Operation White Tower

Bradford Washburn

THE ORIGINAL idea for Operation White Tower was developed by Paul Hollister, of RKO Radio Pictures, which expects to film *The White Tower* in the Alps next year. This picture will require infinitely more "on location" photography than any other movie produced in years. Furthermore, the greater part of this photography will have to be done at higher altitudes and in much colder weather than most Hollywood productions. Before plunging headlong into a million-dollar project 12,000 feet above the sea and 7000 miles away from home, RKO asked the New England Museum of Natural History if it would be willing to take two of their cameramen and a representative of their publicity department high on a big mountain to familiarize them thoroughly with conditions as bad as the worst they could possibly expect to encounter while shooting *The White Tower*.

It was not Mr. Hollister's idea to have this a small party which would merely study the use of heavy, electrically-operated camera equipment on a large mountain. He wanted to have "Operation White Tower," as the expedition came to be known, a self-supporting enterprise which would photograph a half-hour short subject, while its personnel were learning the limitations of studio equipment on a big peak and while the public was becoming further imbued with the magic words "White Tower."

The New England Museum agreed to undertake this project provided that RKO made it financially possible for the Museum to carry out a number of purely scientific objectives which would make the expedition a thoroughly useful and practical enterprise. RKO promptly and enthusiastically agreed, because such an expedition would obviously result in a much more interesting film than one which simply related the physical story of a mountain ascent with no other objective than reaching the top.

After considerable deliberation, Mount McKinley was chosen as the ideal location for this expedition, not only because it was climatically and photographically ideal for RKO's experiment, but also because the New England Museum was already keenly inter-

ested in carrying out extensive survey work, photography and geologic collecting in that region.

Definite plans for Operation White Tower were not started until late in January 1947, thus allowing barely two months of preparation before the vanguard of the party landed at the foot of McKinley. Because this expedition offered a unique opportunity for the first really lengthy stay on the upper slopes of McKinley, the Museum communicated with a number of different Government departments and private individuals which it felt might profit by cooperative field study. By the end of February, the basic scientific objectives of Operation White Tower were determined as follows:

(1) To undertake Cosmic Ray Research at Denali Pass (18,150 ft.) for the Physics Department, University of Chicago, which agreed to furnish all equipment and an experienced observer to accompany the party in the field.

(2) To make a thorough survey of the area around and to the east of McKinley and of the approaches to McKinley from Wonder Lake. This was to be done both on the ground, with equipment furnished by the U. S. Coast and Geodetic Survey, and from the air by the B-29's of the 46th Reconnaissance Squadron of the Army Air Forces.

(3) To undertake a geological collection between McGonagall Pass and the tops of both peaks of McKinley in order to tie into the work already done in the adjacent lowlands by the U. S. Geological Survey.

(4) To compile a detailed weather record with instruments furnished by the U. S. Weather Bureau.

(5) To permit representatives of the Army Air Forces and Army Ground Forces to carry out field tests of various articles of new equipment and food throughout the course of the expedition.

(6) To film a photographic story in movies and still pictures to document the efforts of the party to achieve these various objectives.

Because the major scientific goal of the expedition was cosmic ray research in Denali Pass, the Army Air Forces agreed to furnish air support in order to effect the establishment of this special high-altitude camp. The Alaska Communications System also offered to help by setting up at Wonder Lake a radio relay station which would make possible constant reliable contact between Anchorage and all the camps on the mountain—coordination essential to effi-

cient air support. The National Park Service not only permitted the use of the Wonder Lake Ranger Cabin as a radio station, but also allowed Chief Ranger Grant Pearson to accompany the party on the mountain.

The personnel of the party was rapidly chosen during February, but never met as a group until we all reached Anchorage late in March. The Museum was extremely fortunate in being able to gather together so experienced, able and congenial a group on such short notice:

Anderson, Carl (horses); Browne, George (artist); Christensen, Hakon (pilot); Craig, Robert W. (American Alpine Club); Deeke, William (RKO cameraman); Gale, James E. (representative of the 10th Rescue Squadron); Hackett, Lt. William D. (representative of the Army Ground Forces); Lange, G. Robert (University of New Hampshire); Norris, Earl (dog driver); Pearson, Grant (Chief Ranger, McKinley Park); Shannon, Leonard (RKO); Solberg, Sgt. Harvey (radio operator); Sterling, William (RKO); Victoreen, H. T. (University of Chicago); Washburn, Bradford, and Mrs. Washburn (New England Museum); and Wellstead, George H. (RKO cameraman).

The organization of an expedition to Alaska in 1947 was very trying. Not only were we beset with incredible difficulty in obtaining almost every single item of equipment, but steamship freight to Alaska was hopelessly snarled by labor trouble, and the only reliable means of travel was by air. Accordingly Northwest Airlines was used, and during March and April this line carried eight passengers and over 11,000 pounds of freight from Minneapolis to Anchorage without the loss of a single item. In one instance a load of air freight was actually carried from Boston to Muldrow Glacier in slightly less than 48 hours' elapsed time!

The snow and weather conditions on McKinley naturally determine the best time of year to attempt the climb. Unfortunately the best never occur simultaneously. The best weather appears to be during July, the best going underfoot during April and May. Airplane landings on Muldrow Glacier are dubious after April 20th, though they have been made successfully as much as three weeks later. What determined April 1st as the date of establishment of Base Camp at McGonagall Pass was the great weight of the professional movie equipment (over 500 lbs.) which had to be carried

to at least 12,000 feet. We planned to use a dog-team in order to minimize a huge and already unavoidable back-packing program, and dogs cannot work efficiently on the lower Muldrow Glacier much later than June 1st.

George Browne * and Bob Lange reached Anchorage on March 15th, at once setting to work with Jim Gale to sort freight and to prepare it to be flown to the Base Camp or dropped at other points on the mountain later in the spring. The Alaskan Air Command generously provided part of a Quonset hut in which all the freight was stored and sorted, except for the frozen meat and Birdseye food, which was handled at Castner's Cold Storage in Anchorage. The Tenth Rescue Squadron, to which this Quonset hut belonged, was assigned the job of handling all of our aerial liaison by General Atkinson, the air commander of this theatre.

Advance operations were carried out speedily and ahead of schedule. On March 17th Gale and bush pilot Hakon Christensen made the first landing on Muldrow just below McGonagall Pass. They used a small Waco cabin plane and carried a light load of canned gasoline. The purpose of the flight was mainly to mark the 3000-foot landing strip with twigs and to test snow conditions to see if they were satisfactory for a heavier plane. An unbroken spell of evil weather prevented even an attempt at another flight until the day after the whole party was assembled in Anchorage.

An unusual streak of excellent spring weather made flying to the glacier safe and easy. Christensen and Gale made a second trip with a 2000-pound load in a Norseman plane on March 28th, and two days later Browne and Lange were landed at McGonagall Pass and set up the nucleus of Base Camp on March 30th. The Wonder Lake radio station for relay of our messages, together with three months' food supplies for the operator, were flown in on April 1st and 2nd. Sgt. Harvey Solberg, our efficient Signal Corps operator, assisted by Mr. Moore, a Signal Corps engineer, had this station (WXE-2) operating perfectly by April 3rd.

Day after day of warm clear weather in Anchorage was fast melting the snow off Hood Lake, whence we were taking off for our ski flights to the mountain, and we literally worked day and night to get our personnel and freight in to Base Camp before the ice began

* The son of Belmore Browne, who had an old family score to settle with Mt. McKinley.

to rot seriously. While temperatures at Base Camp dropped to 20 and 30 below at night and hovered just above zero in the daytime, spring hit the seacoast in earnest. Anchorage became a sea of slush.

On April 12th Gale, Victoreen and Shannon landed on the glacier with our last load of freight, and the expedition as a whole went to work in the field. Gale, Pearson, Craig and Hackett spent most of their time reconnoitering up-glacier and establishing a safe, practical route for dog-teaming. The two icefalls of Muldrow were very badly crevassed this year—far worse than I could recollect from 1942 or Grant Pearson from the 1932 expedition. Hence several days were spent on a job that otherwise would have been very simple. Two of the advance guard took nasty spills into deep, hidden crevasses before a good route was discovered and marked out. An advance camp to facilitate this reconnoitering was set up in the middle of the first icefall at 7200 feet, six miles above McGonagall.

Meanwhile Bill Deeke and George Wellstead, of RKO, worked furiously on their film; and Lange and I began observing from the survey stations according to the plan of operations supplied us by the Coast and Geodetic Survey. We also completed a collection of geologic specimens typical of the McGonagall granite and Birch Creek schist, the two dominant formations in the lower Muldrow area.

The method which we used for making our long survey shots between the hills just north of Muldrow Glacier and the main control station at Wonder Lake, 20 miles away, was simple but very successful. On our 8 A.M. radio schedule with Wonder Lake we made another schedule three hours later. By then we had packed our light Forest Service SPF radio telephone set to the top of McGonagall Peak, 800 feet above camp, and set it up beside our theodolite. The theodolite was focused on the Wonder Lake Ranger Cabin, where Sgt. Solberg ran our radio relay station, about 100 yards from the key survey station in the Wonder Lake area. At 11 A.M. we contacted Solberg on our radio and told him we were ready to observe. He took a large mirror over to the survey station and kept flashing us with it till we told him on the radio that we had made the necessary number of repetitions of our angle and that they checked properly. This system required flawless visibility between these points as well as good radio and survey teamwork. The survey work was bitterly cold, as the lowlands around Wonder

Lake were rarely clear except with a light cutting northerly or northeasterly breeze. Later on, this same system was used successfully from both Gunsight Pass and Browne Tower.

On April 15th Earl Norris, our dog driver, arrived after the 100-mile overland trek from McKinley Park headquarters, which he covered in four days. By the time the dogs reached camp, our vanguard had marked a route up to our first advance camp, and Norris started relaying supplies forward as fast as possible.

Ten days later the second group of our party moved ahead from Base Camp to Camp I (7200 ft.), and there joined Gale, Pearson, Craig and Hackett about two-thirds of the way up the lower Muldrow icefall. Gale, who is the Alaskan Air Command's top expert on cold weather rescue operations, is also an expert at igloo-building. By the time we reached Camp I, he and his eager pupils had constructed two fine big igloos for sleeping quarters.

I believe our use of igloos on Operation White Tower is the first time that they have been steadily relied upon as shelter on a major mountain expedition. They were wonderful. Although they were somewhat humid and never could be kept really warm inside, they were never at all cold. They did not flap in a gusty wind. They did not have to be dug out after a heavy snowfall. Almost best of all, once built, they were up for weeks, as long as the weather stayed cold. On a cold night, the temperature dropped to 15 or 20 below zero inside a tent almost the moment the stove was turned off, even though it had been 60 or 70 above with the heat on. Inside the igloos we always had to ventilate in order to keep the daytime temperature, even when cooking, down to about 35 degrees above; *but,* with the stove off and vents nearly closed after bedtime, the igloos rarely got colder than 20° above even when it was bitterly cold and windy outside. When we broke camp, we simply rolled up our sleeping bags and crawled out, just as if we were leaving a house. If we had to reoccupy a camp that we had evacuated a week or two before, all we had to do was shovel a drift of snow out of the doorway, open the vent in the roof, and set up housekeeping. Although above 11,000 feet we did a lot of cooking in igloos, we preferred to have a separate cooktent. The 8-by-10-foot (oval-shaped) igloos slept three to four men comfortably, but the 9-by-12-foot wall tent was far more practical as a chow tent for the full 13-man party.

While the vanguard again pushed ahead to establish a camp at 8500 feet, halfway up the Great Sérac, Earl Norris and I returned for a day to McGonagall to meet Bill Sterling, our new correspondent, who had been sent from Hollywood to replace Shannon. Poor Sterling was flown almost non-stop from broiling California to Muldrow Glacier in three days. He barely got in, as the ice on Hood Lake had completely rotted away. Christensen was forced to fly his plane to the Cook Inlet mud flats at low tide in order to be able to take off for his last flight to the glacier on skis. The sight of his snappy red Waco plane with eel grass and mud all over the skis and struts was a fond reminder of the thrilling flights we had made from the Valdez mud flats to Lucania with Bob Reeve ten years before.

The Muldrow icefalls were in wretched condition. Although there had been reasonably heavy winter snows and no early spring thaws at all, it had been a very windy year. The big crevasses were completely uncovered and far worse to navigate through than in July 1942. Our route up both icefalls was so tortuous that in several places 200 yards of trudging through deep snow would net us only 30 or 40 feet forward up the glacier.

We had no air-drops between McGonagall and 11,000 feet; hence our packing program of 600 pounds of movie gear and about 500 pounds of dog-food in addition to our own food, clothing and camping equipment was very heavy. The last load was hauled into the Great Sérac camp (Camp II) on May 8th, three days after our first reconnaissance had reached the lower col of Karstens Ridge.

It was our hope to carry out a week of intensive glacier motion experiments at Camp II; but, to our dismay, preliminary observations showed the glacier moving only 15 inches per day at this point. The type of observations needed for the experiments we wished to make required at least three feet of movement per day, so this project was promptly dropped. Below 11,000 feet, Muldrow appears to be moving very slowly even in its steepest portions. At McGonagall Pass sand cones observed on the ice near the pass in 1942 and 1944 appeared to be in almost exactly the same place in 1947, and the big avalanche moraine at the corner of the glacier, four miles above McGonagall, seems to have advanced only about a half mile in the 15 years since the Carpé-Koven disaster.

MOUNT McKINLEY FROM THE WEST

Photo, B. Washburn

On May 12th, after a wicked siege of back-packing movie equipment, batteries, food and a dozen sacks of evil-smelling dried fish (dog-food) up the Great Sérac, our last contingent arrived at 11,000 feet, where Jim Gale and Victoreen had already established a splendid three-igloo village. This was the end of the trail for Earl Norris, George Wellstead and the dogs. The glacier back-packing was concluded two miles below Camp III, and Norris relayed supplies up to camp in a series of short heavy loads from a large cache just above the Great Sérac, while the rest of us lost no time in going to work on Karstens Ridge. The Tenth Rescue Squadron made two drops of dog-food, gasoline, and other equipment at this camp; and we were rapidly set up there for a stay of nearly four weeks.

Up until this time we had advanced slowly and methodically. We had reached the glacier early in April to assure safe landings and takeoffs for our airplane, but we had had no desire to get onto the high part of McKinley before mid-May because of the fierce winds and extreme cold there at that time of year. We had therefore devoted our time to various chores—surveying, painting, geology, photography and glacial motion—while the sun rose higher in the sky and spring came to the lowlands.

In sharp contrast to the wretched conditions of the lower glacier, Karstens Ridge was in excellent shape, windpacked and covered with from one to three feet of fresh drifted snow. Gale, Craig and I made a swift reconnaissance to Browne Tower (14,700 ft.) on May 13th, leaving fixed ropes on the ice-step at 13,000 feet and on the "coxcomb," 500 feet higher, where treacherous windslab conditions seem to prevail almost always. We had a surprise and thrill that day when we discovered the fixed rope left by our Army party in 1942 still firmly attached to a picket at the ice-step. The rope was in such good shape and the picket still so soundly stuck in the ice that we actually fixed our new rope through a loop in the old one! About 18 inches of blue ice had accumulated during the five years since 1942.

We easily relocated both the 1932 and 1942 caches at Stuck's old Browne Tower campsite. The real disappointment of the day was the discovery of the two minimum recording thermometers left near these caches in 1942: one minimum indicator read 60 degrees *above* zero, the other read 40 below, neither a very close second to the

LAST 5000 FEET OF MOUNT McKINLEY FROM THE SOUTH
Photo, B. Washburn

almost incredible minimum reading of Archdeacon Stuck's thermometer found in 1932 after a lapse of 19 years.*

The need for fixed ropes on any part of Karstens Ridge is negligible for an ordinary climbing party, but they were a godsend for our frequent relays with heavy packs. George Browne, I believe, holds the all-time record for packing on the ridge by carrying up a 94-pound load on one trip! Despite excellent air liaison both below and above the ridge, we undoubtedly packed more food and equipment up it than any previous party. This was done in order to set up reliable camps at 12,000 feet (IV) and at 14,700 feet (V), so that trips between 11,000 and 18,000 feet could later be made without the slightest delay or danger of being caught somewhere without food or shelter. We had one igloo at 12,000 feet, two igloos at Browne Tower (14,700 ft.), and another large igloo at 16,500 feet on the plateau between the two great icefalls of Harper Glacier.

On April 30th the Tenth Rescue Squadron's B-17 had dropped five cases of 10 in 1 rations free-fall in Denali Pass on a pre-arranged schedule, while we were winding our way upward through the crevasses of the first Muldrow icefall. Unfortunately a case of gasoline and a ski-sled dropped by parachute at the same time missed the target completely and were irretrievably lost down the bottomless abyss to the west of the pass. Knowing that there was no gasoline at Denali Pass, we took more than originally planned up Karstens Ridge. We were confident of finding the rations in the pass, as they were packed in large orange wooden boxes at least twice the size of ordinary ration cases and would almost certainly be blown clear by the terrific gales that sweep the pass throughout the year.

Victoreen, Hackett and Gale spent the night of May 14th in the igloo at 12,000 feet on the first flat gable of Karstens Ridge. The next day, as they advanced to Parker Pass, Barbara and I moved up to 12,000. The following day in dense, impenetrable fog we climbed to Browne Tower together and joined the others. Up to this time Operation White Tower had been clicking right on schedule, but now old McKinley started to cut up in earnest.

---

* When found by the Lindley-Liek party in April 1932, Archdeacon Stuck's alcohol thermometer registered "lower than the minimum range of the thermometer, 95 degrees below zero Fahrenheit." The accuracy of this instrument has been questioned. The thermometer left near the summit by Belmore Browne in 1912 has not yet been discovered. See *A.A.J.*, II (1933), 39; V (1943), 12; V (1945), 433-4.

As we had approached the peak and worked on the foothills in April and early May, we had seen scarcely a day when the summits above 15,000 feet had not been capped in clouds and ripped by furious northerly and southwesterly gales. Regardless of how calm and nice it might be in the lowlands, the top of McKinley was an almost constant inferno in the spring of 1947. In fact, between the time I landed on the glacier (April 10th) and the end of the expedition (June 30th), there were only five days on which the summit could possibly have been attained with any degree of enjoyment.

We spent one full day (May 17th) surveying and igloo-building at Browne Tower, and then started up the Great Basin. The weather being perpetually fierce, we decided to attack Denali Pass forthwith, regardless of conditions, rather than to wait a seemingly endless time for a pleasant day. Gale and I had camped a good deal together before, and I knew the Great Basin intimately from past experience, so we became the logical vanguard of the party for the next advance. Barbara, Hackett and Victoreen acted as support at Browne Tower, and the remainder of the party busied itself by taking 35-mm. movies of Karstens Ridge at every possible clear moment.

All five of us climbed from Browne Tower to the top of the first Harper Icefall on May 18th and left light loads there, marking an excellent and easy trail in perfect snow conditions, which did not even require snowshoes on the level 15,000-foot plateau. As expected, the weather did not improve, and Gale and I moved into the 16,400-foot camp on May 20th in a gathering southwester. We put up our tent in a gusty 40-mile wind which rapidly increased to 60 or more. The thermometer, which had dropped to better than 20 below zero during the last two nights at Browne Tower, rose to $-10°$ minimum, and a wild blizzard raged about us for 18 hours. The wind abated a bit on May 21st, and we hustled up the glacier a third of a mile to the bottom of the next icefall (16,500 ft.). There we spent as unpleasant an afternoon as I have ever experienced, building an igloo in dense fog, gusty wind and drifting snow, with the mercury barely above zero. It takes 40 to 50 blocks of snow roughly two feet square and six inches thick to build an igloo. I did the quarrying of the rough blocks with a 30-inch handsaw. Gale tapered them with a machete and set up the igloo. A big igloo is an easy half-day job for two men at 10,000 feet, but at 16,500 we labored for four hours and

had not even started the tunnel entrance when we retreated to our near-by camp at six in the evening, looking more like snowmen than human beings. As we groped our way back to camp through the storm, we discovered a little dead bird (Lapland Longspur) lying in the trail. This and a Redpoll found dead after a storm at 17,700 feet a week later are the highest records of wild life ever found on this continent north of Central America.

The next morning we broke camp in a fierce gale, and moved up to the igloo, finished the entrance, and left our equipment there. Then we climbed to Denali Pass in an inferno of blowing snow and located four of the five cases of rations which had been dropped there three weeks before. This gave us an excellent food reserve, but our gasoline was running very low. As the storm redoubled its fury that night and through the next day, we used our fuel only for cooking. We went to bed when we got cold. We were in constant contact by radio with the camps at 11,000 and 15,000 feet, where both were taking a terrible lashing from the gales. Hackett and Victoreen managed to carry up some gasoline and equipment to us in a lull the same afternoon we reached Denali Pass, but Victoreen's Geiger counters, which were the key component of his cosmic ray apparatus, were still cached at 16,400. They intended to bring them up to the igloo that day, but the storm increased again after lunch and they decided to carry them forward on another trip. In fact they reached Browne Tower in a veritable tempest of wind and snow on their return journey. Few if any of our movements above 15,000 feet that week could possibly have been made without a thoroughly willow-wanded trail.

Jim Gale and I at the 16,500-foot igloo were less than a two-hour walk from Denali Pass, but the weather above the igloo was fantastic. For 48 hours we never even went outdoors. The wind outside was at least 90 miles an hour, and the radio from 11,000 cheerily reported 100 miles of wind, two tents blown flat (one of them a new Army pentagonal tent), and all hands holding down the cooktent for dear life. Barbara reported savage gusts, dense fog and heavy snow at Browne Tower. McKinley Park Headquarters, 14,000 feet below us, reported a heavy warm rain and the buds coming out on the trees!

The Great Storm, as we came to call it, abated a bit more on May 26th, and Gale and I hastily moved our tent, two days' food

and a gallon of gas to Denali Pass in two relays; but again the lull was only a matter of a few hours. By supper time the tempest hit us again with redoubled fury, and we had an unpleasant night in a wildly flapping, half-buried tent, spoiled as we were after the comparatively quiet, peaceful life in our igloo at the camp below.

Dismal news reached us that night. Victoreen and Bill Hackett had carried a load up to the igloo at 16,500 feet from Browne Tower and had been unable to find any trace of the precious bundle of Geiger counters at the 16,400-foot cache. The storm prevented a really good search, but the area all around the cache was honeycombed with huge crevasses, and it looked as if the whole bundle had been blown away by the gale. Inasmuch as a Geiger counter is as important in a cosmic ray outfit as an engine is in an automobile, this report made a bad night even worse. One of the key objectives of the expedition had been to carry out the cosmic ray experiments at Denali Pass. It appeared that McKinley had again successfully thwarted efforts to do cosmic ray work on her slopes.* Victoreen sadly told us that it would be virtually impossible to replace the lost counters in less than a month. We wired the bad news to Dr. Schein, of the Physics Department at the University of Chicago, dug the tent out again, and started supper with our last gallon of gasoline.

The Great Storm finally fizzled out after nine days of almost ceaseless blizzard, and on May 30th Barbara, Victoreen and Bill Hackett advanced to join us at Denali Pass. An air-drop the night before had solidified our position beyond all question by giving us 20 gallons of gasoline and additional food to bolster the four cases of rations which we had retrieved from the advance drop of a month before.

While we strengthened our foothold in Denali Pass, Craig, Lange, Deeke, Pearson, Browne and Sterling moved up to Browne Tower in two shifts. Then came really good news. A telegram from Dr. Schein in Chicago told us that all the Geiger counters had been miraculously replaced, were already on their way to Anchorage by air, and should arrive by June 6th. Our happiness knew no bounds. The Tenth Rescue Squadron also improved our morale. They made several flights over camp to drop, both free fall and by parachute,

* See *A. A. J.*, II (1933), 45 ff.

an 800-pound knockdown insulated house for the cosmic ray work, and 2000 pounds of food, gasoline and equipment for army tests.

On the evening of June 5th, Barbara, Bill Deeke and I reconnoitered a trail to 19,200 feet on the South Peak and Hackett and Lange chopped a route out of the pass up the steep 800-foot buttress of the North Peak. When June 6th dawned clear, cool (−27°) and windless, we were ready to move in either direction.

At 10.30 A.M. of the 6th, Barbara, Deeke, Pearson, Craig, Hackett, Lange, Gale, Browne and I set out for the South Peak, armed with loads of survey and photo equipment which averaged about 40 pounds apiece. Conditions were perfect. The snow had been windpacked to the consistency of concrete by the Great Storm, and our crampons cut into it little more than they would have into the surface of a skating rink.

We followed a new route. In 1942 we had wallowed to the top up the old trail on the northeast side of McKinley's summit cone. The prevailing southwest and south winds at this time of year appear almost always to bury the lee side of the cone beneath a deep mantle of fluffy powder. Our new route followed the crest of the westerly buttress of the South Peak, which connects it and the Archdeacon's Tower to Denali Pass.

The ascent of the last 2000 feet of the South Peak is downright easy from a climbing standpoint. The only difficulties which one can expect to encounter are extreme cold, wind, and the usual discomforts of relatively great altitude. Most of these are minimized by the new western approach. Not only is the ridge well windpacked, but its position makes it possible for one constantly to watch the southern and western horizons for bad weather. Nine-tenths of McKinley's bad weather comes from the southwest, a direction impossible to watch from the old northeast approach; hence the unfortunate experiences of the Parker-Browne party of 1912.

We had a beautiful climb through almost cloudless and windless skies. Views of the North Peak, Mount Foraker and the great abyss to the southwest of McKinley at the head of Kahiltna Glacier were impressive and never-to-be-forgotten. At no point were we ever on a sharp or corniced ridge until we reached the last 200 yards of great ice hummocks just below the top. Our only disappointment came when a pounding heart forced Grant Pearson to turn back just above 19,000 feet.

We had a late lunch halfway up the big western snowslope, after crossing the broad flat plateau between the summit and the Archdeacon's Tower. A half hour of ploughing through deep snowdrifts after lunch brought us to the summit ridge at 3.30 P.M., and there the weather abruptly changed.

The temperature was about 20 below zero, and now an icy southeast breeze hit us as we tackled the steep summit drifts. The skies to the south and southwest were rapidly clouding in, and a high milky overcast sped above us to take the place of the clear blue of the forenoon. Barbara, Hackett and Lange pushed ahead while the rest of us lingered a bit behind to take pictures of their arrival on the top. At 4 P.M. their tiny black forms snailed their way up the final drift; and McKinley had been climbed for the fourth time, the first time in history by a woman.

Twenty minutes later the rest of us joined the already frigid little party on the summit. To our complete amazement, Barbara had just discovered the bundle of willow wands jammed into the summit drift by Bob Bates in July 1942. They were not covered by snow and not more than three feet from the actual top. Almost all the black paint had been sand-blasted off them by five years of wind and snow.

A blustering southeast breeze and lowering clouds made my second visit to Denali's peak a sad contrast to the beautiful afternoon when we had lolled there in the balmy sun of July 1942. This time we had not only unpleasant weather but also work to do. By the time I reached the top, Hackett and Lange had the theodolite set up; and we at once started to swing the three key angles desired by the Coast and Geodetic Survey. Special care was given to obtaining accurate readings on the North Peak and Mount Silverthrone, which are key points in the ground control of the McKinley region.

By the time the survey work had been completed and the angles checked, our fingers were numb with cold and the once-clear valleys below us were rapidly filling with gray, evil-looking clouds. After a hearty handshake all around, we bade farewell to the windswept summit at 5.30 P.M., leaving an eight-foot bamboo survey marker and orange flag on the top of the highest drift.

It is a mystery how little one feels the altitude going downhill. We stopped only once, just below the summit, to clamber 80 feet down a very steep, crusty slope on the south side in order to collect

geological specimens of the McKinley granite. As we descended, the weather steadily improved. We sauntered happily across the upper plateau, past the Archdeacon's Tower and down the ridge toward Denali Pass. The cirrus veil which had obscured Foraker since early morning lifted and dispersed. A glittering sea of cumulus clouds surged against the western precipices of the North Peak. Tiny lakes on the lowlands appeared here and there through rifts in the fog, shining brightly despite the dense afternoon haze. As we reached camp, the skies completely cleared, the thermometer dropped to 24 below zero, and we had one of the finest evenings of the whole expedition.

The following day dawned cloudless, crisp and still. Though we were not too eager to set out on another climb immediately after our chilly experience on the South Peak, we vividly remembered the weather of the last two months and felt that we had better profit by clear skies while we had them! Fortified by a monstrous breakfast of fresh grapefruit, cereal, bacon and coffee, we set out for the North Peak at ten o'clock, again laden with survey and camera equipment.

The North Peak, unlike the South, is by no means a snow dome. Its sharp crusted summit is immediately underlain by the jet black rocks of the Birch Creek schist. A thousand feet beneath this schist lies the massive intrusion of the yellowish McKinley granite, which forms the core of the whole mass of McKinley. This little black sedimentary cap on the North Peak has been thrust up nearly four vertical miles out of the lowlands in one of North America's greatest faults.

Two hundred yards east of Denali Pass the snowfields of upper Harper Glacier climb steeply up into this black schist. Following Lange and Hackett's 400-foot staircase in this icy snow, we worked our way out onto the precipitous slaty rocks. We then traversed a series of snow-covered platforms and jagged, frost-loosened ledges to the crest of the cliffs 800 feet above Denali Pass. The views of the South Peak and Mount Foraker during this climb were truly magnificent.

Once atop the first crags above the pass, one is startled to see the summit cone of the North Peak, still over half a mile away, on the other side of a broad, gently-sloping snow saddle. Trail markers are probably more essential here than during any other part of the ascent of McKinley, for there is not a profusion of easy routes up the cliffs

above Denali Pass, and if one were caught in a sudden storm near the top of the North Peak, loss of the trail on the return journey might easily prove disastrous.

Bill Hackett, Shorty Lange and I, carrying the survey and photographic gear, went ahead. The others, ably led by Bob Craig and Jim Gale, followed a half-hour behind us. Leaving the rocks just after noon, we descended easily across the firm-packed snow of the great saddle and had a bite to eat on a ledge at the base of the final cone. Thence we zigzagged upward, first on broken rocks, then on snow and crust, till we attained the crest of the spectacular summit ridge a few hundred yards west of the peak.

Never before have I seen such fantastic precipices as on the northwest face of the North Peak, called Wickersham Wall after the pioneer Alaskan judge who first assaulted this side of the mountain in the spring of 1903. This tremendous glaciated rampart drops more than 14,000 vertical feet to the surface of Peters Glacier in a staggering series of snow slopes, hanging glaciers and jagged rocky cliffs. As we peered gingerly over the edge, we realized that we were looking down one of the greatest precipices known to man.

The final ridge of the North Peak was uncorniced when we climbed it, extremely steep to the north and quite gentle on the south. The usual afternoon clouds were rapidly obscuring the plains to the north, but beyond the beautiful white dome of the South Peak, the whole Chulitna Valley lay cloudless beneath the clear blue sky. There was not a breath of wind. The temperature hovered around ten below zero, and the sun actually beat warm on our backs as we clambered to the top of the final pointed drift.

The view from the North Peak far excels that from the South. The South Peak itself, moulded by ever-changing shadows as the sun slowly swings around behind it, Browne Tower and the Traleika Basin, seemingly close enough to touch, and the long twisting course of Muldrow Glacier all contribute to a breath-taking panorama.

Surveying from the North Peak, although not to be recommended as sport at ten below zero, was still a picnic compared with the job the day before on the South Peak. We were lucky to have such perfect conditions, because the North Peak, speaking purely in terms of survey importance, is a far more useful station than the South Peak. The domed top of the South Peak is hard to identify

precisely from any direction, even with a powerful instrument, while the North Peak has a distinct summit.

The weather was so perfect that we surveyed, photographed and drank in the magnificent view for three full hours atop the North Peak. The others joined us for an hour, then left an hour before we did. Finally at 5.20 P.M., as the shadows lengthened in the valleys and a sharp bitter breeze started to blow from the south, we took a last look at Peters Glacier and its great abyss, then headed downward toward home. A more perfect day on the heights would be hard to imagine.

Victoreen's hut was nearly done when we returned to camp that night, but the Geiger counters had not as yet reached Anchorage. As it was clear that we might have more delay in getting the cosmic ray work started, next morning Bill Sterling, Pearson and Browne descended to Camp III at 11,000 feet in order to lessen food and fuel consumption at Denali Pass. It was amazing to see how much we were eating at that camp despite the altitude. I attribute this entirely to two factors: all our cooking was done in pressure cookers, which assured the food being thoroughly cooked despite the altitude; and all of our fruit and vegetables were Birdseye frozen, with the result that the food was not only delicious, but far higher in vitamin content than the best dehydrated products.

We ate much more palatable and better balanced meals at Denali Pass than we had in Anchorage! High-altitude appetite is certainly finicky and unpredictable. For example, none of us had the slightest desire for cocoa or chocolate above 12,000 feet, though both were coveted delicacies below that. Basically, however, fresh fruit and vegetables, frozen meat and toasted fresh bread and butter seemed to taste just as well at Denali Pass as they do at sea level.

Survey work and geologic collecting near our high camp were concluded on June 8th. As dog-food and fuel were beginning to run low at 11,000 feet and a complicated survey program still awaited completion at Wonder Lake, on the 11th, Barbara, Craig, Hackett, Deeke and I descended to the head of Muldrow leaving Jim Gale, Shorty Lange and Victoreen to handle the cosmic ray program as soon as the Geiger counters could be parachuted. The counters were now in Anchorage and the weather fine, but, as luck would have it, the plane was out of order!

No sooner did we reach Camp III* than another furious southwester swept the mountain, leaving in its wake nearly three feet of fresh new snow. We wallowed down to the 7700-foot plateau between the two séracs after the storm abated, our old trail heavily buried, but still well-marked and firm through the crevasses. With exposed film, geologic specimens, survey and camera gear, we were loaded down with well over half a ton of equipment.

On the 16th we had a splendid warm spring day. Starting at 2 A.M., we made three back-pack relays through the crevasses of the lower icefall, piled up a cache below it for the dogs to haul down later, and reached McGonagall Pass in mid-afternoon, footweary and sunburned red as lobsters. That night, as we enjoyed the fragrance of alpine flowers and moss, we watched the B-17 parachute Vic's Geiger counters safely in Denali Pass.

The next two weeks were among the most pleasant I have ever enjoyed in Alaska. The weather was splendid, and Superintendent Frank Been loaned us a Park Service truck, which greatly facilitated completion of survey work at our four key stations between Eielson and Wonder Lake. We spent a genial evening with Johnny Busia, the lone resident of Kantishna, and caught dozens of luscious grayling in Moose Creek. Meanwhile, Victoreen and his companions put the finishing touches on a large and carefully-protected cache of food and equipment at Denali Pass and started the long descent.**

On the same day, Carl Anderson and I took off on a three-day pack-trip to the head of Muddy River and Peters Glacier; but, hampered by a storm, we never saw McKinley once during our three-day trip. On horseback all the way, we succeeded in going to the very bottom of McKinley, five miles above the snout of Peters Glacier, where we found a broad grassy meadow (4550 ft.), doubtless where Wickersham and Cook had camped in 1903. Above us the great wall of the North Peak rose fully 15,000 feet into a sombre curtain of fog, sleet and rain.

---

* Passing on Karstens Ridge the three-man party led by Gordon Herried, of the University of Alaska, which later reached our 16,500-ft. igloo and returned without climbing higher, because of the acute illness of one member of the party.

** Minimum recording thermometers given the expedition by the American Alpine Club Research Fund were left in large rock cairns at Denali Pass, Browne Tower and McGonagall Pass.

On June 30th Jim Gale, Victoreen and Lange waded the McKinley River and arrived safely at Wonder Lake. Operation White Tower was now at an end. Our party had been on McKinley for 92 days. We had completed our entire scientific and photographic program except for glacier motion studies—and it was not our fault that Muldrow did not move quite fast enough! Over one hundred dollars worth of first aid equipment still lay unused in its box, minus a few aspirin tablets, sleeping pills and adhesive tape for the inevitable crop of blisters!

As we drove eastward toward Park Headquarters, McKinley reared her twin summits behind us all day—the only time in over 100 days that she had been totally clear from sunrise to sunset. Our expedition had not only attained its objectives but it had been one of the most perfect social experiences I have ever had in the mountains. Although report would have it that we frolicked up McKinley nibbling fresh strawberries, with a daily rain of parachuted supplies, I think it only fair to state in conclusion that, despite the wonderful assistance of the Alaskan Air Command and pilot Christensen, we still sledged and back-packed more equipment up McKinley than any other party. The loan of Grant Pearson by the Park Service and the loan of Earl Norris by the Weather Bureau both helped us inestimably; but, when all is said and done, it is teamwork rather than individuals that climb a big mountain. It was with a keen sense of sorrow that our party at last broke up and headed homeward after a splendid and unforgettable experience.

UPPER MULDROW GLACIER

A badly crevassed area seen from the northeast. The "Great Sérac" is in the center

Photo, B. Washburn