before the brink at the falls, where it plunges 167 feet, then down another 98 on its way to Ontario, which finally discharges 233,900 cubic feet per second into the St. Lawrence River.

Except for Lake Erie, which is in a sense a wide connecting river, these vast storage lakes are deep: the maximum depth of Superior is 1,333 feet; Michigan, 923; Huron, 750; Ontario, 802; and Erie, 210, though its average depth is only 58 feet.

One wonders how much water *is* that, in the earth's largest freshwater body: But what answer has meaning? "Sixty-seven trillion gallons" leaves us with the same question. So does "ninety-five thousand square miles." Natural history writer Robert Allen answers that it is "enough water to cover all Canada twelve feet deep"—and Canada is the earth's second-largest nation!

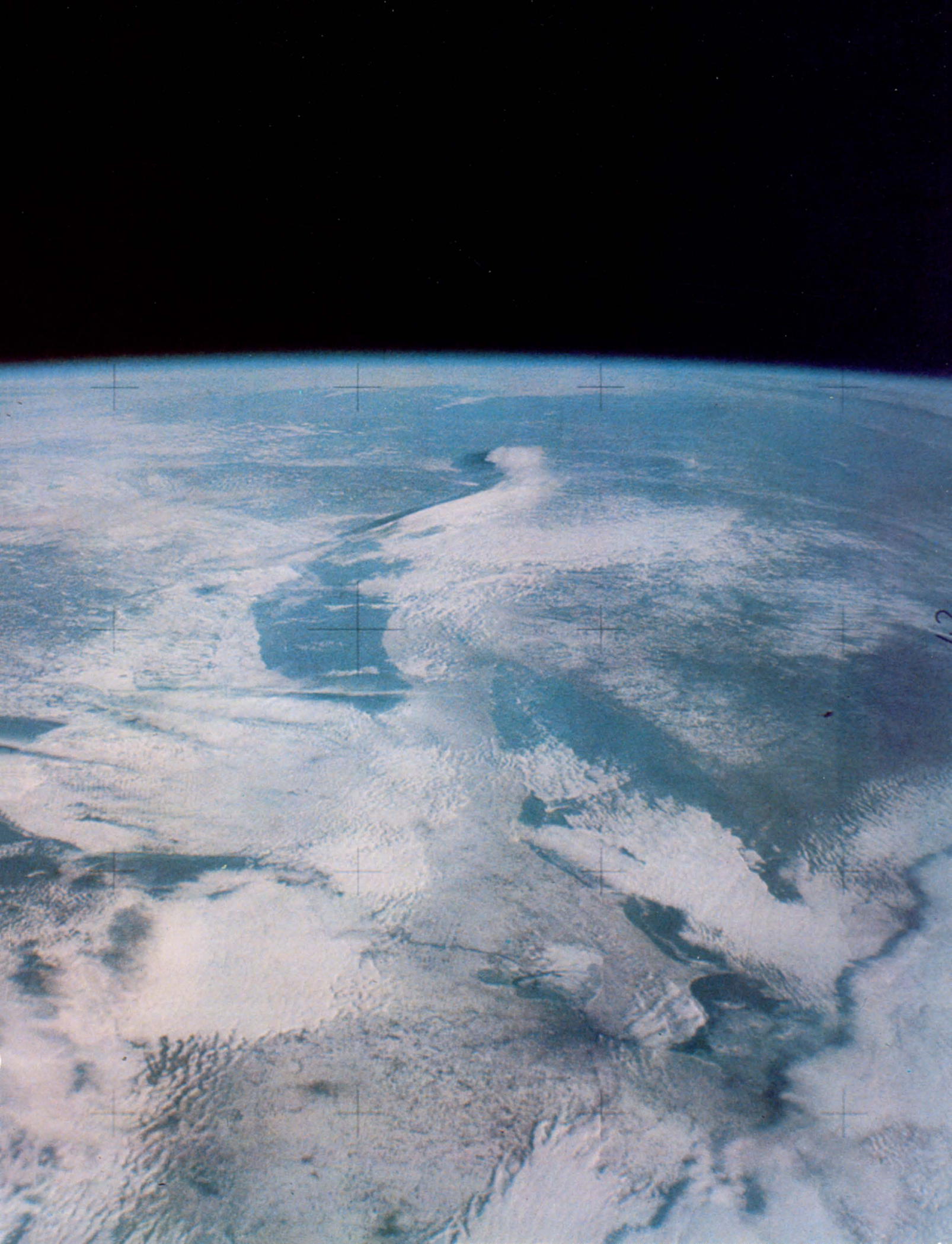
TO DECODE MOST of our continent's geological history, we are dependent upon subtle clues planted empty eons before the evolution of erect-walking, history-recording beings. But the Great Lakes region is so young that we actually have eyewitness observations of the formation *as it was happening*.

One such witness is as recent as metal-using, tool-making man. His message is decipherable and preserved for us by

This article is adapted from material in Land of the Inland Seas: The Historic and Beautiful Great Lakes Country *by William Donohue Ellis, to be released next month by the American West Publishing Company.*

A Skylab IV view of the cloud- and snow-covered eastern half of the Great Lakes shows the region much as it might have appeared near the end of the last ice age. Facing toward the northeast, the camera shows Georgian Bay and south Lake Huron at left, Lake Ontario in the middle distance, and Lake Erie at right. The St. Clair and Detroit rivers connect Lakes Huron and Erie in the center foreground.

NATIONAL AERONAUTICS & SPACE ADMINISTRATION



another human being, who had a two-part name, Agis Salpukas. The observer, as described by Salpukas, was very calm for a being with keen territorial imperative instincts who was actually witnessing violent geological evolution. He said simply, "I expected it." He was watching gale-driven waters tear away two feet of land to form a new Lake Erie shoreline. The first level of his not-so-crude shelter was flooded, and he was watching from his second level while pouring a liquid into a drinking vessel for other shore-dwelling humans from flooded shelters.

This host also had a two-part name—Alex Steve, swimming coach, Monroe High School, Bolles Harbor, Michigan. While it took a million years to form the Lake Erie basin, the Bolles Harbor shore had just been reshaped by two feet in eight hours. Mr. Steve was probably calm because as a teacher he knows the Great Lakes country is still in a dynamically formative stage. He had earlier watched Lake Erie tear out his ten-thousand-dollar concrete retaining wall, implanted to hold the geological status quo. The date of this drama was April 10, 1973; the narrator, reporter Agis Salpukas of the *New York Times*.

On the same night, in Ohio, one full lane of Port Clinton's highway dropped into gale-whipped seas. That same month, Lake Michigan's eight-thousand-mile shoreline was radically altered. A rise of one foot in Lake Michigan brings the water twenty-five feet farther inland. Chicago's luxurious Thorndale Beach condominium, which was thirty feet from the lake five years ago, is now on the lake; on April 15, 1973, twenty-five-foot waves put Lake Michigan inside the Thorndale.

Lake Erie's southern shoreline moved inland that year far enough to damage 450 houses and gently lower 50 of them into the lake, lap them apart, and float them silently away. South-shore property owners expect to lose up to six inches of land each year, and in some years as much as two feet, and they move their fences back several times as the landscape continues to form.

In a region of such dynamic geology, vessel skippers threading the Great Lakes' channels, rivers, harbors, and straits dare not use three-year-old charts. Sportsmen see the tributary lakes and streams change to meadows between their boyhood catches of sunfish and their adult search for trout. Shorelines are being straightened into smooth curves as waves and currents build bars, hooks, and spits across shore indentations, creating lagoons that turn into swamps, then muck lands. The lake floors are building deep muds. Marshes are solidifying. Niagara Falls moves upstream 125 feet between a couple's honeymoon and silver anniversary. Topographic maps of the region go out of date while they're being printed.

Laid down in Precambrian times, hard-rock formations of the Canadian shield border the western edge of Lake Superior, here seen near Palisade Head, Minnesota.

TOM ALGIRE

AMERICAN MUSEUM OF NATURAL HISTORY

During four great ice ages, advancing glaciers carved out Great Lakes features. Retreating glaciers further defined the land by depositing debris in distinctive patterns.

THE BEDROCK FOUNDATION of the Great Lakes region evolved over eons. A vast structure of rock called the "Canadian shield" loops down from the north into the Great Lakes region. Formed during thousands of millions of years, it contains records of emplacement of huge amounts of granite and other igneous rocks erupting molten from deep in the earth. This was followed by cooling and hardening, erosion of the landscape on a grand scale, deposition of great layers of various sediments, outpouring of more lava, and erosion again—all repeated many times. Finally, a half billion years ago, the long period of erosion left the shield a stable, gently rolling surface.

Onto this base the Paleozoic seas flooded, laying down marine sediments of sandstone, shale, and limestone. Some areas sank but were kept nearly filled by the flood of sediment. One of these areas is the Michigan structural basin, centered in the Lower Peninsula and extending outward to the circle seen on a common road map almost fully outlined by Lakes Michigan and Huron. Twelve thousand feet of different layers of marine sediment underlie the center of this basin.

The Great Lakes basins bear no resemblance to the shapes of their predecessor Paleozoic seas; but after the waters drained away, about 200 million years ago, the shaping of the Great Lakes region as we know it began. Mighty river systems and slow erosion of the land etched the softer rocks where they surfaced, carving broad valleys that would become the lake basins.

Only a million years ago the region was invaded again. The continental glaciers of the Pleistocene epoch moved down from the north through the lowlands and spread out of them, gouging the bedrock deeper and dumping most of their accumulated debris far to the south. After several episodes of glaciation the final northward retreat of the ice margin began.

Only about fifteen thousand years ago the ice margin retreated north, and lake water ponded between to the divides, forming the first known Great Lakes. One of these, called Early Lake Chicago, spilled over a low spot and drained southward to the Illinois and Mississippi rivers. Another, Lake Maumee, at the southwestern corner of the Erie basin, flowed through a gap at what is now Fort Wayne, Indiana, and drained down the Wabash River to the Ohio, and thence to the Mississippi (see top map on page 62).

Many retreats and minor advances of the ice margin then made a complicated series of lake stages with different surface levels and different exits. In the Michigan basin, major lakes existed whose surfaces were 60 feet, then 40 feet, then 25 feet above the present Lake Michigan. In the Erie basin Lake Maumee at one time stood 227 feet above present Lake Erie, and there were many other stages at lower levels, during each of which beaches were cut and built. These are easily visible today as shelves on the land.

While ice still formed a dam to the east in the Ontario basin, the glacier's edge retreated northward in the Huron basin and allowed the waters of Erie and Huron to flow westward across central Michigan in the Grand River Valley. Grand River, emptying into the Michigan basin, built a hundred-square-mile delta.

Retreating still farther, the ice margin then uncovered the Little Traverse Bay lowland in the north end of Michigan's Lower Peninsula, allowing Huron to drain westward and

Thousands of large and small smooth-sided boulders—memorabilia of the retreating Wisconsin Glacier—clutter the landscape on Michigan's Grand Traverse Peninsula.

GRANT HEILMAN

RON & DON BRONDZ

Weathered trunks toppled from an eroding Lake Erie shoreline are mute reminders that the Great Lakes are still in a process of dynamic formation.

bringing its surface down to that in the Michigan basin, 60 feet above the present lake. Two episodes of downcutting of the Chicago outlet lowered the lakes to 25 feet above present level. This brought into existence Early Lake Algonquin at 605 feet above sea level in both the Michigan and Huron basins.

Meanwhile, in the Superior basin west of the shrinking glacier, there was a Lake Keweenaw, draining to the upper Mississippi.

Ice retreat in the Ontario basin then allowed the Erie basin to drain eastward. It discharged at Rome, New York, down the Mohawk River to the Hudson and on to the Atlantic. The drainage lowered Lake Erie to below its present level and gave Early Lake Algonquin (in the Huron and Michigan basins) a second outlet so that it drained east to the Erie basin as well as south to the Illinois River.

Further retreat of the ice margin then opened an exit at Kirkfield, Ontario (east of Georgian Bay), and as the surface level in the Huron and Michigan basins fell, the southern outlets went dry.

By this time the ice front had retreated north of the St. Lawrence Valley. That broad valley was still depressed because of the tremendous weight of ice that had only recently withdrawn; therefore it was flooded by seawater, which extended inland nearly to the Ontario basin and northwest up the Ottawa River Valley to beyond Ottawa. Erie drained over the rocky Niagara escarpment and began cutting the Niagara Gorge. Ontario emptied almost directly into St. Lawrence waters.

THEN IN A VIGOROUS but short-lived advance, the glacier moved down again toward the southwestern end of the Superior basin; its lobes covered part of the Michigan and Huron basins, and closed the Kirkfield outlet east of Georgian Bay. Lake Superior still drained to the Mississippi. Huron and Michigan rose to discharge again at Chicago and Port Huron, and reoccupied the Algonquin shores at 605 feet above sea level. This initiated what is called the main Algonquin stage (center map on page 62). In the east the ice did not recross the St. Lawrence Valley.

The margin of the ice soon retreated northward in the Huron and Michigan basins, and the shore of Lake Algonquin followed it. At the maximum extent of Lake Algonquin, the ice margin extended from the Ontario basin through a point just south of Kirkfield, Ontario, across the northern edge of the Upper Peninsula of Michigan, and across Lake Superior from the Keweenaw Peninsula to the Canadian shore on the northwestern rim of the Superior basin. The western end of Superior contained Lake Duluth, which drained down the St. Croix River to the upper Mississippi.

Soon vigorous melting of the ice began. The glacial margin was in full retreat across a terrain still depressed from the years of heavy ice. When the ice left the vicinity of North Bay, Ontario, the waters of three upper lakes drained out there, down the Mattawa River to the Ottawa arm of the St. Lawrence. This was the situation just ten thousand years ago —only yesterday.

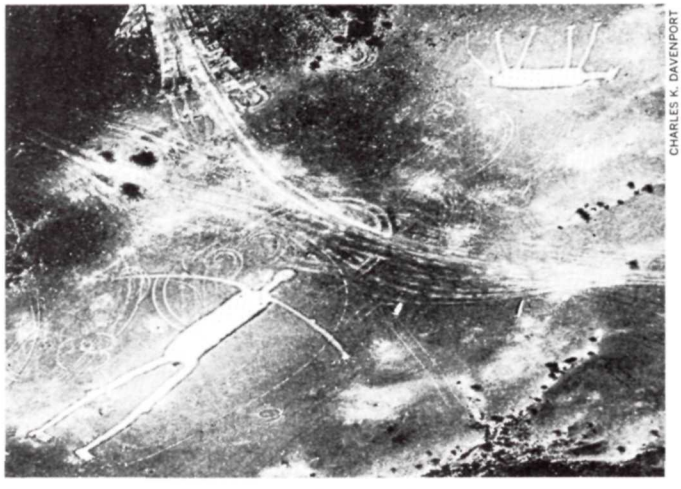
Continued on page 61

Thundering cataracts at Niagara are the Great Lakes region's most dramatic example of change; every year the falls retreat several feet upstream.

ED COOPER

A Matter of Opinion

The Fragile Desert



CHARLES K. DAVENPORT

An air view of this ancient 175-foot figure near Blyth, California, shows track damage from off-road vehicles. More recently fenced off for protection, the figure has nevertheless suffered additional vandalism by motorcyclists.

As one of the last great semiwilderness areas left in the contiguous United States, the desert lands of the Southwest and California provide Americans with a priceless treasure house of physical, biological, intellectual, and recreational resources. Yet, as is happening in other wild lands, much of our desert is facing irreparable damage under the growing impact of man and his technology. Perhaps the greatest hazard to the desert's future survival is the mushrooming use of off-road vehicles (ORVs)—motorcycles, minibikes, dune buggies, and all-terrain and four-wheel drive vehicles. There are now more than 5 million such ORVs in use today in the United States.

Causes of the ORV explosion are readily apparent. Affluence, a large population with leisure time, a multi-million-dollar industry, the need for release from the frustrations of city life, the sheer enjoyment of riding unrestrained, and supportive news, advertising, and motion picture media are at its roots. The urge to "get away from it all" and "back to nature" is laudable, but unfortunately, in this instance it is being satisfied on wheels—far more wheels than the land can tolerate.

The increase in popularity of ORVs has been so rapid that there are inadequate laws for their control, and public agencies have yielded to pressure from ORV recreationists and have accommodated ORVs in ever greater numbers on public lands.

An especially acute situation exists in the arid lands of California. The California desert occupies about one-quarter of the state—some 16 million acres. All of this region lies within easy reach of major population centers, including the huge coastal metropolis of Southern California.

Off-road vehicles first appeared in the desert in considerable numbers in 1968, and their popularity has increased rapidly since that time. Environmental destruction in some areas was soon obvious, and problems of sanitation, littering, vandalism, traffic, and personal safety of riders and other desert users became pressing. On one weekend in 1972, for example, approximately 45,000 people gathered to engage in or watch dune-buggy activities in the Imperial Sandhills. In 1973 some 20,000 assembled for the Barstow–Las Vegas motorcycle race, which involved more than 3,000 machines.

With respect to the effect of man, deserts are among the most fragile living environments on earth. Under some conditions one pass of a motorcycle can cause significant damage to the soil and plant life. When ORVs are concentrated in large numbers, they can be utterly devastating. Many acres of shrubby desert can be severely damaged in a single weekend. The rapidity with which such scars are increasing in size and number is alarming. In areas receiving heavy use, ORVs have completely denuded portions of the landscape, and recovery is expected to require many decades—if it occurs at all. As the vegetation deteriorates, so does the fauna. The mobility of ORVs has made possible vandalism in formerly remote and inaccessible parts of the desert, compounding the difficulty of preserving unique and fragile sites of paleontological, archaeological, and geological value (see photograph). Some damage to the desert lands is already irreversible. Much more may occur before ORV activity can be controlled.

I understand the great attraction the desert has for those stifled by city life. I have been going there for forty years. Knowledge of the fascinating plant and animal life makes a walk in the desert an unforgettable experience. Let us have a few areas for ORVs, but let us retain most of the desert in its pristine beauty, which we can savor by driving by road to remote areas, parking, and walking.

Robert C. Stebbins
Professor of Zoology,
University of California, Berkeley

A Matter of Opinion *is provided as an open forum. Contributions from our readers are invited, but should be limited to 750 words and must be signed.*

Indians: The Great Photographs That Reveal North American Indian Life

REVIEWED BY BERNARD L. FONTANA

WHEN A BOOK combines the words "Indians," "great photographs," and "Smithsonian Institution" in its title and subtitle, it is certain to have wide popular appeal. Most of us are at least dimly aware that the Smithsonian Institution has what is probably the world's largest collection of photographs of North American Indians, and one would expect a book containing a selection of them to be a splendid reading—or viewing—experience.

Indians: The Great Photographs That Reveal North American Indian Life, 1847–1929, from the Unique Collection of the Smithsonian Institution by Joanna Cohan Scherer with Jean Burton Walker *(Crown, New York, 1974; 190 pp., illus., map, $12.95).*

What Joanna Scherer has given us is a fairly random and broad selection of 142 photographs dating from 1847 (a Thomas Easterly daguerreotype of Sauk war chief Keokuk) to 1973 (a burial service at Wounded Knee II). The collection is presented in three parts: "The Way They Looked," "The Way They Lived," and "Envoys to Washington." Some seventy Indian groups (languages, tribes, bands, etc.) and ten cultures are represented. These include 43 pictures of the Southwest Indian culture; 42 from the Great Plains; and in rapidly descending order, 15 from the Northeast, 11 from the Northwest Coast, 9 each from the Plateau and Southeast, 5 from the Arctic, and 4 each from the Subarctic, California, and the Great Basin cultures.

Work by more than eighty photographers is included, with the heaviest representation by John K. Hillers, James Mooney, De Lancey Gill, William Dinwiddie, Sumner W. Matteson, and William Henry Jackson. Three-fourths of the pictures were taken during the four-decade period between 1870 and 1909, and thirty-six of these were made during the 1890s.

The presentation grew out of an exhibit entitled "Indian Images: Photographs of North American Indians, 1847–1928," assembled in 1970 for the Smithsonian Festival of American Folklife. We are told in the book's preface that "it is difficult to see, in the photographs taken after that date [1929], any vestige of how the Indians lived before their encounter with white culture." But since all but ten of the pictures were made after 1870—by which time there were no North American natives who were not seriously affected by white influences—the selection perhaps better meets the author's intent "to show the reader the tremendous changes that took place in Indian life during these eighty-two years. . . ." The illustrations, however, are in no particular chronological or geographical order. A Dakota (Miniconjou) portrait of 1896 is followed by a Laguna Pueblo picture of the 1870s; Powhatan (Pamunkey) of 1899 precedes Sauk (1847), which is followed by Abenaki (1860–75). The result tends to be a potpourri whose parts are held together by little more than the common heading of North American natives and by the high quality of the individual pictures.

Many of the photographs are perhaps not "great" but most are ethnographically excellent and historically important. Each merits careful study; each has a story to tell. A few are indeed works of art, such as a Richard Throssel view of Crow runners; a photograph of a Tlingit house (possibly by George T. Emmons); a Makah whaler by Asahel Curtis; a Zuñi brave and young eagles by Hillers; Kwakiutls at Fort Rupert (by C. O. Hastings or Franz Boaz); and a portrait of Chippewa brave One Called From A Distance (photographer unknown). For journalistic quality, moreover, it would be hard to match the before-boarding-school and after-boarding-school portraits of Navajo Tom Torleno or the shot of an Indian participant in the 1973 takeover of the Bureau of Indian Affairs checking the day's newspaper.

The text and captions are brief, and as will happen in condensations, errors of overgeneralization creep through. To write, for example, that weaving on southwestern reservations "provides one of the few means of income," or that "by the nineties, practically every western male, Indian or white, wore a cartridge belt," is to foster stereotypic notions wholly at variance with the facts.

There is also the underlying assumption here that Indians were static peoples who, when Columbus first saw them, were "men of great deference and kindness" that had something called "original" or "aboriginal" lands, customs, dress, and homes which were subsequently "lost" under the impact of European invasion. That culture changes cannot be gainsaid, but surely the presence of so many Indians in 1974 who continue to assert their Indianness suggests that culture is not "lost."

Photographs, however, can speak for themselves. The selection here is certainly outstanding, providing a permanent source of historical, anthropological, and aesthetic enjoyment for present and future generations of viewers.

Bernard L. Fontana, *ethnologist at the Arizona State Museum, is editor and past president of the American Society for Ethnohistory.*

Frontier Violence: Another Look by W. Eugene Hollon *(Oxford University, New York, 1974; 279 pp., illus., biblio., notes, index, $7.95).*

REVIEWED BY PAUL E. WILSON

ANOTHER LOOK is hardly necessary to support the assertion that for most Americans violence was a dominant characteristic of nineteenth-century frontier culture. But perhaps it is time for a scholarly examination—such as W. Eugene Hollon has undertaken—of some of our assumptions about violence on the frontier and its relation to contemporary violence.

In the legends of the westward movement, both hero and villain were men of violent disposition, distinguished by proficiency with the six-shooter and a casual regard for human life. The intrinsic ethical quality of the act of homicide is seldom considered in western literature, and whether killing is good or evil is determined by surrounding circumstances, the identity of the person killed, and the objectives of the killer.

W. Eugene Hollon's theses may be summarized as follows: first, violence is an American rather than a frontier tradition. Second, the violent tradition in America contributed to both frontier violence and violence elsewhere. Third, contemporary violence in American cities is not the child of violence on the American frontier. Instead, both stem from America's historical disposition to violence.

Frontier Violence contains ten chapters. In the first nine the author builds his thesis upon a review of violence on the frontier. The attention of the reader is drawn across a wide array of well-known figures and episodes—from Leif Ericsson to Billy the Kid, from the hanging of witches at Salem to the massacre of Indians at Wounded Knee. While most of the historical material consists of the retelling of old and familiar stories, this is done with charm and with appropriate scholarly objectivity. The author concludes that the western frontier was more civilized, more peaceful, and more safe than American society today, and that the frontier heritage produced more of what is good in American character than what is bad.

Accepting Professor Hollon's premise that violence in American history has occurred more often in cities than on the frontier, and that peaceful means were used more productively than violence in the winning of the West, we inquire why the theme of violence in the region west of the Mississippi has been so overplayed The question provokes thoughts that may not be answers but seem to be legitimate inferences from Professor Hollon's thinking.

In the late nineteenth century, the era of rugged individuals reached its zenith. This philosophy—added to the impact of civil war, the rise of materialism, the indifference of government to poverty, and the continuing wars upon the Indian —tended to stifle the development of an effective social conscience. The rhetoric of war romanticized violence and violent persons. Violence was often reflected in the treatment of American minorities. Bigotry, which may have been the logical successor to the religious fanaticism of the Spanish conquerors and the intolerance of the Puritans, when carried to its ultimate extent results in the forceful suppression of persons outside the favored group. Indians, Orientals, and Mexicans were often the objects of frontier violence. But rugged individualism and intolerance in the gilded age were pervasive and not limited to frontier communities. The frontier only reflected what existed elsewhere in America.

While firearms were common in the early stages of settlement when the law was ineffective, violent death occurred much less often in fact than in legend. To appease his ego, the frontiersman tended to exaggerate and to overemphasize dramatic events and the feats of the adventurer. The reality of the frontier often fell short of the dream; but the frontiersman found it better to keep the dream alive through fantasy than to admit the truth, and these are the events that Americans choose to remember today. On the other side of the coin, there is much evidence in frontier history of a respect for law and a commitment to the civilized standards of life.

Paul E. Wilson *is Kane Professor of Law at the University of Kansas, Lawrence. He combines an interest in the teaching of criminal law and procedure with an enthusiasm for western history.*

So Vast So Beautiful a Land: Louisiana and the Purchase by Marshall Sprague *(Little, Brown, Boston, 1974; 396 pp., illus., maps, prologue, biblio., appen., notes, index, chronology, $12.50).*

REVIEWED BY STEVEN L. DEL SESTO

IN FIFTEEN-FORTY-ONE, Francisco de Coronado became the first European to set foot on what was to become Louisiana. That same year, Hernando de Soto "discovered" the Mississippi River. Thus began Louisiana's two-and-one-half centuries of stormy and colorful history. Carrying his account from these events up through 1803—when Napoleon's shrewd foreign minister Talleyrand was outbargained by a shrewder Robert Livingston and persuaded to sell the entire Louisiana Territory to the United States for a mere $15 million—Marshall Sprague unfolds the epic story of how and why the infant United States acquired one of the richest territories on earth.

Responsible for shaping modern America, according to Sprague, were a Europe so self-absorbed that it could not perceive the immense value of Louisiana; the vastness and complexity of a land that baffled explorers and geographers for nearly 350 years; and the nurturing of a new nation by a man with continental dreams and the ideals of freedom, liberty, and the pursuit of happiness.

This skillfully written volume is divided into two parts: the discovery and the purchase. In part one, Sprague discusses the factors that encouraged exploration of the Mississippi River system —the fur trade, the search for the Northwest Passage, and the quests for freedom and world empire that prompted explorers like Jolliet, Marquette, La Salle, Iberville, and the La Vérendryes to seek fame and fortune in the New World. Hostile Indians, a lack of map-making and navigational skills, and above all, events in Europe—continuing war, the Industrial Revolution, ostentation, a misunderstanding of colonialism, the new idea of democracy, and Napoleon and the French Revolution — prevented Europeans from realizing the value and significance of Louisiana. Thus, throughout the 250 years of European domination, Louisiana history mirrored European history and the social and political events of its three major powers: Spain, France, and England, which traded the "ownership" of Louisiana until the end of the American Revolution.

According to the terms of the Treaty of Paris (1783), England returned the Floridas to Spain (acquired through the French–Indian War of 1754–63 and for which France had compensated Spain with West Louisiana) and the United States government gained control of East Louisiana.

Jefferson was the man most responsible for the purchase. The key to his view of democracy was the free, industrious farmer settling and working the land, thus realizing the dreams of freedom, liberty, and the pursuit of happiness. As he gazed west from Monticello, Jefferson knew the U.S. must acquire Louisiana to fulfill this vision. As Sprague hints, Jefferson's dream went beyond Louisiana to the Pacific, apparent in his framing of the Northwest Ordinance (1787) that laid the foundations of American westward expansion and settlement. But before Jefferson's expansionist dreams could be realized, the British had to be expelled from their forts and American sovereignty established in East Louisiana. Jefferson's farmers also had to get access to the Mississippi and its ports so they could market their goods. John Jay's and Charles Pinckney's treaties in the years 1794 and 1975, respectively, contributed to these goals.

Then, just before Jefferson's inauguration in 1801, Spain ceded West Louisiana to France in the "secret" Treaty of Ildefonso. Jefferson then sent Livingston as ambassador to France with explicit instructions to buy New Orleans and the Floridas, crucial for U.S. control of East Louisiana. Two years later, under orders from a disillusioned Napoleon, Talleyrand stunned Livingston with an offer to sell *all* of Louisiana. On April 30, 1803, the transaction was completed.

Adequately documented and well written, this readable book is highly recommended for those interested in American history.

Steven Del Sesto *is a doctoral candidate in sociology at Brown University and co-editor of the forthcoming book,* The Culture of Acadiana: Tradition and Change in South Louisiana.

To Possess the Land: A Biography of Arthur Rochford Manby by Frank Waters *(Swallow, Chicago, 1974; 287 pp., illus., biblio., notes, index, epilogue, $8.95).*

REVIEWED BY CHARLES R. MCCLURE

ARTHUR ROCHFORD MANBY'S quest for control of the Antonio Martínez New Mexican land grant has all the inherent qualities that provide the basis of a good story—eccentric protagonist, quaint setting of Taos, old Spanish land grant, a secret society of terrorists, topped with the mysterious beheading and death of the protagonist, Manby.

An Englishman by birth, Manby arrived in the Taos area in 1883 and involved himself in local mining operations and control of the Antonio Martínez grant of some 100,000 acres. Using procedures found effective by Lucien B. Maxwell to acquire property rights held by family heirs, Manby finally came into legal possession of the grant in May 1913.

Yet neither his grandiose schemes, his interlocking companies, nor his extensive stock sales could make the land grant profitable, and by 1916 it had reverted to the state due to Manby's failure to meet outstanding debts and taxes. After the loss of his grant, Manby's eccentric behavior became more peculiar until his presumed death in 1929.

One such peculiar involvement was his membership and possible organization of the United States Secret and Civil Society, Self-Supporting Branch. Ostensibly to protect the United States from "The Enemies," the society managed to fleece tens of thousands of dollars from gullible Taos area patriots with ploys that encompassed a spectrum of deceit, shaded with overtones of murder and terror.

While Waters devotes much attention to the society, Manby's actual relationship with the secret group and its operation—incredible as it appears—may never be known. Despite Manby's continued schemes, he never again obtained title to the land grant. In early July 1929, a body with the head severed from its torso was discovered in Manby's mansion. A coroner immediately declared death by natural causes (!) and the alleged body of Manby was promptly buried. A subsequent investigation produced more questions than answers, and the mystery lives on.

Waters's style is not as successful with an historical account as it has been with some of his recent fictional works. Because of the diffuse elements and characters in the story, he points out that this biography could have been told from three literary viewpoints: the traditional Hollywood western drama, the documentary history of a land grant and its promoter, or the introverted psychological account of Manby's obsession. The author states that it would be impossible for one account to relate Manby's life on all three levels. Thus, to solve the dilemma, Waters writes in the introduction that he has "deliberately ignored all literary pretense to form, letting the chips fall where they may."

The reader may complain that keeping the story straight while watching for falling literary chips is too great a demand. Manby's life was a maze of confusion and eccentricity, the seeming result of a conscious effort on Manby's part to conceal both his questionable business dealings and his reclusive personal life.

Acceptance of this volume will depend largely on the reader's preconceived notions of historical fiction, fictional biography, psychological history, and all points between.

The real importance of the book, however—both locally and in the larger historical framework—is Manby's obsession to possess the land, and not the anecdotes connected with his life and aquaintances.

Some historians will look forward to another account—following the example of Myra Ellen Jenkins's recent land grant studies—to provide a better development of the Martínez grant, and the pattern of Manby's promotional activities compared to other land promoters during this era.

Nonetheless, western Americana buffs and folklorists will enjoy Waters's journey into Taos local history. They will enjoy the author's flowing descriptive passages and excellent use of imagery. Waters must also be commended for collecting and writing an account of what he modestly refers to as "the greatest mystery of the West."

Charles R. McClure *is head of the History-Government Department at the University Library, University of Texas at El Paso.*

Stanley Vestal: Champion of the Old West by Ray Tassin *(Arthur H. Clark, Glendale, Calif., 1973; 299 pp., illus., biblio., index, $11.00).*

REVIEWED BY JAMES T. KING

FEW PERSONS with an interest in the American West do not know one or another of the many works of Stanley Vestal. Before his death in 1957, he was a prominent and colorful participant in writers' conferences, Westerners' groups, Indian celebrations—any function, in fact, which aroused his interest as a writer or afficionado of the West. This full-length biography of Vestal provides fascinating glimpses into the many-sided personality that Tassin numbers among those western writers who "stand out above all the rest as literary giants."

The author emphasizes the significance of Vestal's childhood experiences in determining his lifelong interest in the West. Born near Severy, Kansas, in 1887, Vestal was influenced by a grandmother who filled him with tales of the Civil War and of Kit Carson, and by a stepfather, James Robert Campbell—an educator and former member of H. H. Bancroft's research staff—who enthralled the boy with stories of the Old West. Young Vestal also was swayed by his close acquaintance with the Cheyennes, in whose company he spent a great deal of time "sharing in their old-time life," as Tassin writes, "eating their food, taking shelter in their tents, learning their language, sometimes joining in their social dances." His friends included Indian agent John H. Seger, former scout John Washee, Cheyenne warrior George Bent, and some survivors of the Sand Creek Massacre. Vestal's formal education included schooling at the Weatherford, Oklahoma, normal school, and baccalaureate and master's degrees from Oxford University.

Tassin traces his subject's professional career from its beginning at a Kentucky high school through the trying years when Vestal, as a debt-ridden professor at the University of Oklahoma, was struggling for recognition as a writer, to his later prominence as a western specialist and as head of a prestigious school for professional writers. Vestal's service in World War I—during which he concluded that he "would much prefer the old Cheyenne way to the soldier way"—was of marked significance to his career as a writer, for he then qualified himself among the old warriors of the Plains to be told the heroic stories of their own fighting days. Such information provided a basis for Vestal's many western literary and historical works, the best of which is his well-known biography, *Sitting Bull, Champion of the Sioux.*

Tassin attempts little analysis of Vestal's scholarship; the reasons for Vestal's tendency to use Indian sources uncritically, for instance, are presented only by implication. But the book is well detailed, based solidly on Vestal's papers, and the writing is straightforward and lucid. The work is a useful addition to the historiography of the West.

James T. King—*professor of history at the University of Wisconsin, River Falls—is a specialist in western military and Indian history.*

The Mexican War: A Lithographic Record by Ronnie C. Tyler with an introduction by Stanley R. Ross *(Texas State Historical Association, Austin, 1974; 90 pp., illus., map, notes, index, $10.00).*

REVIEWED BY RAYMOND FRIDAY LOCKE

THAT BRIEF AND INGLORIOUS affair we Americans refer to as the Mexican War came about at exactly the time (1846) when the art of lithography occupied an eminent position in the graphic arts in America. Photography was still in its infancy; Louis Daguerre's invention had been made public by the French government in 1839, only seven years before. All later U.S. wars were to be illustrated by photographs, but only a handful of daguerreotypes, none illustrating actual conflict, were made during the war with Mexico.

Lithography was developed in Bavaria in the late eighteenth century and was pioneered in America with a fine art landscape in 1819. The best-known American lithographer, Nathaniel Currier, entered the profession less than ten years later and, in 1840, produced the first illustrated extra of a newspaper. The extra—depicting the burning of the steamboat *Lexington,* which sank in Long Island Sound killing more than one hundred persons—caused a sensation. Thereafter Currier and his associates worked around the clock to satisfy the public demand for illustrations in news reporting.

As Ronnie C. Tyler points out in this well-researched and beautifully presented study, "Although the lithographic process is a complicated one, it was easily the best method of reproducing pictures, before the use of the camera. Furthermore, it matured at just the right time in history to become the natural form to portray the Mexican War. In fact, lithography and the war seemed to benefit each other."

Tyler has done a commendable job in the selection of lithographs used in this study and has presented a balanced and convincing case for the lithography of the Mexican War as a legitimate source for historians, carefully evaluating the accuracy of each drawing.

Raymond Friday Locke, *a former editor of* Mankind *magazine, is now writing a history of the Shoshone Indians of California.*

Doc Middleton: Life and Legends of the Notorious Plains Outlaw by Harold Hutton *(Swallow, Chicago, 1974; 290 pp., illus., maps, biblio., appen., notes, index, epilogue, genealogical charts, $10.00).*

REVIEWED BY GEORGE HART

IT IS AN almost irresistible temptation to say that Harold Hutton tells us much more than we really wish to know about Doc Middleton, but such a statement would be uncalled-for flippancy in the face of this honest and thorough piece of research. The work's unfortunate failure to convey any real feeling for the central character is probably due less to any deficiency on the author's part than to the fact that Middleton's life is of minor interest and, sad to say, the same can be said for the outlaw's "legend." In spite of this, Hutton succeeds in giving some dimension to a character whose chief claims to fame were his roles as horsethief and participant (a loser at that!) in a thousand-mile horse race from Chadron, Nebraska, to Chicago, Illinois. Indeed, Hutton has an excellent understanding and feel for the era about which he writes, a trait sadly missing in most works of this type.

While Middleton's name is certainly known to those conversant with the outlaw mystique, his proper place is in the realm of local history. He lacks the overall significance of the James brothers and their ilk. Nevertheless, anyone who maintains a general collection of "badman" literature should have this book as *the* work on Middleton. Unlike more intriguing lawbreakers of the Old West, there will be little room for other books on Middleton.

Hutton effectively, yet gently, demolishes the myths that grew out of the so-called Doc Middleton Country in Nebraska. Happily absent is the stridency one finds in the tomes of debunkers. Another point in the author's favor is that when a particular item has been researched and still not provided an answer, he simply says "I don't know." Unfortunately, this phrase has fallen into disuse in modern times, and it is most refreshing to see it revived by Hutton.

George Hart *is a free-lance writer and collector of photographs, whose specialty is the Old West.*

Solitary Star: A Biography of Sam Houston by Donald Braider *(G. Putnam's Sons, New York, 1974; 344 pp., maps, biblio., notes, index, epilogue, $10.00).*

REVIEWED BY GEORGE WILLIAMS

THIS BOOK offers new insight into the complex character of Texas hero Sam Houston (1793–1863). What emerges in this popular biography is a clear picture of a super-patriot, a man of vision, a strong-willed and sometimes vacillating politician, and also a biased, vindictive, and stubborn man.

Yet as Donald Braider points out, few men could match the colorful, violent, and strange career of Sam Houston. He was the governor of two states (Tennessee and Texas), president of a republic, an Indian guide and trader, a representative to Congress, a property speculator, a general, a teacher, an adopted member of the Cherokee nation—and a strong foe of the Mexicans and a fervent supporter of slavery. Shrewd and tenacious, Houston worked hard to preserve the Union. But the author suggests that Houston also was such an insecure person that he nearly destroyed his career at age forty and ruined opportunities to gain the U.S. presidency in 1856 and 1860. Had he become president, the author implies, the devastating conflict between North and South might have been avoided.

Margaret Lea, Houston's second wife, emerges as a more interesting person than in previous books by Llerena Friend and others. Braider implies that she opposed and even slowed down her husband's political career. He concludes that Sam Houston, the savior of Texas, was also rejected near the end of a full life of service by those for whom he had worked long and ably. Stubborn to the point of futility, Sam Houston carved out a strong, curious, and powerful name for himself that has been equaled by few other politicians in American history.

If the book has any flaw, it lies in the grammatical construction, which is often difficult to follow, thus making it sometimes impossible to exactly determine what the author is trying to say.

George Williams *is a staff administrator, teacher, and educational consultant at the University of Denver. He also is a frequent lecturer in the social sciences.*

Lewis and Clark: And the Crossing of North America by David Holloway *(Saturday Review, New York, 1974; 224 pp., illus., maps, biblio., index, $12.50).*

REVIEWED BY ROBERT A. MURRAY

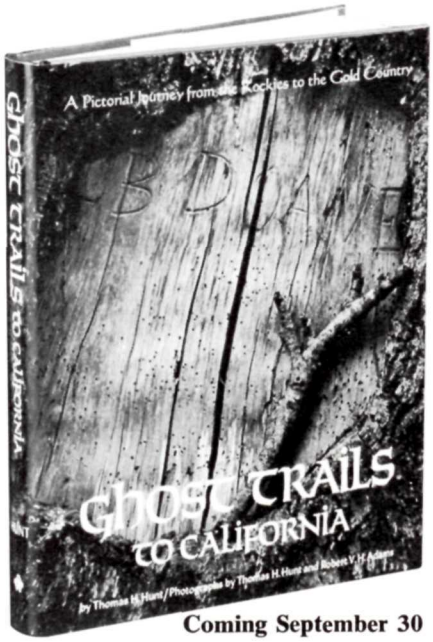
OVER the last 160 years, a wealth of material has been published relevant to the Lewis and Clark expedition, so much in fact that each addition prompts the question, "Why another Lewis and Clark book?" Scholars, who have some frequent use for the various published editions of the journals of William Clark, Meriwether Lewis, and other expedition participants, will probably be the first with the question. Yet, in truth, some of the very most important material on this overland expedition to the Pacific Northwest (1804–06) has only come into print during our own generation. And fresh work on the natural history observations of the expedition has added a new dimension to easily available knowledge about their trip.

David Holloway's book is not, however, a basic contribution to new details or to new perspectives about the exploration, which was initiated by President Thomas Jefferson before the Louisiana Purchase. Rather it is perhaps the best overall narrative thus far published about the entire expedition from its start to finish. We can recommend it highly as a first book on a complex subject.

The volume is superbly illustrated with a broad range of pictorial material, ranging from early newspaper and book engravings, through the work of major western artists, to recent photos of many key locales.

Like most books for the general reader, it does have a few shortcomings that should not have crept in. For example, Holloway has apparently gone no further than Grace R. Hebard's *Sacajawea* for the story of that durable woman and her son, accepting as he does the "Wyoming" version of their story, now long considered untenable from a standpoint of fact. For all this, *Lewis and Clark* is a generally good introductory work for the nonspecialist.

Robert A. Murray, *for some years a historian with the National Park Service, is currently an interpretive systems planner in Sheridan, Wyoming.*



Coming September 30

GHOST TRAILS TO CALIFORNIA *By Thomas H. Hunt*

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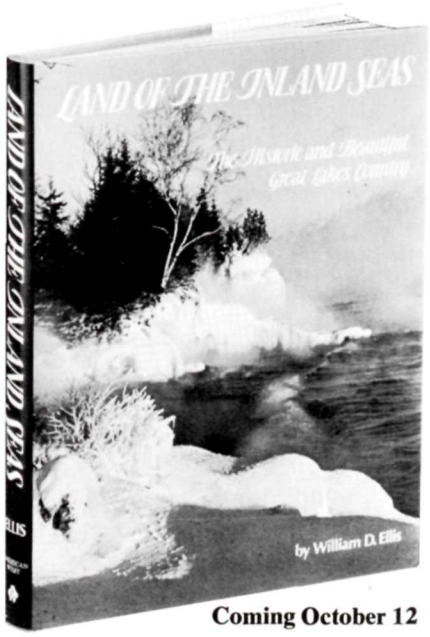

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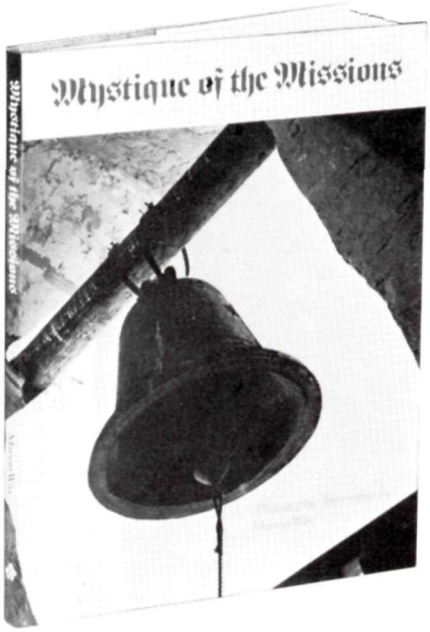

MYSTIQUE OF THE MISSIONS
Photographic Impressions by Marvin Wax

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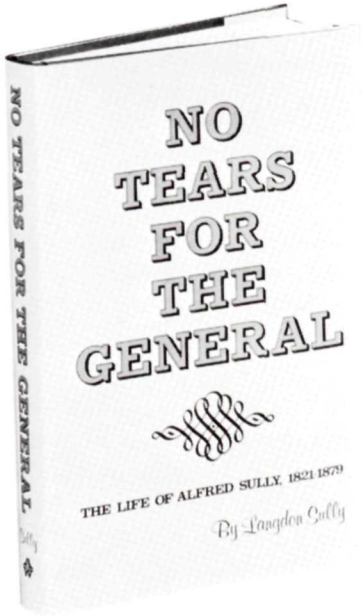


NO TEARS FOR THE GENERAL *By Langdon Sully*

$9.95

AMERICAN WEST PUBLISHING COMPANY

PALO ALTO - CALIFORNIA

BOOKS IN BRIEF

By Ed Holm

The Forty-Niners by the Editors of Time-Life Books with text by William Weber Johnson *(Time-Life, New York, 1974; 240 pp., illus., maps, biblio., index, $7.95).*

Liberally endowed with old photographs, paintings, and engravings in black-and-white and color, this account of the California gold rush is another volume in the continuing Time-Life "Old West" series. Previously released titles include *The Indians, The Trailblazers, The Cowboys, The Soldiers,* and *The Railroaders.*

American Diaries in Manuscript, 1580–1954: A Descriptive Bibliography by William Matthews *(University of Georgia, Athens, 1974; 176 pp., index, $12.50).*

More than five thousand annotated entries listing diaries (both published and unpublished) in the collections of some three hundred and fifty libraries make this a valuable reference tool for any writer or researcher working in the field of American history.

Voices From the Wilderness: The Frontiersman's Own Story edited by Thomas Froncek *(McGraw-Hill, New York, 1974; 360 pp., $9.95).*

This anthology of twenty-seven historical accounts from the American frontier contains stories by and about such adventurers as Daniel Boone, Davy Crockett, James P. Beckwourth, Jedediah Smith, Joe Meek, and James Bridger.

Water, Stone, Sky: A Pictorial Essay on Lake Powell written and photographed by Stanley L. Welsh and Catherine Ann Toft *(Brigham Young University, Provo, 1974; 77 pp., illus., map, $6.95).*

Published in an unusual small-sized format, this tastefully designed and handsomely photographed essay (eighty-four color views with accompanying commentary) celebrates the beauty and the stark contrasts of the Lake Powell (formerly Glen Canyon) region bordering southern Utah and northern Arizona.

Travels in North America, 1822–1824 by Paul Wilhelm, Duke of Wurttenberg, translated by W. Robert Nitske and edited by Savoie Lottinville *(University of Oklahoma, Norman, 1973; 457 pp., illus., maps, biblio., index, $20.00).*

This thick volume, the first fully annotated translation of an 1835 German edition, documents the rovings of a wealthy, inquisitive, scientifically oriented explorer-collecter in the wilds of the Trans-Mississippi frontier.

The Last Stand: Ralph Nader's Study Group Report on the National Forests by Daniel R. Barney *(Grossman, New York, 1974; 185 pp., illus., map, appen., notes, index, $7.95).*

"Printed on 100 percent recycled paper," this volume presents a critical view of government management policies and commercial exploitation of the National Forests, which comprise 10 percent of the nation's land area.

STIRRUPS OR PEDALS?

(Continued from page 13)

gray dawn, to wait for the command to close up and to eat. There are always bikes which break down, and it takes a little time to repair them; and men will fall and injure themselves more or less. But within an hour I had my command all up except five men, having marched nearly seventy miles in eleven hours, had one engagement, and crossed a river. And now, Colonel Ladigo, was that not good work?"

"Oh yes, Pedal, quite good; could do it myself, though." The soul of the cavalryman was bound to assert itself.

"Undoubtedly you could, but not next day." And Pedal lit a cigar, conscious that he had Ladigo down, but not finally suppressed.

"My men down the road took in a cavalry patrol without a shot—actually took in a cavalry—"

"Humph—humph! snorted Ladigo; "cavalry forsooth!—a lot of jays on plough-teams; cavalry, sir—"

"Here—here, Ladigo, come down!" expostulated the assembled officers, and Ladigo relapsed.

"Well, after a reconnaissance and information from the patrol, I found that there were over five thousand men rendezvoused there, partly organized, and armed with all sorts of guns. Old Middle was in command—you remember Middle, formerly of the Twenty-seventh Infantry, cashiered at Fort Verde in '82."

He was known to the men present, and a few sniffs and the remark that "he was bad medicine" were all that greeted the memory of Middle.

"From the patrol I found where their camps and lines and outworks to cover the roads were, and also that it was but a quarter of a mile across a wood-lot to the road by which I had intended to retire, and which ran southeast towards Spearfish and Hallam Junction, so I trundled my bikes over to it, and laid them in a column formation off the road, and left them under guard. I formed my command, and turned some fellows out of some rifle-pits which were designed to protect the road, and it was growing light. We charged into the town, which had been alarmed by our fire directed at the men in the pits. The first thing we struck was a long line of temporary camps, of what was probably a regiment which was on the other side of a railroad embankment; but they were in a panic, and offered us no resistance, while we advanced, rapidly firing, and nearly destroyed them. As we entered the town I took one battalion and directed it against the car shops, which were full of stores and troops; these men we also nearly destroyed; and

having set fire to the shops, I entered the main part of the town, and as we advanced I had it also fired. From my right I heard heavy firing, and knew that the other command had encountered opposition; and turning to my right, I struck a second railroad embankment, swarming behind with men, who were standing off the advance of the other battalion. I enfiladed them, and they retired precipitately. From the network of railroad embankments farther up the flats north of Colville I could see masses of men forming. They began firing at me from a great distance, but we were protected by the railroad fill, and did not mind it; while our sharpshooters, with their arms of longer range, annoyed the enemy quite a little, and kept up his demoralization. A great many men had gotten away from the town when I had attacked the car shops, and I was in fear lest they might form in my rear, under cover of the burning town, so I had my wounded removed rapidly to the hill where my bikes were left, and then retreated rapidly under cover of the smoke. The enemy were left so completely in the air that they advanced slowly, while from the cover of the brush on the upper edge of a field I held them in play for an hour while my wounded got a good start. At last they seemed to form and approached to my right, going around the smoke of the burning town, and as they outnumbered me four to one, they would speedily have outflanked me. I began the retreat as I had intended. I had thirty-eight badly wounded men, who had to be carried in blankets, fifty-six slightly wounded, who would be trundled on bicycles, and had left eighteen dead on the field."

"I say, Colonel, how do you remove wounded men on bicycles?" asked some one.

"It is simple when you see it, but rather difficult to explain. If you will come down some day I will be glad to show you a wounded-drill, and then you can see for yourself. By cutting sticks and tying a blanket or shelter-tent a desperately wounded man can be laid supine between two bicycles, or if slightly hurt he can be trundled, or even ridden double with a comrade, while one man can move two men and even three bicycles. Oh, I tell you, the bike is a great convenience, once you come to understand it," proceeded the Colonel of Cycle Infantry.

I SHOULD LIKE TO HAVE fought those fellows a little harder, but I was sixty miles inside of their lines, and I knew that to prolong the affair would mean that they would be heavily re-enforced; and besides, this was my first expedition. I had already destroyed the bigger half of the enemy and burned the town, and I did not apprehend a vigorous pursuit. What to do with my wounded was now on my mind. The country to the east of North Colville is very broken, wild, and sparsely inhabited. It had become necessary to abandon my wounded. I selected a point over twelve miles from our battle-ground, far back from the unfrequented road, in a very wild spot in the hills, and left every man not able to travel there, with all our rations and two medical officers, with ten men as a detail for the camp. My trail of course continued, and they were never suspected. Coming to the valley of the Spearfish, I halted and slept my command until sundown, and then started for our lines. On the way I rode into and demoralized half a dozen bands of armed insurgents, and struck our lines at five o'clock in the morning."

"What became of your wounded up there, Colonel?" asked the medical officer with the long pipe.

"The evening following, Captain Barhandle with fifty men started and made a successful march to their relief, and left two more medical officers and a lot of medical stores and rations, and came back three days after. The camp was never discovered, and was relieved when the general here made his first expedition into Wood County. They had protected themselves from prowlers by waylaying the roads, and had a dozen prisoners in camp, together with a half-dozen milch cows. My bikemen are excellent foragers, since they have been so much on outpost duty."

"Suppose, Colonel Pedal, you were forced to abandon your bicycles, what would you do?"

"We had a detachment on a scout the other day who were pressed into some bad country, and had to abandon their machines, which they did by sinking them in Dead Creek, and the next day we went out and recovered them. If it is desired utterly to destroy them, it can be done in an instant by stepping on the wheel and 'buckling' it; or if you remove the chain it is useless to any one but yourself," explained the colonel.

"Now, Colonel, do you consider that you can move your men successfully in a hilly or mountainous country?" inquired Ladigo.

"In all candor, no—not to good advantage. I can march up a hill as fast as infantry, and go down at limited-express speed; but I really want a rather flat country, with lots of roads. I am not particular as to the quality of the roads, so there are enough of them. I can move through snow which has been tracked down by teams; I can fly on the ice; and when it is muddy there is always an inch or so beside the road which is not muddy, and that is enough for me. A favorable place for a bicycle is along a railroad track—going in the center or at one side. When suddenly attacked, my men can get out of the road like a covey of quail, and a bicycle can be trundled across the worst possible country as fast as a man can travel; for, you see, all the weight of the man's gun and pack are on the wheel, which runs without any appreciable resistance, and all bikemen know how to throw a bicycle over a fence with ease, and my average march is eighty miles a day. Ladigo, remember —eighty miles a day! No kind of roads, no conditions of weather, or anything but superior force, can stop my command for an instant, sir."

And the Colonel of Cavalry rose and added, "Colonel Pedal, will you have a drink with me?"

Ted C. Hinckley *is professor of history at California State University, San Jose, and is author of* The Americanization of Alaska, 1867–1897.

THE MAN WHO TOLD TIME BY THE TREES

(Continued from page 29)

with the precious package. The lens was delivered in a quick exchange and reached camp two full days before the eclipse.

At Libertad it rained throughout the day preceding the eclipse. The telescopes had to be tied down and braced with sandbags to steady them in the gale. Douglass was exhausted from the preparations and felt defeated by the scowling clouds above. He climbed into the only shelter he could find—the long horizontal tube of his telescope. His fitful four-hour sleep was troubled by the probability the expedition would be ruined by bad weather.

But shortly before noon on the tenth, the sky cleared. Douglass ducked into his traveling darkroom and exuberantly made exposures as the moon eclipsed the sun.

When the party arrived back in Tucson, they learned theirs had been the only expedition to succeed. All of the other astronomical teams that had flocked to the California coast were rained on or clouded out. Dr. Douglass's photographs were the only existing record of the eclipse of '23.

AFTER THIS EXPEDITION, business went on at the observatory as usual, but events that would have a tremendous impact on both dendrochronology and Douglass were brewing in other quarters. Douglass's interest in tree rings as indicators of climatic change led Dr. Clark Wissler of the American Museum of Natural History to wonder if they could help solve a perplexing archaeological problem.

Much to the consternation of archaeologists, no one had yet been able to determine the exact occupation dates of the impressive prehistoric Indian ruins of the Southwest. Though a great deal was already known about the ancient peoples who once lived at places like Pueblo Bonito and Mesa Verde, the tribes had left no written language and no calendar. The archaeologists were in a quandary, and though they strongly suspected their astronomical colleague was more interested in sunspots than the age of ruins, they turned to him with their question: Was it possible to build a tree-ring calendar by which the ruins could be precisely dated?

Douglass's answer, which finally came in 1929 after three beam expeditions sponsored by the National Geographic Society, was a breakthrough in the field of archaeology. If he were to make such a calendar, he had earlier said, he must know more than what living trees could tell:

"When we reach the earliest date which the oldest weather recording tree can tell us about, it becomes necessary to search for beams that have been cut and used by man before the now-living trees took up the story. Here and there are beams, the later years of which are contemporaneous with the early life of trees still living.

"By arranging these beams in their proper time sequence [today called "cross-dating"], so the inner diary entries of each dovetail into and match the entries of its predecessors, we have an unbroken sequence of beams and trees. In this way we can push back historical dates further and further."

And in what seemed a desperate move, after the beam hunters ran out of intact timbers, Douglass and his assistants searched for charcoal lumps, the burned remainders still retaining their ring patterns.

In June of 1923, Douglass traveled to the Hopi Indian villages in search of beam sections from successively older pueblos. Wood salvaged by the Hopis from the Spanish missions they destroyed in 1680 was still being used in kivas (subterranean ceremonial rooms) and old dwellings. These timbers Douglass hoped to use in formulating his calendar.

He and two assistants rented some rooms in an Indian house at Oraibi, Arizona, and immediately began locating old structures where the salvaged wood might be found.

In order to enlist cooperation—or at least toleration—from the villagers, Douglass carried along a beautiful piece of purple chiffon velvet for the chief, Tawa-Guap-Tiwa. The chief, pleased with the gesture, gave them permission to sample what timbers they might and often called on the three in the evenings to chat and smoke in the moonlight.

Beam sampling required certain precautions. To appease the spirits and the Hopis, the "hunters" had to say certain prayers and fill the holes they left with turquoise. This had to be done, the Indians insisted, to keep the spirits of decay from lodging in the timbers.

During their stay at Oraibi, the time came for the ceremonial Bean Dance, and the chief invited his guests to attend. Some of the men in the ceremony represented the sympathetic spirits of rain. "Our brothers in Oraibi are ready to plant their beans, and need rain to make them grow," they chanted. "Come, let us help them."

As Douglass watched the ceremony he realized that "I was one term in a human series. Those before me were praying to the powerful spirits that rule the rain. I myself was there to study the rainfall history in pine timbers and learn the great natural laws which govern the coming of rain. We are all doing exactly the same thing, each according to our lights."

From Oraibi, the search took the scientists to Walpi, Hano, and Black Mesa, until Douglass, using living trees and old beams, had extended his tree-ring calendar back in time to A.D. 1260.

In addition to this historic chronology, Douglass had what he called a "floating" prehistoric ring sequence 585 years long which had been developed from the beams of the Aztec, Pueblo Bonito, Cliff Palace, and Betatakin ruins. The series "floated" because Douglass could not pin it to definite calendrical dates.

Douglass had to find some way to unite this second chronology with a ring record of known age. If this could be

achieved, he could deduce the occupation dates of the old ruins and solve one of the Southwest's most perplexing mysteries. Douglass had to locate a site containing wood specimens younger than those of his floating chronology, yet older than those found in the Hopi villages.

Color gradations in northern Arizona pottery provided a vital clue. Archaeologists knew that the pottery of the area had evolved from red to orange to yellow. Douglass's floating chronology came from sites with a predominance of red pottery, while the older part of his historic sequence was found at sites with yellow pottery. The solution seemed simple: ruins where orange pottery predominated might yield wood whose rings would bind the two sequences together.

In 1929 the Whipple ruin at Show Low, Arizona, was selected for testing, and Douglass and several archaeologists moved into the only hotel—right across the street from the site. Their first glimpse of the ruin did not fill them with a sense of destiny. It was the backyard of Edson Whipple, who had overturned every room in the old village site to find primitive pottery and at the same time extend his garden.

A small crew of laborers signed up, and a five-dollar reward was posted for any beam having a hundred rings or more.

In an attempt to sample widely, one of the workers dug by a stone wall which cut off the main part of the ruin from a few smaller rooms. Not far below the surface, his shovel hit the charred end of an ancient roof timber, the largest piece found so far.

Douglass arrived just in time to take the fragile piece out of the ground. He carefully wrapped it with string to keep it from flaking apart, then commandeered one of Whipple's sheds on the property for some quick field tests. He counted back in time. The earliest ring proved to correspond with the year 1237, two decades older than the earliest part of his existing historic chronology.

Throughout the afternoon Douglass studied his specimen, extracting every bit of information it might hold. After dinner that evening, the four scientists gathered in the hotel's reception room, around a small table lit by a hanging gas lamp. A charcoal smudge on Douglass's nose grew larger and larger as he checked and rechecked the specimen.

Finally the answer came.

"I think we have it. Ring patterns between 1240 and 1300 of this historic sequence correspond in all important respects to the youngest part of the prehistoric sequence. This means there was no gap at all."

The overlap between the floating and historic chronologies was so slight that there previously had not been enough evidence to cross-date them. The beam from Whipple's backyard had bridged the gap.

The archaeologists sat spellbound.

"This means Pueblo Bonito was occupied in the eleventh and early twelfth centuries, and the other large ruins of Chaco Canyon are of the same age." Douglass continued his recitation, revealing in turn the ages of forty major ruins.

A. E. Douglass's work was a milestone in archaeology. He not only had turned time back on a grand scale, but had built an unbroken climatic record twelve hundred years long at the same time.

To this day, Dr. Douglass's tree-ring system remains the most exact means of dating the remains of preliterate people, and his unique contribution has given the Southwest the most precisely dated prehistory in the world.

When the University of Arizona established a full-time tree-ring laboratory in 1937, Douglass became its director. Today the work he began is being carried on in the only complete laboratory of its kind.

Douglass retired as active director in 1960 at the age of ninety-two. But, as he was a highly productive individual possessed of a low-key overriding drive, he spent nearly every day of the remaining two years of his life at his office, in a fervent effort to complete his work on long-range weather prediction based on tree-ring and sunspot-cycle information.

Shortly before his death he wrote in a letter to a friend: "I believe I have found the cause that profoundly affects droughts and floods. I feel confident that it will be possible to predict these generations ahead, but there are some very complex details that will take immense calculations."

Andrew Ellicott Douglass died before this work was completed, in May of 1962, but the astronomer-archaeologist left behind an enduring legacy: the science of dendrochronology —the key to the West's talking trees.

Daphne Overstreet *is a writer and staff assistant in the Laboratory of Tree-Ring Research (of which Dr. A. E. Douglass was the first director) at the University of Arizona, Tucson.*

MIDCONTINENT IN TRANSITION

(Continued from page 47)

The land to the north and east was rising rapidly at this time, rebounding from the ice. This raised all the steps in the upper chain of lakes. When the North Bay sill came as high as the old southern outlets, five thousand years later, Lakes Huron, Michigan, and Superior were at the same elevation, forming Lake Nipissing, 605 feet above sea level. This largest of all the postglacial lakes at first had three outlets: the still-rising North Bay exit and the old, stable ones to the south (at Port Huron, Michigan, and at Chicago). Lake Nipissing may have endured for a thousand years; it made some of the strongest shore features of the region—wave-cut bluffs and broad beaches bordered by massive sand dunes. After the North Bay outlet rose too high to carry any of the discharge, increased flow to the south started cutting down the bed of the St. Clair River, and the lake level was lowered.

There was a halt in the downcutting of the outlet of Lake

Huron, however, which held Huron and Michigan for a time at the Algoma stage, 595 feet above sea level. Then, probably because of a shift in river channel, downcutting resumed until Huron and Michigan came to their present levels—580 feet above sea level—about three thousand years ago. Meanwhile, the sill of the Superior basin at Sault Ste. Marie had risen above the level of the southern outlets and Superior became independent, rising above Huron, where it has been ever since.

What is the Great Lakes' future? The land to the north of Lakes Superior and Huron is still rising at a rate of one foot per thousand years. The outlet of Lake Ontario, on hard rock, will be worn away slowly by the clear lake water flowing over it. However, it is rising faster than it wears down, and the resulting slight rise in lake level is felt on its southern shores. The future for Superior is the same—a natural hard rock sill at the Sault, reinforced by man's construction of the Soo locks system, is rising slowly.

Lake Erie will be the first to experience a major change. Niagara Falls, wearing away the brink, is retreating headward at about five feet per year; the Niagara Gorge will ultimately eat its way into Lake Erie and drain it completely. When Erie is drained, Huron and Michigan will be lowered.

Though the Great Lakes came to approximately their present average levels three thousand years ago, wave action on the shores continues its work—especially during the years of high levels, which come and go in response to variations in precipitation.

WHILE GLACIERS were shaping the immediate lake basins, they also sculpted the plains. When a glacier resumed its retreat after a halt, it left behind a *moraine*, a low hill made up of glacial debris dropped in much the same way that a melting snowdrift beside the highway drops an elongated pile of gravel thrown into it by snowplows. These moraines are positioned not only at the rims of the lakes but also far to the south—anywhere the glacier began a halting retreat during a melting climate. Hence to the south we have lines of long, low hills like those running east from Shelbyville, Illinois, into southern Ohio and bending northerly to Pennsylvania, then southerly to Long Island, New York. The substance of these ranges is highly miscellaneous rock and soil collected by the glacier in its grinding trip down over North America.

The same kinds of materials were also deposited in different patterns important to midcontinent ways of life. When rising temperature forced a more rapid and steady retreat, this accumulated detritus, instead of forming ranges of hills, was spread evenly in broad till plains. This collection of silt, debris, and rock—scraped off Canada and spread over New York, Ohio, Michigan, and Illinois—would overlay the bedrock with a deep, fertile mantle, which in turn sponsored thick vegetation and forests. This overburden kept preglacial rock outcroppings scarce, thus concealing for many years much of the deeper, mineral-rich rock.

MAPS & DIAGRAM BY MARY WILEY

The Great Lakes had many previous shapes. As the Wisconsin Glacier retreated in periods of warming climate, lakes formed in the basins at its melting edge. In colder periods the glacier readvanced, pushing the waters back out of the new lakes and diminishing them. Ensuing withdrawals recreated them, at the same time rearranging the divides that shaped them. In one early stage (top), Early Lake Chicago and Lake Maumee each discharged its overflow into the Mississippi River Valley. Several thousand years later (center), Lake Duluth emptied into the Mississippi Valley; Lake Aglonquin discharged both into the Mississippi and into Early Lake Erie; and Lakes Erie and Iroquois drained through the Mohawk River to the Hudson.

Another type of land feature, found particularly in Michigan, is the conical hill, or *kame,* formed by streams flowing in tunnels on or through the glacial ice and carrying along gravel and sand. When such a stream came to the edge of the glacier or to an outlet hole in the bottom, it would surge out, piling up water-sorted pebbles, rocks, and debris in a cone.

The composition of these kames differs somewhat from the moraines. In forming a moraine, the melting glacier edge merely eased its mixed load straight down, and the components retained their relative and random positions. However, the kame has more definition. Fast-running streams separated the fine from the coarse, the sand from the boulders. Coming off the rim of the glacier, the fine materials would arc out with the water, while boulders reaching the lip would plunge straight down. Therefore a kame will often have a south slope of fine sand and a north slope of boulders.

Another set of glacial footprints over the region are *eskers*—long, narrow ridges ranging from a quarter mile to many miles in length. They were formed by streams, flowing on, in, or under the ice, which became choked with debris like a clogged pipe. When the ice melted, this material would settle down right where it was in a steep, elongated pile, twenty to two hundred feet high, depending on the diameter of the pipe in which it had accumulated.

Drumlins are hills, shaped like overturned kyaks, that point in the direction of the ice movement. These piles of till or outwash were smeared by glaciers into streamlined shapes.

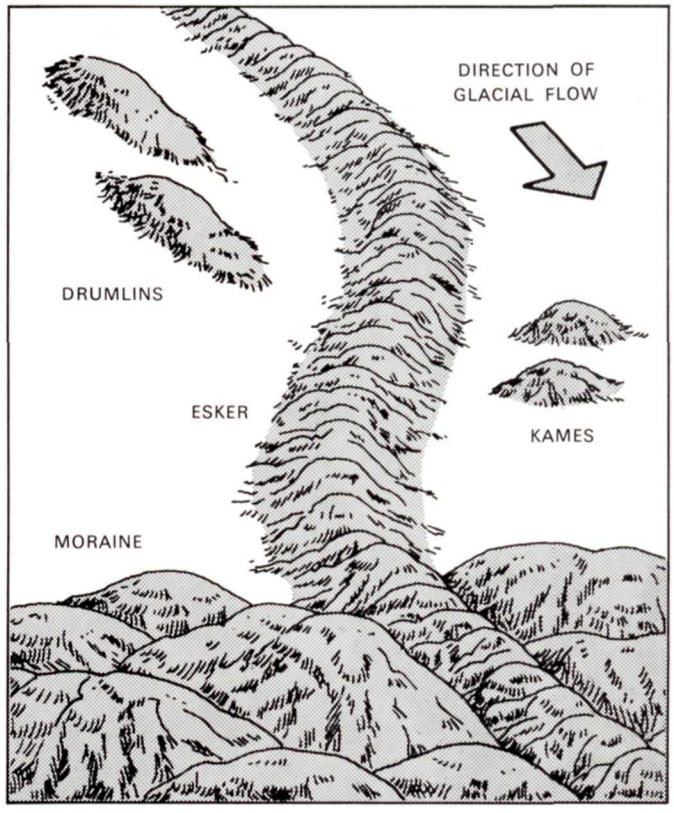
A *nunatak* is a high, hard point around which the glacier flowed. The very tip of the arrowhead of land pointing southwest dividing Lakes Huron and Erie is a nunatak. It separated the glacial front into two lobes, the Erie and the Huron. Today it holds these lakes apart—for awhile.

The kames, moraines, eskers, drumlins, and outwash plains were mixed accumulations of limestone, sandstone, granite, gneiss, copper, iron ore, and gravel collected during the glacier's course.

During centuries of warmer weather, the thickness of the ice shield decreased, relaxing the pressure and retracting the glacier. As it retreated, plant and animal life followed its face north at a respectful distance. During darker centuries, the glacier advanced again, fossilizing mammoths, mastodons, and marine life.

The weight of the thickest part of the glacier pressed the edge outward and southward in lobe-shaped salients. These lobes were driven not only south but east and west as well. Each lobe became a smaller version of the total glacier.

Man has used everything this evolution built. Abandoned lake outlets became beds for canals and highways. Ancient beach lines, now high above water, became footpaths, then trails, then railroad shelves, and were always chosen as the level for military forts. Glacial spillways, till plains, and lake beds became meadows in Wisconsin, orchards in New York, forests and wheat fields in lower Canada and Michigan, and the great rent-payer in the corn and hog latitudes of Illinois, Indiana, and Ohio.



Glacial debris forms a basis of much Great Lakes topography.

UNAWARE of these massive natural earth movements, Frank DeVries climbs onto his bulldozer at 7:00 A.M. and shatters the air north of Toledo, cranking his puny twin 400-horsepower diesels to life. He is specially trained to operate this new twin-engine bulldozer with the highest daily cubic-yard capacity in the earth-moving world. His assignment is restoring the Lake Erie beach line. A sign on the side of his machine says "We Move the Earth," and DeVries carries himself with that belief.

DeVries is still amazed at the power of his bulldozer. But he might be staggered to know that as he teaspoons earth in three-cubic-yard cuts, nature is tilting up the whole northern part of the continent—an inch every ten years for each hundred miles north of the great continental hinge under the lakes—tending to pile the waters up against the southern and eastern shores.

Meanwhile, we humans must plan in shorter term. Frank DeVries runs an hour overtime because the radio forecasts rain tomorrow, and the governors of the Great Lakes states meet to plan a break-wall system bigger and tougher than the one behind Alex Steve's dwelling, to hold the shape of the lakes . . . for awhile.

William D. Ellis *is a magazine and television scriptwriter, as well as an author of several books. Each of his three novels on the Old Northwest*—The Bounty Lands, Jonathan Blair: Bounty Lands Lawyer, *and* The Brooks Legend—*was for several months on the* New York Times *and other best-seller lists.*

Forthcoming in
THE AMERICAN WEST

Richard Henry Dana wrote that "a song is as necessary to sailors as the drum and fife to a soldier." Sea shanties—folk songs of the sea—rose out of this need for expression, and for us today they provide an unparalleled, intimate view of nineteenth-century sea life. In **Flights of Spirit Before the Mast,** Robert J. Schwendinger takes us on a voyage to this world of romantic songs that haunt the sleep.

off to Texas on vacation, got caught up in a series of disastrous events that almost cost him his life. In **Reporter on the Spot,** Paul Laune recounts the adventures and misadventures of journalist George Wilkins Kendall and the ill-fated Texas–Santa Fe Expedition—including his grueling overland trek to Mexico City as a prisoner of Santa Anna.

In other forthcoming articles, Betty Roda Anderson explores the natural sphere of **Weather in the West**, Clifford M. Drury examines a possible long-lost portrait of pioneer missionary **Marcus Whitman,** and Franklin Folsom relates a notable archaeological breakthrough in **Amateurs, Mavericks, and the Discovery of Early Man in America.**

THE BETTMANN ARCHIVE

Golden opportunities are where you find them: this enterprising turn-of-the-century miner rocked out $10 per day in the middle of Nome, Alaska's, Front Street.