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Amid the snows of Baltistan

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lous, however, as is the perfection of this record of such long past times, there is much to be done before the full story can be deciphered.

"We are still ignorant of the position of the probably receding shore-line which must have marked the boundary between the northern land-formed deposit and the southern subaqueous one. We have not yet discovered the ancient coast-line, which should be indicated by the passage of the land-formed ground moraine, or unconformable 'Glacial Conglomerate,' into the conformable 'Dwyka Conglomerate,' or subaqueous silt with its foreign boulders, laid down under quiet waters, south of the glacier front quite conformably on the Witteberg Quartzites. It is probable that sufficiently good outcrops exist along the western side of the Karroo to reveal this passage of unconformable 'Glacial Conglomerate' into the conformable 'Dwyka,' and thus mark the position of a portion at least of the ancient shore-line. To discover if such evidence is obtainable will be part of our work in the immediate future."

AMID THE SNOWS OF BALTISTAN.

By FANNY BULLOCK WORKMAN, F.R.S.G.S., M.R.A.S.

A PARTY, consisting of Dr. W. H. Workman, Mattia Zurbriggen, myself, and about fifty coolies and servants, left Serinagar, Kashmir, on July 1st, 1899, and passed by the upper Deosai route to Skardu and Shigar. Thence crossing the Skoro La (17,000 feet) in three marches, we reached Askole, in Braldu, at the foot of the Biafo, Punmah, and Baltora glaciers.

The Skoro La is one of the most beautiful and varied of the many mountain passes which we crossed during our two summers in high Asia. We were told at Skardu that it was still too early in the year to cross the Skoro La; but we had not much faith in the opinions of the valley people, and decided to open the pass for the season, if, indeed, it had not been crossed already.

Two or three hours' march from Shigar brought us to Askor Nullah, a village shaded with apricot-trees, at the opening of a wild ravine leading to the pass. A considerable time was lost here by our servants, and it was nearly ten o'clock before we succeeded in entering the ravine. The trail winds under high precipices, and sometimes climbs over the steep faces of adjacent rocks; and we had to ford the Askor torrent twelve times before reaching the base of the pass.

Askole has been aptly called "the world's end"; the name is given to seven villages scattered about the valley, each having its own lambardar or chief. The principal collection of huts, connected with the outer world only by a flimsy rope bridge and the trackless ice rivers towards Hunza and Turkestan, stands in the last dot of green on the ragged edge of a world of rock and snow. The bridge which spans the Braldu river, at a width of 270 feet, is one of the longest and most trying in the country.

In Shigar the Askole people are spoken of as Braldu men. The

Mt. Koser Gunge, from the Shigar Valley, 21,000 feet.

The above illustration is reproduced by permission of T. Fisher Unwin.

Askole valley is in the province of Braldu, but the Braldu inhabitants are very similar to the Baltis, dressing like them, and, so far as we could learn, speaking the same language. They are of Tibetan origin though Mohammedan in religion; they are cheerful and garrulous, and are naturally good mountaineers, although, like the Kashmiri, they prefer to huddle round a camp fire and gossip all day.

We proposed to follow up the Biafo glacier for more than thirty miles to the Hispar pass; this was not a common undertaking for the Askole people, and three days had passed before the lambardars had assembled coolies and collected the necessary provisions. No European

Peaks on west side of Biafo Glacier.

had been there since Sir Martin Conway and his party had descended the glacier in 1892. The chiefs seemed to be all new men, and the only souvenir of the Conway party was Sir Martin's *chit* of reference, which was handed to us by Lambardar Kinchin, who was to be chief of our band. He had not been with Sir Martin Conway, but he now owned the testimonial, and, as he spoke Hindustani, was to act as interpreter as well as leader of the men. He wore the cast-off coat of a Sahib, and carried a cotton umbrella. He failed as a disciplinarian, but never lost his dignified demeanour.

We left Askole on the 16th of July. Two hours' march brought us to the beginning of the glacier, where all paths cease, and the tiresome moraine work common to all great glaciers begins. A recession of the

snout of the glacier has taken place in late years. Colonel Godwin Austen tells us that in 1861 the end abutted against the cliffs of the south side of the Askole valley; now, it only reaches the line of the north side. Zurbriggen, who was with the Conway party in 1892, also found great changes in the first twelve miles of our route; it had become much more heavily crevassed and broken into séracs, and consequently was more difficult to explore. We ascended the high lateral moraine at a point over a mile from the end of the glacier, thus shortening our distance and obtaining an early foothold on the ice. The march continued all day over great truncated séracs, divided by deep crevasses. The ice, though often very slippery, was generally concealed by a varied covering

Mount Meru.

of detritus of mud and sand. Boulders of granite, white quartz, sandstone, and shale lay all about, sometimes bridging the crevasses. We made fair headway; towards night we left the glacier, climbed to a high alluvial terrace, and encamped at a height of 11,775 feet.

The next day, as we attacked the glacier, we foresaw hard and slow work: giant honeycombed séracs rose as far as the eye could reach, and a light covering of new snow lay over ice and detritus. The crevasses were longer, wider, and seldom spanned by bridges. We sought for a passage not far from camp, but found none on that side; we then crossed to the centre and tried our fortune amid a reach of séracs rising like a huge white tongue fifty feet or more above our trail. We had to spend several hours cutting steps over and around them.

After losing much time we succeeded in bringing the coolies through, until we came upon two specially high séracs separated by a profound crevasse. On the side of one of these Zurbriggen had to cut a gallery fully thirty feet long. A number of the older coolies began to remonstrate and talk of returning; but a firm reply restored discipline. Owing to the projection of the icy walls, the coolies could not follow loaded, so that the loads had to be handed through the passage first. To accomplish this, Kinchin and our bearer were placed in the gallery to hand the packs—some of which weighed sixty pounds—to Zurbriggen, who stood at the most precarious point, with one leg across the crevasse and his foot braced against the opposite sérac; he passed them on to

Mount Kolahoi, Lidar valley, 17,839 ft.

two camp servants standing on a lower shelf. Last of all came two sheep, which were to serve as food; one was landed safely, the other, carelessly handled, slipped into the crevasse. Zurbriggen insisted that he should be lowered on a rope, and succeeded in recovering it unhurt.

We next reached a couloir, through which we pushed as fast as possible, but soon came to a flat ice surface where we were confronted with huge bridgeless crevasses which could not be jumped. As the weather was thickening, the day advanced, and the guide unable to find a passage, we decided to return to the old camp for the night. There we remained during the following day while Zurbriggen and Kinchin made a reconnaissance: at last a bridge was discovered near the point which we had left.

On July 19th we passed the great sérac belt by noon, and came to a fairly smooth surface along the middle of the glacier; we tried to find a place for encampment on the right bank, but had at length to cross to the other side, and spent the night on a stony plateau at an elevation of 12,900 feet. On July 20th we came to Boggy Camp, 13,650 feet high, on the west bank—a sandy hollow at the entrance of a nullah leading to a group of snow-peaks. Here we passed four days; and as this is the last point at which wood may be found, we employed the time in sending wood to Ogre Camp for future use. On the 25th July we broke camp, and after an hour over rough moraine reached to centre of the glacier.

Ogre Camp.

Before we reached the Ogre Camp, the Ogre came into view. The camp is situated on a southern spur of one of the most beautiful of the mountain massifs. It consists of a small grass-covered projection from a rock slant, and overhangs the glacier. Opposite is a huge faleric of granite walls and peaks, which we named the Biafo Walhalla; it splits midway from its base into spires and domes rising to 21,000 and 23,000 feet.

From the mountain rising to the north of Ogre Camp, several peaks attain a height of 23,000 feet, and two glaciers descend to the Biafo. About six hours above this camp the Biafo opens into Snow Lake, a vast basin of ice and snow, encircled by unnamed peaks. We pursued the

gradual ascent from Ogre Camp to the entrance, which is at an elevation of 16,000 feet. The march was slow and trying; at last we reached an ice slant, where each step had to be cut; and late in the afternoon encamped on a narrow ice shelf (16,450 feet) at the base of a rocky cliff. Here a packet of fagots, which we suppose to have been left by the Conway party in 1892, was found.

The next morning we started for the Hispar pass. The ascent led first over a long snow slope, and later over a sharp crest; it was necessary to make several detours in order to avoid certain wide crevasses. One of the latter assumed almost the shape of an ice cañon. We reached the top of the pass (17,435 feet) at 8.30. It is an ice defile, bounded on both sides by peaks. To the south is a range which culminates in the peak "B. 15," whose height has been determined by the Trigonometrical Survey at 23,900 feet; this peak bounds on the south-west a long arm of Snow Lake. Colonel Godwin Austen sketched "B. 15" from a height above the Punmah glacier in 1861; we called the summit Mount Kailasa.

On the following day we descended to Ogre Camp in a snowstorm, and left it the next morning; by nine o'clock we were crossing the glacier in four inches of snow. We returned to Askole in long marches, descending in half the time which it took to ascend. The seven lambardars in their best clothes, together with the ladies of Askole, stood on the house-tops to welcome our entry into the village. Here we remained for two days, to rest and to enlist coolies for the next trip.

On August 5th we left Askole for an exploring tour in the Skoro La range, with thirty coolies under Lambardar Kinchin. He still carried the cotton umbrella, now much battered, but had added more substantial clothing to his outfit, in order to meet the varied temperatures which he had learned to expect. Again crossing that unpleasantly mobile rope bridge, we climbed the south wall of the valley to the nullah leading to the Skoro La. Following this up to the limit of wood, we encamped at an elevation of 14,200 feet. As the peaks came in view, we selected the first horn to the east of the pass as our objective, and decided to press towards it on the following day. We forded several torrents, and crossed the glacier, bearing up the crest of the right lateral moraine. It was narrow and steep, and ascended sharply towards another fine glacier which descended in chaotic séracs from the circle of summits above. When they saw the nature of the country for which we were heading, the coolies began their usual refrain: "Please, Sahibs, go back to wood and grass." This, of course, we refused to do. We attempted to cross the higher glacier in order to make an ice camp, but the men continued to clamour, and finally threw down their loads and refused to move farther. We therefore had to pitch on the border of the ice. The moraine ledge was barely safe from boulders falling from a great peak behind, but we made the coolies build up rock terraces for the tents.

At five in the morning of August 7th, accompanied by two of the more courageous coolies as porters, we crossed the glacier leading to the base of our peak. An ordinary Swiss guide would have been puzzled,

and might have lost some hours in finding his path through the maze of séracs and crevasses which faced us. But Zurbriggen was not one of these. He led us in and out and over them, as though he had been following a well-remembered path. In less than three hours we had conquered the séracs and were breakfasting on a sloping plateau. Thence some steep slopes of the peak were ascended, and above these there came an hour's rough climbing over rock slabs. Then the final snow slopes began, after which we reached a lower rock summit. Here our porters, who had continued to complain of their loads, threw themselves upon the ground and were fast asleep in two minutes, while we

The Siegfriedhorn.

went on to the main top, which is a narrow snow cornice. We had come from the camp to the summit in five and a half hours. The height—taking the average of the Watkin Patent and the Carey aneroids—was 18,600 feet. The view was very fine: ridge after ridge of Karakoram and Hunza peaks rose to the north and east; among them Masherbrum was clearly seen. We named this peak the Siegfriedhorn. The porters built a strong cairn on the lower rock summit which crowns a ragged shaly wall that falls several thousand feet in a sheer precipice on the Shigar or south side.

Weather detained us two days at Avalanche Camp. We intended to attempt a beautiful white cone, the fifth from Siegfriedhorn, and the first of three snow-corniced peaks which we named the "White Fates."

The glacier descending from this peak was deeply crevassed, and broken into thousands of séracs of great size. The height of one ice-fall above our tents was at least 500 feet. We might perhaps have ascended over its side, but coolies could not be taken through, and a higher camp for the final climb was necessary. Zurbriggen went out during our detention at camp to see what might be done. He decided that an exceedingly steep talus to the left, descending from a rock peak, would have to be ascended, and that then we should have to traverse a rock shoulder exposed to falling stones.

On the morning of August 10th we started, with only a few men, and the barest camp necessities. After struggling for an hour over a

Summit of the Siegfriedhorn, 18,650 ft.

sharp moraine and the abrupt talus, we had great difficulty with the coolies. At last we got them over the rock shoulder, where we were all for twenty minutes in imminent danger from falling stones, and reached a spot on the glacier which we had selected for a camp from the summit of the Siegfriedhorn. This was the best of our very high camps; it stood at an elevation of 17,375 feet, on ice lightly covered with moraine. The ascent was continued on the 11th at 6 A.M. A reach of moraine and glacier brought us to a bold crevassed slope which led to higher snowfields. The surface was very icy, and step-cutting began immediately. We were roped from the first; as we ascended in zigzags to an icy snout overhanging a basin a thousand feet

below, Zurbriggen continually called to the coolies to move carefully and to keep the proper length of rope between them. His advice was given in a polyglot dialect of German, Hindustani, and English, which made no serious impression on the porters, for they sat down at a critical point to remove snow from their boots. There was no rock work, the ascent being from the first over a succession of ice and snow slants. The last arête, about 400 feet in height, rose at an angle of about 60°, and proved long and laborious, as the new snow lay fifteen inches deep.

We attained the summit (19,450 feet) at 10 A.M., thus completing the ascent which began at Avalanche Camp eight hours below. Considering the rock climbing between the two camps and the combined ice and snow work from our last night's camp to the summit, this mountain proved much more difficult than the Siegfriedhorn, and may be classed, according to Zurbriggen, among peaks of the first order, even in that land of giants. This peak was named Mount Bullock Workman. Looking over the edge towards the east, we saw a large glacier which swept far away among escarpments of wild peaks; this we named Crescent Glacier. Its lower part is indicated on the Indian Survey Map, but not the upper part, which we were the first to photograph. From the peak on which we stood was seen "K. 2," the second highest summit in the world; and to the north-east, beyond Mungo Gusor, overtopping lesser hills, appeared the peaks "B. 15," "D. 16," and "No. 11." On examining the original drawings made by Colonel Godwin Austen in 1861, we found that the forms sketched by him corresponded almost exactly with our photographs.

Our third ascent was the highest. On August 12th we recrossed the Skoro La on the way to the Shigar valley. Ever since we had left Shigar, early in July, a grand white dome, facing the valley to the north, had strongly attracted us. We had seen it from Mount Bullock Workman, surmounted by a higher peak. The massif, with its chief peak, Koser Gunge, is shown on the Indian Survey map of the Shigar valley.

We made two marches up the valley to Yuno, whence we had determined to make our attempt. From this village 5000 feet of steep earth and grass slopes, followed by 6000 more of rock wall, end in a broken arête, above which a small part of a snowy height is seen. Zurbriggen crossed to the other side of the narrow valley to see if a better view of the mountain could be obtained; for we were not then sure that the summit had been seen. He made up his mind upon that point; and we waited three days while coolies were gathered from the scattered villages.

On August 20th, with a not very promising sky, we started from Yuno in search of our first camp. After seven hours' stiff climbing we came to a grass ledge which had been selected from the valley. This knoll, at 14,600 feet, proved a comfortable place. The day was fine at sunrise, but by eight o'clock misty clouds had covered the lower or dome summit. As the route lay entirely over rock arêtes to the snow, and could not be attempted in doubtful weather, we were kept in camp all

that day and the next. On the third morning the barometer made a leap upwards, and Zurbriggen set out to find a place for camp. But the day turned to hail, wind, and thunder, and the guide returned toward night, angry with the weather, the great cold, and the slippery condition of the rocks.

The fourth morning was fine. Sun burned upon the range, and the snow was rapidly melted. But when the coolies were called, they came slowly forward and stood sullenly gazing upon their loads; and, when ordered to move, they bolted down the mountain side. We sent an embassy to the place where the men halted on a lower spur, and it was

Summit of Mount Bullock Workman, 19,450 ft.

only after an absurd bribe had been offered that thirteen of them agreed to carry our tents to our highest camp.

This was a wild, windswept, sloping, rock-covered plateau at 17,900 feet, at the foot of the bare wall which we were to attack on the next day. It was a cheerless *gîte*, but we were fortunate enough to find water in a rocky couloir near by.

A tent servant and a Kashmir coolie accompanied us on the ascent, for the Shigar coolies possessed no sufficient clothing. The morning was fair but windy. For the first 1200 feet we had some severe rock work on the wall; and then a steep *arête* leading to a horizontal one had to be overcome. Thence we passed along a narrow shelf forty feet in length, projecting from a rock mass overhanging an abyss, to a snow basin. At this point no summit could be seen; there was only a long

snow slope leading to another ridge. We stopped for a light breakfast. The sun shone fitfully between heavy clouds, and it grew very cold. The wind blew strong in our faces from the moment that we touched snow.

When we reached the ridge the summit was still invisible; a shoulder and another sharper slope cut off farther prospect. The snow became deeper. The second slope led to a huge arête, rising at an angle of fully 55° , and so placed as to bring us more directly in the teeth of the wind. The cold became intense, not so much because of the low temperature (14° Fahr.) as because of the relentless wind, which, with the highly rarefied air, greatly impeded our progress.

Crescent Glacier from Mount Bullock Workman.

By noon we had reached an elevation of 20,000 feet; the snow came to our knees—snow dry and mealy, which so chilled and benumbed our feet that we expected frost-bite. The surface beneath the snow was of ice, making our footing on the sharp slants very insecure. Zurbriggen worked hard, treading out every step; and the waiting for him to do this was bitter. The mere lifting of the feet from one deep step to the next made us pant for breath. We needed food but could not find it with half-frozen fingers. I called to Zurbriggen that I must change my gloves, for I could no longer feel my ice-axe; but he scarcely heard the loudest shout at the end of thirty feet of rope. We halted while he rubbed my hands and pounded my feet as well as he could.

We came, in time, to a knife-like edge, where the snow was hurled

in stinging gusts in our faces; and there, at last, we saw the final peak, a high snow cone with a blue ice cornice, emerging from a cloud. It was still some hundreds of feet above, and separated from us by a small snow lake and another arête. The distance seemed great, insurmountable. We descended, crossed the basin and attacked the slant in zigzags. The snow portion of Koser Gunge proved to be not one peak only, but a system of slopes and domes.

On the last dangerous incline our Kashmiri porter gave out, and sat down, turning his back to the roped train. There was a pull on the rope; looking up we saw Zurbriggen, with icicles two inches long hanging from his beard, waving his hands and calling. As we could hear nothing distinctly he came close to us. We ordered the servant to unrope the coolie. It was several minutes before the man was released, and we saw him crawl downward. Benumbed by the halt in the wind and cold, we plodded on, and our goal was reached at three o'clock. One of our aneroids registered a hundred feet under, the other a hundred and fifty feet over, 21,000 feet. The thermometer indicated 10° Fahr.

We hurried down as fast as the difficult conditions would permit. That descent in the still raging storm to the boundary arête was not easy; and it was quite two hours before we reached a place where a short meal could be taken. Here we found the coolie trying to keep warm behind his load.

A word may be added with regard to our measuring of altitudes. The chief aneroid used during the expedition was a Watkin Patent barometer graduated to 24,500 feet, which, so far as we could judge, worked with great accuracy. The highest pressure at all stations where there was opportunity for taking a series of readings—and consequently the lowest altitude—was adopted as probably approaching most nearly to the true altitude. In several instances the heights corresponding to our readings were a good deal lower than those given by others and indicated on maps. One pass marked on the maps as 15,900 feet was measured by our Watkin as 15,425 feet. We do not claim that our altitudes are exact; but if the points to which they relate are ever fixed by the Survey, we think that they will not be found to differ greatly from the altitudes which we have given.

REVIEW OF THE ALASKA BOUNDARY QUESTION.

By ALEXANDER BEGG, Author of the *History of British Columbia*.

(Continued from page 30.)

In an article on the Alaskan boundary, which appeared in the November (1899) number of the *National Geographic Magazine*, the Hon. John W. Foster, ex-Secretary of State for the United States, is represented as stating that "much of the difficulty on reaching an agreement on this point (the correct location of the boundary-line) grew out of the