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BROKEN clouds shrouded the Alaska Range as our Air Transport Command plane touched down on the wet tarmac at Fairbanks with a cargo of equipment and the final members of the Alaska Test Expedition. At two in the morning it was still light enough for us to recognize Walter Wood and our Commanding Officer, Colonel Marchman. All of us had news to offer and questions to ask, for no one knew all that had been done since Colonel L. O. Grice of the Quartermaster Corps attended the spring council meeting of the American Alpine Club two months earlier and asked for the Club's assistance in testing equipment. Sprawled over one of the bare bedrooms in the Bachelor Officers Quarters at Ladd Field, one after another of the expedition told of his share in the undertaking. That night only part of the tale was told, but the more complete story goes like this:

Many items of mountain, arctic, and emergency clothing and equipment were developed by the United States Army Quartermaster Corps and the United States Army Air Forces throughout the winter and spring of 1942. Field tests in bitter cold, however, had not been made for a variety of reasons, and with large scale procurement imminent, it was felt essential that such tests be performed if a suitable locality could be found. To discuss the Quartermaster problems Colonel L. O. Grice attended the spring council meeting of the American Alpine Club and asked for assistance. He did not know that at the same time the Army Air Forces at Wright Field were having similar anxieties, for as the value of northern operations increased, so did the importance of clothing and emergency equipment for fliers in the frigid areas. The Air Forces too felt it essential that field tests be made to guide procurement of cold weather equipment for the winter of 1942-1943.

Such was the situation in mid-April when the American Alpine Club, through Bradford Washburn, Walter Wood and myself, brought the Quartermaster Corps and the Air Forces together. Washburn perhaps did most to make the joint program possible for he had been discussing an Air Force test expedition at the same time that Wood and I had been working on plans for the Quartermaster Corps-Alpine Club program. Accordingly, Washburn and I discussed the entire matter with the Quartermaster General, who became keenly interested in having a well coordinated plan. Negotiations resulted in the testing expedition being approved by the commanding generals, Services of Supply, and Army Air Forces.

Plans for the expedition by now were well started. As the Air Forces wished the Quartermaster Corps to organize and conduct the test work, Lieut. Colonel Frank G. Marchman, QMC, was appointed commanding officer of the expedition, with me as second in command. Washburn was specifically responsible for the Air Forces test program and Wood of the American Alpine Club contingent. Mt. McKinley National Park was selected as the test area, for considerable study of several regions showed the Alaska Range best suited to the many problems involved. The approval of Mr. Newton Drury, Superintendent of Mt. McKinley National Park, was obtained, as well as a promise to provide assistance in transportation of supplies to the mountain.

As important as the test area was the personnel, for a blend of experienced Army men and trained mountaineers was needed. The following men were finally selected:

American Alpine Club

Sterling B. Hendricks

Terris Moore

Einar Nilsson

Walter A. Wood, Jr.

Army Air Forces

Pvt. William Goddard (musher)

Lt. Paul Hansen

Capt. Harold Lund

Sgt. Wilbur Musser (Cook)

Bradford Washburn

Army Ground Forces

Capt. A. H. Jackman

Sgt. Peter Gabriel

Medical Corps

Capt. Jack Bollerud

Royal Canadian Air Force

Fl.-Lt. Peter Webb

Royal Canadian Army

Capt. E. R. Gibson

Signal Corps

Lt. Waldo Elmer

Quartermaster Corps

Lt. Col. Frank G. Marchman, C. O.

Capt. Robert H. Bates

It is interesting to observe that eight of the party are now members of the American Alpine Club, but it is more important to note that the emphasis of the test program was laid fully as strongly on arctic, cold weather, and emergency equipment as on clothing and material for mountain troops. Thirteen of the party had had previous Alaskan experience and a fourteenth had just been assigned to duty near Fairbanks.

The entire group was never completely united at any one time. As a matter of fact, rarely were there more than eight or ten together. The first contingent leaving for Alaska consisted only of Wood and Washburn. They left on May 25th, more than two weeks ahead of the main party, in order to reconnoiter and photograph the test areas from the air, make arrangements for use of planes by the expedition, and to establish Base Camp and start parachuting loads if this were feasible. A good start had been made on this ambitious program when the Japanese attack on Dutch Harbor caused many things to change in Alaska. The second contingent of Lt. Colonel Marchman, Lt. Elmer, and Sterling Hendricks, leaving a week behind Wood and Washburn, was considerably delayed and for a while the future of the expedition was distinctly dubious. Fortunately, however, the equipment which Moore and I had been hard at work on for over a month was packed and shipped, and the final members of the expedition, to their great delight, were carried through on schedule. Such was the situation two months to the day after Colonel Grice's attendance at the spring council meeting of the American Alpine Club.

At Fairbanks the advance parties had not been idle: Reconnaissance photographs of McGonigall Pass, the Muldrow Glacier, the Harper Glacier, and adjacent areas had been taken; loads had

been parachuted at appropriate points on the Muldrow and at about 18,000 ft. on the Harper Glacier; and a party led by Washburn was on the way across the tundra to establish Base Camp at McGonigall Pass.

The main contingent left Fairbanks June 15th, went by train to McKinley Park Station, thence by road almost to Wonder Lake, and finally through two miles of woods to a ranger cabin at the edge of the McKinley Fork of the Kantishna River. Frank Bean, Superintendent of Mt. McKinley National Park, who was of great assistance throughout the expedition, drove some of the party to Wonder Lake, while the others went by truck. Many of us, I am sure, were thinking on that drive through McKinley Park of the ease with which we were approaching the great mountain and of the hardships and delays suffered here by Hudson Stuck, Belmore Browne and others when they first drew near Denali.

Next day the party forded the braided glacial stream and swung out across the tundra toward Cache Creek and the base of McGonigall Pass. This 30-mile section of mosquito infested muskeg, marked only by small ponds and caribou trails, provided excellent ground for testing equipment designed for summer use in marshy northern areas. Cache Creek was crossed without difficulty, and not far beyond it the main party soon came upon Capt. Lund and Sgt. Musser cooking supper at a camp not far from where Hudson Stuck had camped nearly 30 years before.

A few days later the main group had crossed 5 miles of tundra, ascended McGonigall Pass and established Base Camp at the top of it on the edge of the Muldrow Glacier near the spot where most of the other McKinley parties have camped. The site is a fine one, providing a splendid view across the ice to Mt. Brooks and up glacier to the North Peak of McKinley. The change from the bottom of McGonigall Pass is striking. Niggerheads and bushes heavy with moisture are supplanted at the end of a 3300-ft. climb by a world of rock and ice. Dreary and forlorn when the clouds hang low in the Pass, the camp, when the skies clear, becomes a belvedere with the eye carried up and up along glittering ice walls to the sharp crest of the north peak. One could hardly pass more quickly from an area of Arctic summer to Arctic spring, with Arctic winter a few miles beyond.

The surface of the glacial ice was soft and mushy, loaded with undrained water left by days of rain, when the main group became

established at Base Camp. Capt. Bollerud, Lt. Elmer and Sterling Hendricks, already there, had brought in most of the loads previously parachuted on the ice. Despite wading through acres of slush and finding precious films and medical supplies in glacial streams, they were cheerful and undaunted by the weather. They showed why the decision had been made for Washburn to return to Fairbanks to give specific information as to where supplies could best be dropped. Much of this we knew, for on our way to Cache Creek we had met Washburn, who was on his way out to Fairbanks with Private Goddard. This hardy musher operating with the advance party, had sledged a load across the tundra to the base of McGonigall Pass by dog team. Conditions on the Muldrow, however, had appeared so unfavorable to the advance party that they sensibly decided to return the dogs to Fairbanks instead of using them on the ice.

The glacial surface dried slowly during the next weeks as the party collected loads of test equipment parachuted onto the ice near camp, developed the main base, reconnoitered the low test areas, and determined in this way what equipment could best be tested where. Moore, Hendricks, Nilsson and Gibson investigated the S. W. fork of the Muldrow and found a good sledging area but no route onto Karstens Ridge to gain the Harper Glacier from that side. Hendricks, Bollerud, Moore, and I also investigated the true right side of the Muldrow Glacier, on the route previously used by all parties. This side of the ice was badly crevassed and in places under fire from the hanging walls of ice above, so it was a pleasure to all of us when Moore, Hendricks, Nilsson and Gibson found a secure and fairly easy route along the opposite side of the glacier.

By this route access from Base Camp to the Middle Testing Area of 10,000 ft. was fairly easy, especially if travelled at night, when snow bridges were firmer and progress safer. At the one point where the passage went under over-hanging séracs, the ice was not very active and but 100 yds. across. All along the route one could feel the chill of the great ice masses on the walls above the glacier, so that the difference in temperature between Base Camp and the 10,000 ft. camp was striking. At Base Camp the temperature at night usually went to freezing but rarely lower, while at 10,000 ft., 8 miles up the Muldrow, the nightly temperature was usually $+ 10^{\circ}$ to zero, and cold came swiftly when the sun left

the camp in afternoon shadow. At both places sudden winds occurred while we were on the mountain, the more violent storm perhaps coming at Base Camp one evening when the wind rolled 75-lb. rocks off one of the big tents and blew several tents down.

In separate groups we tested equipment up the southwest fork of the Muldrow and up and down the main part of the glacier. Rain, hail, and snow, as well as wind, provided sufficient variety to satisfy all of us, especially as we knew that real cold awaited us above. Men let themselves be soaked to the skin to prove the value of water repellent materials, and at other times shivered to learn the minimum temperatures at which climbing boots, sleeping bags, and other items could be used. At one period two of us, to our great disgust, were unable to walk for five days, so energetically had we tested some special boots. But the skinned feet definitely served their purpose, for information was relayed to Washington by radio that changed the design of the boots and saved many men this winter from equally painful feet.

Radio, sorest problem of the expedition for many weeks, finally became its greatest asset, but only after considerable effort. The generator parachuted at Base Camp was not located for two weeks and then found smashed. Subsequent efforts with storage batteries were unsuccessful, and only after Lt. Elmer located his set on the McKinley Park highway did he get good contact with Fairbanks. Meanwhile we on the mountain kept in contact with both Lt. Elmer and Base Camp by means of smaller sets.

Trips between Base Camp and the Middle Test Area taught us a lot about the strong and weak points of our sleds, snowshoes, ropes, ice-axes, stoves, and other gear, but did not show how our tents, sleeping bags, and particularly clothing would react to extreme cold. Accordingly four men were assigned to establish camps on the Harper Glacier in what we called the High Test Area. Here cold and wind would be continuous and severe. General conditions would approximate winter in the Arctic despite the date of early July.

Bad weather and difficulties in getting planes for parachuting supplies on the Harper Glacier were at this time bothering Walter Wood, the only member of the party left in Fairbanks. While he did his best to get cold weather test items in to the Harper Glacier, we prepared to backpack supplies to the High Test Area if our air

support should fail, but first we needed to reconnoiter the route unloaded.

Karstens Ridge, the only route by which McKinley has been climbed, gives access from the upper Muldrow at 10,000 ft. to Browne Tower and the upper basin at about 14,500 ft. The ridge, as we found it, was nowhere severe, but narrow and requiring care at several places. At 12,000 ft. a broad platform provided ample space for an intermediary camp. This spot had been visited earlier by Gibson, Hendricks, Moore, and Nilsson on the expedition's first penetration to 10,000 ft. It was on this reconnaissance that Hendricks roped off 70 ft. into a large crevasse on the Muldrow to recover a box dragged into it by a parachute, and that Moore performed a similar rescue operation.

Now two weeks later Moore himself nearly needed rescue after a painful experience, for on the Fourth of July we had an inadvertent celebration. Four of us, after reconnoitering Karstens Ridge to 13,000 ft., had just settled our sleeping bags into two tents at 12,000 ft. Moore and Washburn were cooking supper and Nilsson and I in the two-man tent opposite were looking forward to it with keen anticipation when a loud explosion shook our tent. Amid screams of pain, a body lurched through the smoke-filled entrance of the other tent. There were shouts of, "Look out for the other stove," "The tent's on fire," "Oh, my neck." A second later another form hurled itself through the tent entrance, fell against our tent and brought the tent down over our heads.

Emerging from this ignominious position, Nilsson and I found the danger gone and this explanation of the sudden explosion: No stove had exploded, but the wire catch on an experimental pressure cooker had parted, the lid had been blown off, hitting Washburn in the head and showering boiling rice onto Moore's bare neck. Moore had flung himself out the door, followed by Washburn who had been momentarily stunned when the lid struck him. Luckily he was wearing a heavy fur hat and was unharmed but Moore was less fortunate. His neck had received a second degree burn and he was forced to return to Base Camp to recuperate.

Bollerud and I descended with Moore to Base Camp, where we discussed tests with Lt. Colonel Marchman and sent out reports to Washington. Meanwhile Gibson, Gabriel, Hansen and Webb had sledged into the cirque at the head of the southwest fork of the

Muldrow to test equipment. Unable to climb out of the cirque and beyond because of bad snow conditions, they had returned to Base Camp with a report on various items tested. All four men were in good shape, and as there was now no doubt that the Harper Glacier was the only test area for real cold, we decided that a second party of four men should be established there. As Moore's neck had greatly improved, he joined Webb, Gibson, and me in forming the second test party.

Without incident we ascended to 10,000 ft., keeping in close contact with Base Camp and the first test party, who were now established at 15,000 ft., half a mile beyond Browne Tower. This party reported supplies running low, as no planes had come in with food or equipment, so we backpacked one load of supplies to 12,600 ft. before starting up to join the others. They had found good going to 18,000 ft., where they located one of the parachutes dropped late in May. Food in this load was bulk food, however, and not balanced like the lightweight dehydrated ration we were testing. But this did not matter, for two days later when our second test party arrived at 15,000 ft., the tents were hardly up when we were visited by two giant planes which showered the Harper Glacier with food, gasoline, and warm clothing. For half an hour in subzero cold we watched the shining parachutes descend, and then, chilled by the wind, crawled into our sleeping bags to get the best sleep in many weeks. We had known that Wood would deliver the goods if it were possible, but had not known whether it were in his power to do so.

Jackman and Hendricks had been camped at about 17,000 ft. when the parachuting occurred, and so were able next day to locate most of the loads. Some were damaged and one was never found, but most were intact. Two mornings later Jackman and Hendricks descended to 15,000 ft. where they found us in real trouble. Gibson, with whom I had been sharing a tent, had been tired when we arrived at the 15,000-ft. camp with a heavy load. Next day bad weather had kept us in camp and he had rested, but the following morning he had complained of a severe pain in his back. Then, while most of us were at breakfast, he had suffered what appeared to be a convulsion.

Things looked bad for the injured man. He was at a great altitude, with a long and narrow ridge separating him from the camp at 10,000 ft., and many miles separating that camp from

Base Camp and the McKinley Highway beyond. During the third convulsion Gibson seemed noticeably weaker. As we had been unable to stop the spasms and could not communicate with Capt. Bollerud, the medical officer, by radio, we decided that two men should go to Base Camp to start him up the mountain as fast as possible. Moore and Jackman, both rapid movers, were selected and left at once.

Over the radio the expedition's medical corps quickly diagnosed the fits as caused by lack of blood sugar, which seemed entirely reasonable to us, but Bollerud could not account for the painful back. He told us we were doing the right things for the patient, added some advice on what not to do, and said he and Gabriel would get their things together and start up the mountain immediately.

The rest of Gibson's story is quickly told. During the next four days he became gradually able to sit up and then to stand, although all motions of the back were attended by great pain. On July 20th he was able to walk enough so that Hendricks and I could start down to the 12,000 ft. camp with him. During this torturous journey through deep snow and along a narrow ridge, Gibson displayed great courage. Though continuously in severe pain, he moved with the instinct of a born climber, and at one place, where 25 ice steps had been cut and he knew a slip would be very hard to hold, forgot his pain and climbed like an almost completely healthy man. What woe that descent cost him we could only guess. Only a real mountaineer could have negotiated that ridge in his condition, for as we learned later, Gibson had fractured four vertebrae.

At 12,000 ft. Bollerud and Gabriel met us and took over our charge. In the next few days they eased the injured man to 10,000 ft., 8000 ft., then Base Camp, where a few days later Mr. Bean, Superintendent of McKinley Park, and Grant Pearson, his chief ranger, met him. These men when they returned from their visit to Base Camp took Gibson with them, and though the three were washed off their feet in crossing the McKinley Fork, all reached the far bank safely and continued on to park headquarters. So ended Gibson's return to civilization.

Relieved from the strain of getting Gibson to safety, we looked forward to work in the High Test Area with great eagerness. Washburn and Nilsson by this time had already been for three days at 17,000 ft. or higher where they had been hard at work retriev-

ing loads parachuted in the upper basin. One load in fact had caught in the rocks at the top of Denali Pass, where its parachute hung over the edge of the slope that descends in a great precipice facing Mt. Foraker 30 miles away. This load, full of mail, was probably the highest mail delivery ever made and certainly the highest ever made in North America.

While Washburn and Nilsson were establishing a high camp at 17,800 ft. above doing valuable work collecting loads, the rest of the party above Base Camp on the night of July 21st was spread out as follows: Gibson, Bollerud and Gabriel were at 10,000 ft.; Moore and Jackman at 12,000 ft; Hendricks and I at 15,000 ft. Next day the first three went down to 8000 ft. while the rest of us joined Washburn and Nilsson at 17,800 ft. Moore and Jackman, be it noted, backpacked about 50 lbs. apiece from 12,000 ft. to nearly 18,000 ft. that day, getting in late when the evening chill was numbing our thoughts and our actions.

The late arrival threw off our plans for an early breakfast, and cold and limited acclimatization slowed our morning efforts. Not until after eleven did Moore and I on one rope and Washburn and Nilsson on another start out to "reconnoiter" the mountain. As bad weather was apparently setting in, we felt dubious of getting to the top, but felt all the more anxious to have a look at the upper part of the mountain before clouds came in.

We were carrying little as we set off, but each was wearing different items of warm clothing in order to test as much as possible. Footgear especially we were interested in, for repeated tests by Hendricks had confirmed the fact that the temperature of the snow was 17° below zero no matter how much the sun smiled. Incidentally the air temperature itself kept generally well below zero and nightly descended to minus 22° or 23°.

Almost casually we struck off toward the general route used by Browne, Stuck and others, years before. All of us were probably thinking the same thing as we broke trail through a foot of loose powder that carpeted the upper slopes: Here we were, not many minutes' distance from a camp well stocked with food and equipment dropped from the skies. What a contrast between our position and that of our predecessors on the mountain. On these slopes Browne, Parker, and LaVoy had fought their way despite pemmican that sickened them and storms that frustrated their every chance; here Stuck, the indomitable archbishop, had toiled

upward, supported by sturdy companions and a brave spirit; here the Lindley-Liek expedition 10 years before had found the peak dangerously cold despite numerous layers of clothing.

Slowly we ascended, changing the lead every 50 steps. No longer were we in a valley but rather looking down on valleys which showed in places through a sea of clouds at about 10,000 ft. The weather was looking better as we stopped for lunch only slightly below the level of the North Peak.

At two-thirty we once more swung upward, as rhythmically as possible, straining to reach the high shoulder that gives the first great view off to the westward. Gradually the surface hardened, and soon we were on firm crust near the place where 30 years ago Browne and Parker sheltered among snow drifts before a howling storm turned them back. Windswept drifts in a little hollow and beyond them snow hardened to ice by many gales were still there, but this day the air was calm.

Our crampons barely dented the rock hard ice as we moved ponderously along an easy ridge to a snow crest. This was not the top, however, for another summit, perhaps 10 feet higher, rose to the south, separated by a 50-ft. stretch of ridge that looked as if it might be a quarter mile long. One minute later we were on the summit, fully conscious that we stood on the highest point of the continent.

Emotions are mixed at such a time, of course. We admired the vastness of the area below us that showed through dappled clouds, and gazed regretfully at the nearby shoulder where storm had halted the Browne-Parker party when victory was close at hand; but most of all our thoughts were patriotic. The flag proudly flown from an ice-axe seemed to be a symbol that the wilderness around us and the whole continent full of people beyond were united in the struggle for victory. It was a reminder too that Alaska itself was under attack and in imminent danger of invasion.

Despite such thoughts, we spent half an hour with great pleasure on that exposed crest before turning back. Fifty-five minutes later Moore and I were in camp, after descending almost directly toward the tents, and from there gleefully shouted advice to Washburn and Nilsson who had got onto steep ice while descending farther to the W.

So much for the first ascent of Mt. McKinley since 1932. Another ascent was shortly to follow. Next day Hendricks, Jackman

and Webb again climbed to the summit, following our route but re-breaking the blown-in trail most of the way. Hendricks, let it be known, not only broke much of the trail, but was so fresh on top that he wished for another couple of thousand feet to go. Some of this excess energy he put into making a first ascent of the Farthing Horn, which he jokingly refers to as "the second highest peak in North America." This sharp summit lies 100 yds. E. of the main peak and is slightly lower.

We were all delighted that Jackman, test officer of the 87th Mountain Infantry, reached the summit, and also Peter Webb, who is the first Canadian to gain the highest point in North America. Jackman had done considerable climbing in the past couple of years but Webb had seen no real climbing before. That Peter Gabriel, Jack Bollerud, and others at Base Camp were not with us on the summit was no fault of their own but rather of the test program.

The rest of the story can be quickly told. Moore and Washburn left for Base Camp on the 24th, a few hours before a terrific westerly storm blew in through Denali Pass. All night and all day for the next two and a half days our tents were pounded by driven snow which drifted in around us. No food did we cook, for the gale was furious. In fact at times we wondered if the tents would be drifted so deeply we should be unable to get out. The intense cold, the pressure of the wind, and the altitude made digging out the tents particularly unpleasant.

After the storm we were able to perform our last cold weather tests, and Jackman and I were even able to spend half a day fruitlessly looking for Browne's thermometer left at the highest rocks of the Browne Tower ridge. Though our camp was well stocked with food, we did not regret it when on July 28th, with tests completed, our descent began. Continued wind, cold, and altitude were becoming trying.

On a level surface near the top of a prominent boulder 150 yds. below Browne Tower, Sterling Hendricks left two minimum thermometers which some day may give added information on the winter cold of Mt. McKinley. The large rock where these instruments rest is marked by twisted rope which should take several years to weather away. The boulder lies 50 yds. down slope from the upended granite slabs where Hudson Stuck's thermometer was located in 1932, registering an approximate 95° below zero Fahrenheit!

Here, where Lindley, Liek, Strom and Pearson found Stuck's thermometer, Hendricks and Jackman after diligent searching found a fine cache left by the 1932 party. Pemmican biscuit, sugar, matches, dynamite soup, and such delicacies as tinned sausages and tinned chicken had been expertly cached in a large tin wrapped in a tarpaulin and carefully tied. Nearly everything was in first rate condition and the chicken and sausages proved excellent.

We recached all these items with the exception of the chicken, sausage, and some of the pemmican biscuit, and left in addition a substantial quantity of our own mountain ration so that future visitors can learn what Army fare was like in 1942. The caching of these supplies and the placing of the thermometers was done more rapidly than we wished, however, for evil clouds rushing down from Denali Pass threatened to reach us before we could descend Karstens Ridge. Quickly we started down and reached the 10,000-ft. camp without incident.

Two days later the whole group, once more at Base Camp, was analyzing item by item the equipment tested. Each man wrote his own notes on each piece of equipment, answering a list of questions and adding ideas of his own. This was done at Base Camp with the test items before us so that experience of the past weeks would be fresh in our minds.

Then followed in quick succession days of breaking camp, caching supplies, and packing out to Wonder Lake, where our notes had a last going over. The items packed out from the mountain were largely samples showing strain or wear, or failure of material or design. These were the things that must quickly be corrected in Washington. At Wonder Lake human transportation ended and trucks took over. One of these belonged to John Busia, a local prospector, who entertained us in holiday fashion until we left for McKinley Park and Fairbanks. At McKinley Park we found a splendid lunch prepared by Mrs. Bean, and saw pictures of the Lindley-Liek Expedition, with comments by Rumore and Pearson. That night we were all in Fairbanks, where we found Rex Gibson recovering in the hospital. During the next three days he joined our conferences as we whipped our report in shape, prior to flying with it to Washington.

So ends the story of the United States Army at Mt. McKinley. The many changes recommended by the Alaskan Test Expedition have been put in effect, with what results 1943 will show.