NANDA DEVI, 25,660 ft.

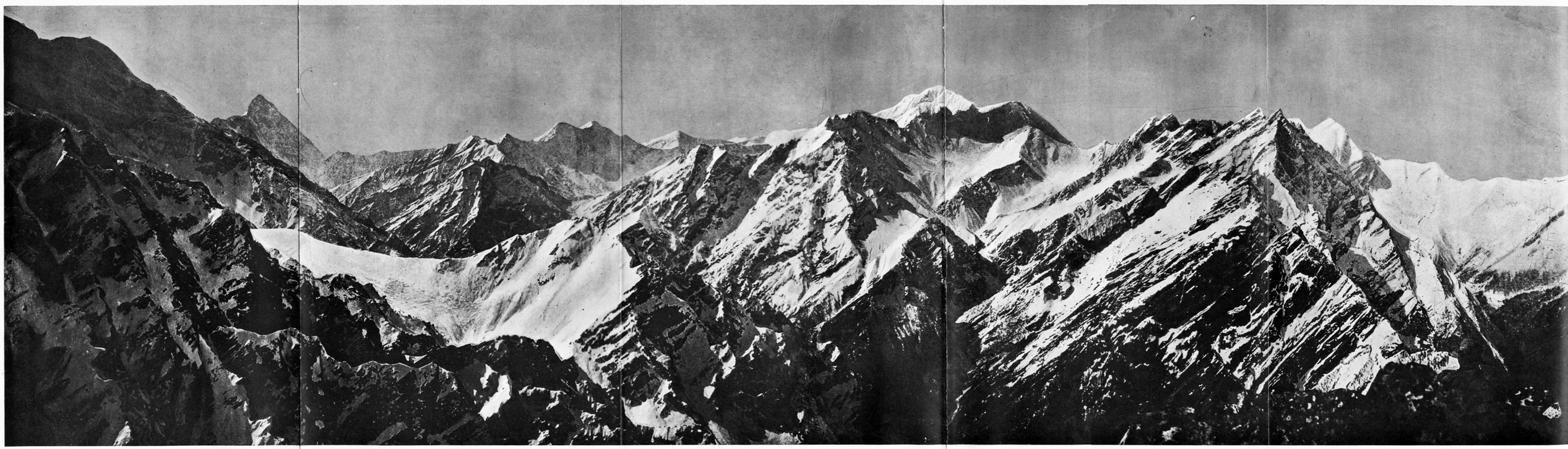
LOWER END OF TRISULI NALA.

G.T.S. PEAK, 20,842 ft.

DIRECTION OF TRISUL 23,406 ft.

NANDA GHUNTI, 21,286 ft.

LOWER END OF RINTI NALA.



CLIFF TRACK TO DURASHI.

DURASHI PEAK, 14,630 ft.

Photo. A. L.

THE RISHI VALLEY, FROM ABOUT 15,000 ft. ON LATA RIDGE. MAY 10, 1907.

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Mountaineering in Garhwal.*

By T. G. LONGSTAFF, M.D.

(Read before the Alpine Club on March 8, 1908.)

LAST summer Bruce, Mumm, and I intended to celebrate the jubilee of the Club by attempting the ascent of Everest, or at least by making the first exploration of its unknown glaciers from the Tibetan side. In this scheme we received the most cordial support from the President and Council of the Royal Geographical Society; but in spite of their efforts on our behalf, and of support from India, this expedition was vetoed by the Home Government. I must admit that, great as this disappointment was, it was with a certain feeling of relief that I found my alternative, a campaign in Garhwal, accepted by the others, for I was in a position to realise from actual experience the exceptional discomforts and hardships we should have had to face in the course of a mountaineering trip in Tibet, while the fact that I had already seen something of Garhwal only increased my desire to revisit a region which is almost the only part of the Himalaya that can be compared with the Alps.

Besides ourselves, the party consisted of the guides Alexis and Henri Brocherel of Courmayeur, who had accompanied me on my previous visit to the Himalaya and Tibet, and Moritz Inderbinnen of Zermatt, who had been Mumm's companion for over twenty years, and with him and Freshfield took part in their expedition to Ruwenzori. Thanks to the great kindness of Colonel A. H. G. Kemball, commanding the 5th Gurkha Rifles, Bruce was able to bring

* Details with reference to scientific observations and map will be found in the April number of the *Geographical Journal*. Thanks to the courtesy of the Secretary, I am enabled to make use of the plates and map therein.

from this regiment Subhadar Karbir Burathoki, Havildar Damar Sing Rana, and seven riflemen, mostly Magars and Gurungs. Damar Sing, who, I am very sorry to say, has recently died, was a trained plane-tabler, had charge of the stores, and kept the accounts. Karbir counted as a guide, for he had climbed a good deal with Bruce in Kashmir and the Karakoram, and also with Sir Martin Conway in the Alps. The others, though accustomed to run about quite regardless of the accepted laws of gravity, were as yet ignorant of the higher mysteries of mountaineering. Plucky, cheerful, and uncomplaining, they were superior to the best Gahrwalis I have met, and even to the Bhotias. Bruce has trained a good many of his men with axe and rope, of whom Harkir (now, I believe, Subhadar Major) will be remembered by several of you, but these men were not available at the time. The regiment is now engaged on a very congenial task, but I doubt if the Zakka Khels will appreciate them as much as we did.

Bruce also brought a single servant as cook, and undertook the entire organisation of the commissariat and Gurkhas' outfit, while Mumm and I were still in England. We joined him with the guides at Almora on April 24 and got away on the 26th, crossing the Pindar river beyond Gwaldam on the 28th, after a 50-mile march through the Kumaon foot-hills. Here we were somewhat troubled by flies, and Bruce used to get very angry over the fact that he was unable, owing to defects in their anatomy, to have the satisfaction of making them scream.

We pushed on rapidly across the three intervening ranges of the middle hills, the zone of the pine, the oak, the rhododendron, and the fir. Snow was still lying on the ground in the upper forests, which are very beautiful, and from which most exquisite views of the high peaks to the east and north are obtained. Our route lay by Wan and Kanol to Ramni, where we picked up the stores which Bruce had sent on in charge of Karbir; then down to the Bireh Ganga and up the other side to Kaliaghat (Pana), and so over the Kuari Pass (12,400 ft.) to Tapoban on the Dhaoli, which we reached on May 5, having covered another 50 miles. From the Kuari Pass, still deep in snow, we saw the wonderful panorama of peaks stretching from beyond Badrinath right round to Dunagiri, and, thanks to the weather and an early start, we obtained some excellent photographs. On this occasion we required one hundred and fifty coolies to carry our baggage and the six months' supplies for the whole party which we

were taking with us. Had it not been for the assistance of Mr. V. A. Stowell, I.C.S., the Deputy Commissioner for Garhwal, and to Bruce's forethought, we might have lost many valuable days on this part of our journey.

Our first objective was the Rishi valley, through which we hoped to find a practicable route up the N.E. slopes of Trisul (23,406 ft.), for though we had never been able to see this side of the mountain, which is screened by an outlying peak of 20,842 ft., my visit in 1905 had convinced me that there was no other practicable route. This valley, though well wooded, and some 20 miles in length by 15 in breadth at its broadest, is so difficult of access that it has never been permanently inhabited, but receives an annual two months' visit from the Tolma shepherds. The Rishi Ganga bursts into the Dhaoli at the hamlet of Rini (6,000 ft.), but so narrow and precipitous is the gorge that Graham's party was the only one which had penetrated far up it. I had hoped that we might be able to follow the valley from its mouth, but the river was swollen with the melting snows, and the local people declared that it was impossible for laden coolies to get along it. There is, however, a back door into the upper part of this valley, known to the Tolma shepherds, by which it has been entered by a single surveyor, a few native shikaris, and by three or four determined sportsmen, none, however, having got nearly as far as Graham, with the exception of Mr. A. P. Davis, from whom I was able to get some idea of the topography.

On May 7 we made a short march to Towa, a Bhotia camping-ground, where we were shown a *chit* signed by Graham and Emil Boss in 1883 in favour of their shikari, the only native who did not desert them in the Rishi valley. Our heavy camp and stores were to go on half a march further to Surai Thota (7,290 ft.) with some of the Gurkhas, and to wait there, as it turned out, until June 19. On May 8 we climbed from the banks of the Dhaoli for six hours up the steep wooded slopes, past Lata village to the tree-limit, and camped on the tiny alpine pasture known as Lata Kharak, $1\frac{3}{4}$ miles N.E. of Lata Peak (12,624 ft.) of the G.T.S. Our camp was at the same altitude, just above the last trees, and the ground was still covered with snow, which extended down below us in sheltered gullies for perhaps a thousand feet.

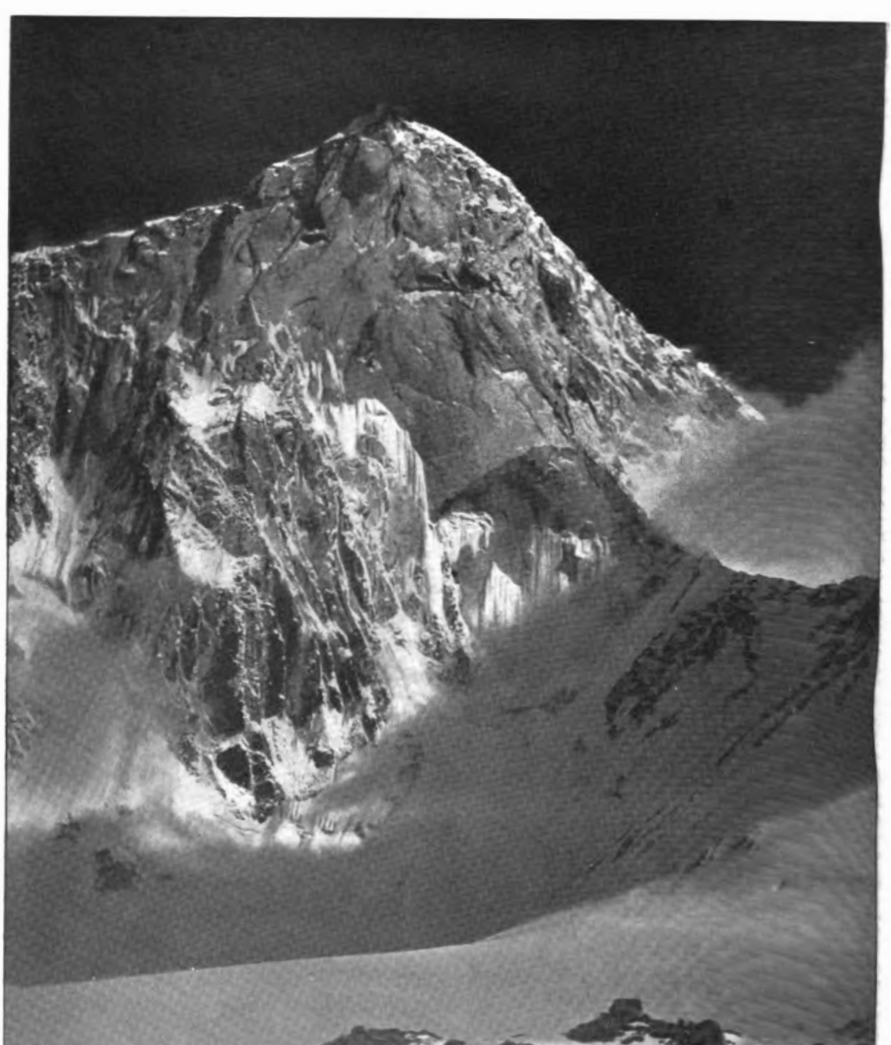
On May 10 we climbed a small peak of 15,000 ft. just above our camp, from the summit of which Mumm took the panorama which forms the frontispiece of this paper. Thus I am relieved from the necessity of attempting to describe a

scene of extraordinary grandeur and beauty. This scene would serve admirably as an illustration of Ruskin's conception that the forms of gneissic mountains are due to their mode of crystallisation and not to the contortion of their strata by the irregular effects of pressure; the whole effect is directly suggestive of an assemblage of huge crystals 'curiously cut' by time and weather.

After reconnoitring the cliffs along which our route must lie, we regretfully came to the conclusion that, owing to the depth of the snow, it was at present impossible to take coolies across with the necessary three weeks' supplies. Frequent snow-squalls rendered it impossible to start work with the plane-table, so we decided to pass on for the present up the Dhaoli and Dunagiri valleys to the Bagini glacier beyond the village of Dunagiri, and to the north-east of the peak of that name, our main depôt still remaining at Surai Thota.

After a short diversion with Mumm in pursuit of *thar* (wild goats), we rejoined Bruce on May 17 at the foot of the Bagini glacier. Our camp was at an altitude of 12,850 ft., on a level with the last rhododendron and birch trees. We reconnoitred the upper part of the glacier basin, and found, as we had hoped, that there seemed to be a strong probability that a mountaineering party could force their way into the Rishi valley over the ridge between the G.T.S. peaks A_{21}, 22,516 ft., and Dunagiri, 23,184 ft., and get out lower down. We also hoped to learn something of the route to Trisul, for this was practically unknown ground; so we decided on this course instead of trying a peak, of which there is a considerable choice hereabouts.

On May 20 the six Europeans, with Karbir, Kulbahadur, Buddhichand, and Dhan Lal, started up the Bagini glacier, taking eight coolies to carry loads. We camped (15,500 ft.) on the right lateral moraine, sending the coolies back at once. Next morning (May 21) we pushed on up the Bagini glacier, and then, turning almost due S., we continued along the main course of the glacier which, flowing from the direction of Dunagiri Parbat, sweeps round towards the N. under the two peaks of A_{21}, 22,735 ft. and 22,516 ft., locally known as Kalanka and Changabang respectively. The latter is the peak ascended by Graham in 1883, and named by him 'Mount Monal.' It is worth recording here that the bestowal of this name, after the *monal* pheasants that he saw on it, was used by the Indian Press as an argument against Graham's veracity. But how can anyone imagine that he meant he saw them on the summit, or even



Dr. T. G. Longstaff, Photo.

CHANGABANG (22,516 ft.) FROM THE BAGINI PASS.

above the snow-line? In his more detailed papers in *Good Words*, he explicitly states that he saw them between his camp on the banks of the Rishi and his final bivouac—a locality in which they abounded at the time of our visit. Changabang is the most superbly beautiful mountain I have ever seen; its N.W. face, a sheer precipice of over 5,000 ft., being composed of such pale granite that it is at first taken for snow lying on the cliffs at an impossibly steep angle.

All who were bound for the pass were heavily loaded, as we had to carry Primus stoves, petroleum, cooking-pots, tents, sleeping-bags, instruments, rifles and ammunition, a large supply of ropes, and provisions sufficient to last our party of eight for ten days. For, having got into the Rishi valley, we intended to get out of it some time. In the interval we must be self-supporting. The sun was so oppressive that after tramping over the snow for five hours we stopped, at 11 A.M., under the shade of some huge blocks which formed part of an irregular medial moraine (18,300 ft.). Instead of making for the pass directly under Changabang, we had now decided to go right up to the head of this arm of the glacier, more directly under the great easterly spur of Dunagiri. Mumm, who was not very fit, did not intend to cross the pass with us, and returned to the camp above Dunagari with Inderbinnen and Damar Sing, leaving us a party of four Europeans and four Gurkhas. He rejoined us later at Surai Thota.

On May 22 we started at 4.30 A.M., but Bruce and I had very soon to stop with cold feet, and it was probably at this time that Karbir got his frost-bite. We had to rope over the last slopes, and the guides cut many steps. Our loads seemed to grow inordinately heavy, but at 10 A.M. we stood on the crest of the pass. Its height comes out at 20,100 ft., and the name Bagini Pass would most naturally belong to it.

From the pass we looked down to a vast *firn*, shut in by snow-clad peaks, while 3,000 ft. above us on the W. towered the icy crest of Dunagiri. But the descent of the S. side looked so bad that we had to set about it at once. The Brocherels had brought a good supply of *pitons* from Courmayeur, and by means of these we were able to lower ourselves and the loads down the snow-draped cliffs below us. It really was a difficult bit of mountaineering, the descent of about 1,000 ft. occupying over 5 hrs., and the two Brocherels were quite in their element. This was a very fine performance on the part of the Gurkhas, and a striking

testimony both to their inherently resolute character and to the excellence of their military training. Remember that they were called upon to perform a feat which was quite beyond the powers of any of the local men. As an instance of the value of local native evidence, I may mention that Mr. J. S. Ward, of the Rifle Brigade, told me that less than three months later our route was pointed out to him as lying over the spurs to the *west* of Dunagiri, along a shepherd's summer track. We had disappeared from the neighbourhood of their village and reappeared eight days later at Surai Thota. Obviously, then, we went by the only route they knew of!

We were very glad to camp about 4 P.M. on the snow-field directly at the S. foot of the pass (18,800 ft.). After a painfully cold night we got off at 6 A.M. (May 23), and proceeded down a huge snow-covered glacier in a south-easterly direction, with the twin peaks of Nanda Devi showing over the ridge straight ahead of us, and then, turning a sharp corner in a south-westerly direction, leaving the magnificent cone of Changabang behind us. In 6 hrs. we reached the end of the glacier for which the name Rhamani or Arhamani was afterwards given us by a shikari whom we took to the foot of the Trisuli Nala, from the slopes of which it is visible. He said that neither he nor anyone else had ever been there, though Graham must have touched it, and I do not know that there is any authority for the name. We had fondly hoped to find ourselves on the great glaciers at the foot of Nanda Devi itself, but the G.T.S. is naturally very inaccurate here.

We next came to an extraordinary gorge cut out by the glacier stream, which was often quite invisible, though very audible, under thick beds of hard snow. In one place we had to lower our loads on the rope, and follow ourselves in a similar manner. After food and a short rest, we broke out of the gorge to the right, climbed up the steep slopes on the W., and down again to the first patch of birch trees, where we camped at 6 P.M. (13,100 ft.) amongst enormous boulders, which still held some snow-drifts from which we could get water. To the E. towered the cliffs of Nanda Devi, too steep to hold the snow. S. was the entrance to the Trisuli Nala, though the peak itself was invisible. Directly at our feet, more than 1,000 ft. below, lay the junction of the Rhamani and Rishi torrents.

We started late on May 24, after a most refreshing night, and skirted high up along the slopes that fall in one con-

The "Curtain" 14,630 ft.
Between Dibrugheta and Durashi camps.
↓

Longstaff Photo. *Swan Electric Engraving Co. Ltd.*

VIEW DOWN THE RISHI VALLEY

KEDARNATH PEAKS IN DISTANCE

tinuous sweep from the peak marked 'Niti, No. 3, 17,056 ft.' on the G.T.S., into the Rishi Ganga, here only 10,900 ft. There is thus a drop of over 6,000 ft. in a horizontal distance of 2 miles, while the slopes of the opposite S. bank of the Rishi are very much steeper. After only a couple of hours of this work we saw some *bharhal* (wild sheep) below us, and killed two, after an easy stalk. Much to the wrath of the guides, we decided to stay where we were and eat them, so we camped under an overhanging cliff, near a convenient supply of juniper bushes and snow. For May 25 I noted a 'really terrific day coasting along the slopes of Niti peak (No. 3, G.T.S.), at about 13,000 ft.' We were all well loaded, and, the strata being the wrong way, we were constantly toiling up steep slopes to avoid difficulties, only to find horrid cut-offs on the other side. This lasted from 7.30 A.M. to 5 P.M., by which time we had covered 2 miles in a straight line, when, after a particularly heart-breaking ascent, we came upon a most unexpected sight. In a deep lateral nala far below us was a thick forest of tall, straight pines surrounding a small grassy alp. For five days we had had to rely on snow for drinking purposes, and at only the two last camps had been able to get any wood, so this was a very welcome change. We afterwards found that this was the summer pasture, named Dibrugheta (11,730 ft.), to which the Tolma shepherds annually bring their flocks.

On May 26 we started rather late—at 7.45 A.M.—to make our way past the screen of bare cliffs, which, towering 2,900 ft. above us, completely shut in the nala on the W. We kept at first to the left bank of the stream, and rapidly gained height by following the crest of an old lateral moraine.

I believe there is an alternative route into the Tolma glen at the head of this ravine, but, crossing the torrent about 1½ miles above Dibrugheta (Graham's Debritigurh), we climbed up the steep grassy slopes, still snow-covered, and crossed the ridge to the W. at over 14,000 ft. Gentle snow-slopes led us on at 2 P.M. to three stone goat-pens half buried in snow. This was Durashi (Graham's Dunassau), (13,230 ft.); it is close to the spot marked 12,950*b* on the G.T.S., so we knew we must be on the right track. The highest peak of the 'Curtain' between Durashi and Dibrugheta was afterwards found to be 14,630 ft., and its lowest depression 14,100 ft. From this little peak, and from the top of a cliff a quarter of a mile to the W. of our camp, we obtained most extraordinary views down a series of appalling precipices to the bed of Rishi

Ganda, far below us. From Lata peak (12,624 ft., G.T.S.), on the other side of which we had encamped a fortnight earlier, the drop to the river must be nearly 6,000 ft., and this in a horizontal distance of only three-quarters of a mile.

We still had to find the whereabouts of the goat track across the cliffs ahead of us, and when we left camp next morning (May 27), at 6.30 A.M. in cold wet mist and falling snow, we realised that we were in for some interesting work. We started up the slopes to the N.W. and tried the cliffs in several places, but, owing to the mist, failed to hit off the route. However, after some good climbing, we found ourselves at 10 A.M. on the summit of a small peak (15,700 ft.). We christened this Tolma peak, because we believed that if we went down the further side we should reach the village of that name. It was snowing and blowing, and the descent of the deep snow gullies below us called for great care and all the usual precautions. Fortunately, the angle gradually eased off, and we were able to unrope and glissade down an old avalanche which took us right into the forest at the head of the Tolma glen. We then raced off down this densely wooded gorge, sometimes in the bed of the torrent itself, but more often creeping along the cliffs on its left bank, and so through Tolma village to our base camp at Surai Thota, thoroughly well satisfied with our eight days' expedition.

Bruce had, most unfortunately, damaged his knee during our passage down the Rishi valley, and it now became so painful that he was compelled to lie up. But the rains were approaching, and the assault on Trisul still to be made; so with his generously given consent we decided to leave him at the base camp at Surai Thota, with his servant and four of the Gurkhas. On May 31, Mumm and I set off with the three guides, Karbir, Damar Sing, Kulbahadur, Dhan Lal, Buddhichand, and also a young shikari, with twenty-three coolies to carry in our supplies for three weeks. We mounted the steep track to Tolma village, and then turned straight upwards into the forest past some magnificent deodars, one of which measured 41 ft. in circumference 6 ft. above the ground. The woods were full of *monal* pheasants, and we found a nest with six eggs in it. Early in the afternoon we camped on a pretty little alp known as Hyetui Kharak (11,500 ft.).

We were up at 5.30 on June 1, but could not get the coolies off till 7 A.M. Soon after the tree-limit (12,000 to 12,500 ft.) had been passed, the guides commenced the arduous task of breaking a track through the snow for the coolies, who

required the help of the rope to get round one particularly awkward corner. At 12.30 we reached the col (14,700 ft.), and commenced the passage of the cliffs leading to Durashi. The guides had to cut every step of the way, while we and the Gurkhas helped the coolies over the worst bits. The goat track should have been clear by now, but, as I have said, the season was a late one, and every ledge was covered by a steep slope of snow. Fortunately, no one slipped, and soon after 3 P.M. we reached our old quarters at Durashi. Next day we crossed the 'Curtain' ridge, dropped down 2,500 ft. to the stream at its foot, and so reached Dibrugheta.

On June 3 the coolies got off before 7 A.M., as we had told them that this would be their last march. Crossing over an intervening spur, we struck down diagonally over very bad ground, below the slopes we had traversed on May 24 and 25, to the Rishi Ganga, making for a spot called Duti (10,900 ft.). Here some huge boulders in the bed of the torrent made it easy to construct a temporary bridge, which we crossed about noon. We were now on the S. side of the Rishi Ganga, and the opening of the Trisuli Nala—as we named it—was only a very short distance further up the stream. But there is, of course, no sign of a track, and we had to climb up 1,500 ft. before we could turn E. along the densely crowded thickets of rhododendron and birch which clothe the sides of the valley. However, soon after 3 P.M. we found a fairly good camping-place in the bed of the Trisuli Nala itself, amongst a tangle of birch-trees, and just on a level with the last of the pines. This camp (11,600 ft.) was to be our base for Trisul, so we paid off all but three of the coolies and sent them back to their homes, with instructions to return in three weeks if they felt inclined, but that we were quite independent of their services. This last statement, though true, was made merely to ensure their return.

On June 4 Damar Sing climbed up the steep crags on the right bank of the stream with the plane-table, while I went up the opposite slopes to get a look up the *nala*. Very soon I saw a glacier with a series of moraines on its left bank, which came sweeping into our *nala* from the S.W. almost at a right angle. Soon after gaining this, about noon, I saw three *bharhal* crossing the ice, and shot a couple for food, which I think was allowable under the circumstances, and considering that only one sportsman, Mr. A. P. Davis, had ever been here. His camping-place was pointed out to me by the shikari, who called it Betatoli, which name I therefore attach to the glacier. It heads from the north-

eastern slopes of the G.T.S. peak (20,842 ft.), 4½ miles N. of Trisul. Its middle course is broken by a formidable ice-fall. Formerly the Trisuli glacier flowed into the Betatoli glacier from the south, and deflected the latter towards the north. Now that the Trisuli glacier has receded, the Betatoli has straightened itself out, leaving a series of lateral moraines along its left bank. Further, it has completely blocked up the Trisuli Nala, impinging against the cliffs of its eastern wall, and presenting to the S. an almost perpendicular face of ice several hundred feet high, through the base of which the Trisuli torrent has carved out an ice-tunnel.

It did not seem worth while carrying our base camp any higher, so we decided to leave Damar Sing in charge to carry on the plane-table survey, and to wait for Bruce with the shikari and the three coolies who had elected to remain with us. On June 5 I set off with Mumm, the three guides, Karbir, and the three other Gurkhas, taking with us the lightest possible outfit. We followed the left bank of the stream straight up to the Trisuli Nala, and then took to the left lateral moraine of the Betatoli glacier. After following this till the ice became less steep and broken, we crossed the glacier at right angles, scrambled up the moraine on the right bank, and dropped down into an unexpected little hollow on the far side. Its floor consisted of old moraine heaps thickly carpeted with coarse grass and juniper scrub about 2 ft. high. It was a pleasant and well-sheltered spot, obviously the last at which we could camp in any comfort, so, although it was only 11 A.M., and our altitude only 13,100 ft., we decided to stay here. Amongst ourselves we always called it 'Juniper Camp.'

After caching some tins and the meat of another *bharhal* in a bed of snow, we started at 6 A.M. (June 6) up the moraine-covered slopes leading to the Trisuli glacier. Keeping well up the left bank of the Trisuli torrent, we reached the snout of the glacier at about 14,000 ft. at 8 A.M. As we went on, the left lateral moraine grew more and more distinct, and soon its crest offered us an excellent path. At first it led us due S., but soon we began to bend round slightly to the S.W. Straight ahead were A_{24} (22,490 ft.) and A_{29} (22,360 ft.), and closing in our view up the glacier on the W. were some high black cliffs festooned with icicles. Then we saw our moraine (left lateral) taking a sharp turn to the W., and, climbing up the mountain-side, disappear amongst snow and ice. At the same moment we saw the great gap between A_{28} and the middle peak of Trisul, which I had reconnoitred from the Kurumtoli (Garhwali Kail) glacier in 1905.

We went on up to the last slope of the moraine that was free from snow, and camped at 2.30 P.M. at a height of about 16,500 ft. In front of us, as we looked towards the invisible summit of Trisul, was a magnificent ice-fall, and above that huge rolling wastes of desolate snow. Starting at 5.30 A.M. on June 7, we continued to mount in a westerly direction, having this ice-fall on our left hand, and a line of dark cliffs on our right. The slopes were steep at first, and our loads kept the pace down. On reaching the open snow-fields above, the sun became very trying, and I felt the exertion severely. About noon the slope steepened again, and a violent W. wind began to blow, so at 2 P.M. we camped at an altitude which works out at 20,050 ft. The surface of the snow was whipped up and driven into and through our clothes from every direction. We managed with great difficulty to persuade one of the Primus stoves to work, and Henri gave us all a hot drink. I turned in with Karbir, who watched over me like a nurse, although he was suffering considerable pain from the frost-bite he had contracted on the Bagini glacier. We passed a cold, uncomfortable night, owing to the violent wind and the snow which was driven into the tents. Next morning, June 8, the gale was still raging. The tents, though only 3 to 4 ft. high, could hardly be kept standing, and it was quite impossible to make a start. As Inderbinnen was suffering from severe headache, and the three Gurkhas were feeling the cold acutely, though without complaint, we decided to send them down to Juniper Camp on the first sign of a lull, which came about noon. The rest of us stayed on in the hope that things might improve by the next morning. We could not stay outside the tents, so I passed the day in smoking and dragging out Karbir's reminiscences of war. He has been in forty affairs, and is great on bullet-wounds; takes a sensible view of war, and fights to hurt. I fear Mumm had a very dull time alone in his tent. We could not even melt snow to drink, though the guides tried for more than an hour. The second night seemed worse than the first, and a lot of snow had driven into the tents by morning, so we literally tore ourselves up by the roots and struggled down through the bitter cold weather. We got out of the wind as soon as we neared the line of cliffs by the ice-fall, and leaving some things at our old camping-place, we trudged back along the moraine to Juniper Camp, which we reached at 2.30 P.M.

On June 10 we enjoyed a well-earned rest and the comforts of a fire, and although it snowed from 1 to 5 P.M., we felt very luxurious. Fearing for Kharbir's frost-bitten foot, I tried to

persuade him to give up the attempt, which we decided to renew on the morrow. But it was useless, as Bruce had warned me it would be: so we made some *bharhal*-skin covers for his boots, which we hoped would help to keep out the cold. Mumm had severe indigestion all night, and was so unwell in the morning that he decided to return to the camp in the Trisuli Nala. It was extremely hard lines, for he had had all the hard work and discomfort so far, and he stood high altitudes so well that he could certainly have reached the summit with us. So, to my great regret, we parted on June 11, with his most strict injunctions to get to the top somehow. I had with me Alexis and Henri Brocherel and Karbir. Dhan Lal and Buddichand came with us for the day to carry my load and lighten that of the guides. Leaving Juniper Camp at 6.20 A.M., we reached our moraine camp of June 6–7 very quickly at 10.50. All the morning the weather looked very Arctic, but the absence of sun probably accounted for our excellent pace. On the way up the moraine, at about 15,000 ft., we saw a couple of dark grey foxes, and put up several ponderous 'snow pheasants' (Tetraogallus tibetanus). After much discussion with the guides, I had come to the conclusion that our best chance was to rush the peak from a lower camp, and not to tempt the wind again on the exposed snow-slopes higher up. Snow began to fall at noon, and soon afterwards we sent the Gurkhas back and pitched our Mummery tents at about 17,450 ft., under the shelter of the high cliffs already mentioned. We immediately set to work with the Primus stove, and after a long drink all round, we filled three large 'Thermos' bottles with cocoa and weak tea. In this way we hoped to provide a breakfast drink and enough liquid for the ascent, without having to waste time over snow-melting the next morning.

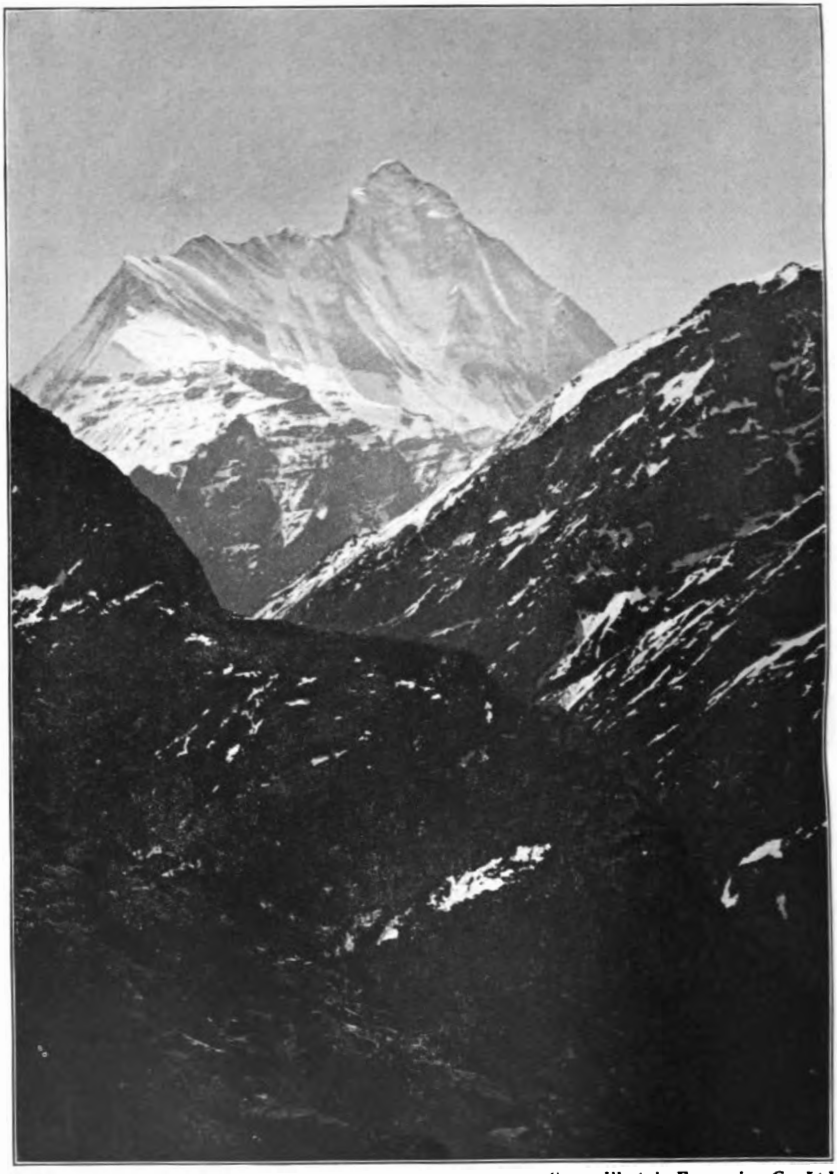
Snow continued to fall gently till the early hours. We tried to start (June 12) at 4 A.M., but I could not face the cold, which attacked my feet and hands before I could get my frozen boots on, although I had kept the latter inside my sleeping-bag all night. However, we started at 5.30 A.M., and as we carried only the very lightest loads we made rapid progress. We reached our old upper camp (20,050 ft.) by 10 A.M., where we remained half an hour to eat a small meal of raisins and plasmon biscuits, for we had all fully realised that it was most unwise for us to try to negotiate a heavy meal at such an altitude. Seeing signs of crevasses ahead, we put on the rope, Alexis leading, then Karbir, Henri, and myself. Then on we went up the snow-slopes, of continuous

steepness but withal quite easy, in a S.W. by southerly direction. My breathing was very rapid, and I felt very feeble, but I was securely tied on to the rope and could not escape. The *tourmentes* of wind-driven snow, to which this slope of the mountain seems very liable, were at times almost paralysing in their intensity, yet I am sure that we bore the cold better than we should have borne extreme heat. At noon we found we had reached 21,000 ft., and here Alexis had to take off the small snow-shoes with which he had been breaking a track through the crust of new snow, as the slope became too steep for their use. I began to doubt my capacity for maintaining the pace much longer, but Alexis and Karbir seemed quite happy, and Henri offered to pull on my rope as much as I liked, so I pocketed my pride and consented to this breach of the rules. Except for the briefest halts to recover breath, we now rose rapidly and continuously, the slopes being at that particular angle of steepness which enables the climber to make height most rapidly, and all the peaks in sight sank below us, except Nanda Devi. As we neared the summit the bitter W. wind again swooped down on us, rattling the icicles on our beards and moustaches, and half smothering us in whirling snow. Suddenly the slope ended, and Alexis turned and shouted to me. We found ourselves standing on a flat-topped dome of snow, which forms the apex of the huge triangular snow-field set at a steep angle upon the N.E. face of the mountain, and along the western edge of which we had climbed; the guides hailed it as the summit, and Henri planted the stick and square of canvas he had insisted on bringing up. But I was not yet satisfied, for just beyond us, across a dip in the ridge, was a most provoking cornice, which seemed to be a few feet higher, and cut off the view to the south. I do not think I am exaggerating when I say it was only by the exercise of considerable mental resolution that I had been able to turn myself into a sufficiently mechanical machine to keep up the pace so far, and I was naturally extremely fatigued; but now excitement made me lose all sense of it. There was some demur to going any further so late in the day—it was 4 P.M.—and, as I could not make myself heard above the gale, I took the lead and pushed on. Not knowing the size of the cornice, I had to keep well down on its western slope. The snow was frozen hard, and, as I was the only one wearing crampons, I soon received orders to cut steps; I did not notice any difficulty in doing so, but the distance was very short, and I soon crawled on to the cornice and looked over the edge down the astounding southern

precipice of Trisul, a sheer drop of over 6,000 ft. I remember no feeling of elation at having accomplished the ascent—I suppose I was too tired for that—but on looking round me I realised as I have seldom done before that higher reward which carries us year after year, through toil and discomfort, back to the mountains. Remote from the world, the sense of isolation was complete: the inhabited earth was at our feet, but we stood on a different planet, removed from it by undreamed-of spaces; and the turmoil of the elements around us intensified the indescribable majesty of that stupendous vision. Over the foot-hills to the south was piled a dense copper-coloured haze—a dust-storm from the plains, but to the west I seemed to be gazing into space itself across the scarp of the Himalaya, whose lines fell in long sweeping curves to the vast unbroken plains, lapping at their feet as did the ocean of a forgotten epoch.

The cold was very trying, and turning back almost at once we regained the first summit, which proved to be the highest after all. It was 4.30 P.M. before we began the descent. I felt quite done up, but had no difficulty with my breathing as soon as I began to go downhill. Going very fast, we reached our camp under the cliffs at 7 P.M.; but perhaps my watch was fast, for it was so light that the men insisted on rolling up the tents and sleeping-bags, and carried everything down to our old camp on the moraine at 16,500 ft. That night my only desire was for sleep; I was neither hungry nor thirsty, though I had taken very little all day.

I hope I have made it plain that the two Brocherels—without whose support, moral and physical, I do not think I should have reached the summit—and Karbir showed no signs of distress during the climb. We ascended from a camp at 17,450 ft. to the summit, 23,406 ft.—that is to say, 6,000 ft. in 10 hrs., the descent of nearly 7,000 ft. being made in a little over 3 hrs. Graham estimated his highest camp on Kabru at 18,500 ft., and reached the summit, 24,000 ft. —an ascent of 5,500 ft.—in a little over 9 hrs. In each case this gives a rate of approximately 600 ft. an hour. Turning to the Alps, the best instance I can remember for comparison is the ascent of Mont Blanc, 15,781 ft. from the Dome Hut 10,499 ft. on the Italian side. I have twice performed this ascent of 5,282 ft. in 5½ hrs., which gives a rate of 960 ft. an hour. In addition to this diminution of progress, I am distinctly conscious of both mental and physical lassitude at very great altitudes; but I have now been to 20,000 ft. and over on about ten occasions, and slept



Longstaff Photo. *Swan Electric Engraving Co. Ltd.*

NANDA DEVI

FROM THE UPPER RISHI VALLEY.

at least three, and probably five, nights at such altitudes, and my experience confirms me in the belief that the effect of low atmospheric pressure depends on the strength and condition of the climber much more than on the actual altitude he attains. I also believe that the idea of acclimatisation to low pressure is fallacious, for in my experience the effects are cumulative; and it was this consideration which finally decided me to rush the peak from a comparatively low camp.

Next morning (June 13) Alexis and I proceeded up the level snow-covered surface of the Trisuli glacier for 1½ hrs.; while Henri and Karbir started back down the glacier with heavy loads. Ahead of us lay the Trisul Gap, as I would name it, for, having never been crossed, it can hardly be called a pass. It has the appearance of being less than 18,000 ft. in altitude, and is situated in the great ridge which runs from the middle peak of Trisul (? about 22,000 ft.) in an easterly direction through the peaks A_{28} and A_{29} of the G.T.S. The map therefore misplaces this water-parting between the Pindar and the Rishi by about two miles, showing the ridge as articulating with the highest (northernmost) peak of Trisul. The approach from the N. is quite easy, but the upper part of the Kurumtoli glacier on the S. side is very dangerous owing to ice avalanches from an offensive series of hanging glaciers. As long ago as 1863 Colonel Edmund Smyth proposed to cross this gap from N. to S., but was never able to attempt it. He supports my contention * as to the correct name of the Kurumtoli glacier of the G.T.S.

Returning down the Trisuli glacier, we redistributed our loads at Juniper Camp, which we had looked on as our home since June 5, and proceeded across the Betatoli glacier and down to our base camp at the mouth of the Trisuli Nala. Here we were welcomed by Bruce and Mumm, the former having sufficiently recovered to come over into the Rishi valley, but being now down with fever, so that it was impossible for him to attempt to repeat the ascent of

* *A. J.* vol. xxiii. p. 225. The river is known as the Kail Ganga and the glacier as the Kail Gal. Kurumtoli is to *west* of Trisul.

Colonel Edmund Smyth, with his brothers Christopher and Grenville, of Mont Blanc fame, made the first ascent of the Ostspitze of Monte Rosa in 1854. Both as a mountaineer and a sportsman he holds the highest reputation in Kumaon and Garhwal, and I am greatly indebted to him for information on various points.

Trisul. It will always be a source of great regret to me that neither of my companions was able to share in this ascent. We all worked together during the expedition, but Bruce worked harder than the rest, and fully deserved the title of 'leader'; Mumm and I owe him a great debt of gratitude for the trouble he took over organisation both before and during the journey. The ascent of Trisul is quite easy from the technical point of view, but demands so much mechanical endurance that no one who is not in perfect health can hope to achieve it. The real difficulty lies in getting to the foot of the peak.

That night Karbir regaled us with stories of Tara Bhot (Tibet): one dealt with a race of men whose ears are so large that they are able to sleep on one while they cover themselves over with the other. Possibly a few similarly long-eared individuals may still be found in Europe. The shikari incautiously asked him if he had been able to see the Plains from the top of Trisul. With a grave face the Gurkha replied that he had made out the city of Bareilly, and beyond that Bombay and the Black Water (the ocean), and beyond that Wilayat (England), and he 'knew it was England because he had been there.' So you will see that he is a man after my own heart.

On June 15 Bruce and Mumm started back across the Rishi valley with the guides and Gurkhas, all carrying double loads. Not relishing this prospect I started on the previous day with Kulbahadur and Pahal Sing in an endeavour to force a way right up to the head of the Rishi Nala under Nanda Devi, taking four days' food with us. With considerable difficulty we reached the junction of the Rhamani torrent with the Rishi Ganga, where we crossed the latter to the N. bank by a snow bridge (11,790 ft.), as we could get no further along the S. bank, and the current was too strong for wading. Here we camped under an overhanging rock amongst the birch trees. Next morning we climbed straight up to about 13,500 ft., and in the intervening 1,700 ft. of cliffs between this and the Rishi Ganga saw no practicable route up the valley, though we obtained a most wonderful view of Nanda Devi, the 'Blessed Goddess,' that queen of mountains, fit to rank with the Matterhorn and Ushba. I think that we were just beyond Graham's furthest point in this direction. We could see no sign of a glacier filling the head of the Rishi valley, such as is shown on the G.T.S. maps, and Damar Sing reported, from his observations from the ridge which forms the eastern boundary of the Trisuli Nala, that the glaciers

A. L. Mumm, Photo.

THE DHAOLI RIVER ABOVE MALARI.

from the N. and S. of Nanda Devi do not join each other at the western base of that peak.

Though no one, native or European, has yet succeeded in forcing his way up the gorge to the western base of Nanda Devi, yet I feel convinced that it is possible to do so. I can think of no more interesting or arduous task for a party composed of mountaineers than to follow up the great glacier under the southern face of Nanda Devi and to cross the ridge on which I camped in 1905, over into the Milam valley. The height of the pass is about 19,000 ft., and as we stood on its crest it appeared quite possible to climb up to it from the Nanda Devi glacier on the W. But this expedition would involve the abandonment of the base camp and all impedimenta in the Dhaoli valley for at least a month. The return could be made most quickly by the Untadhura pass and the difficult Girthi valley to Malari, for I do not think anyone would be likely to try to return by the same route.

Re-crossing to the S. bank, we turned back down the Rishi valley and caught up the others at Duti on the evening of the 15th. On June 16 we all pushed on to Dibrugheta, where we were relieved of our loads by the coolies, who came in on the following day and carried them up to Durashi. Here we found that the snow had nearly disappeared, leaving beds of iris, primula, and anemone in its place. June 18 was gloriously fine—one of those rare days when the snows really do sparkle—and the goat track along the cliffs being almost free from snow we were able to enjoy the wonderful views down into the gorge of the lower Rishi and Ronti valleys, and of the snow peaks amongst which we had spent so many arduous days. That afternoon we reached our base camp in the Dhaoli valley at Surai Thota.

Our next objective was Kamet, so we moved all our stores and baggage up the Dhaoli valley towards Niti. At Malari (10,011 ft.) I was greeted by a Bhotia whom I had met two years previously at Shibchilam, in Tibet. I had there engaged yaks from the Dzongpön of Daba to take my belongings back into India. To my surprise, the Tibetan in charge bolted in the night with the yaks at the foot of the Chor Hoti pass, after having taken me all through the Dakka hills and over the Shalshal pass into British territory. I had no difficulty in reaching Niti, but, as a matter of form, wrote a note in English complaining to the Dzongpön. Months afterwards I had received a postal order for Rs. 8 for which I could never account. Now the Bhotia informed me that the Dzongpön had sent this sum to me as the balance due

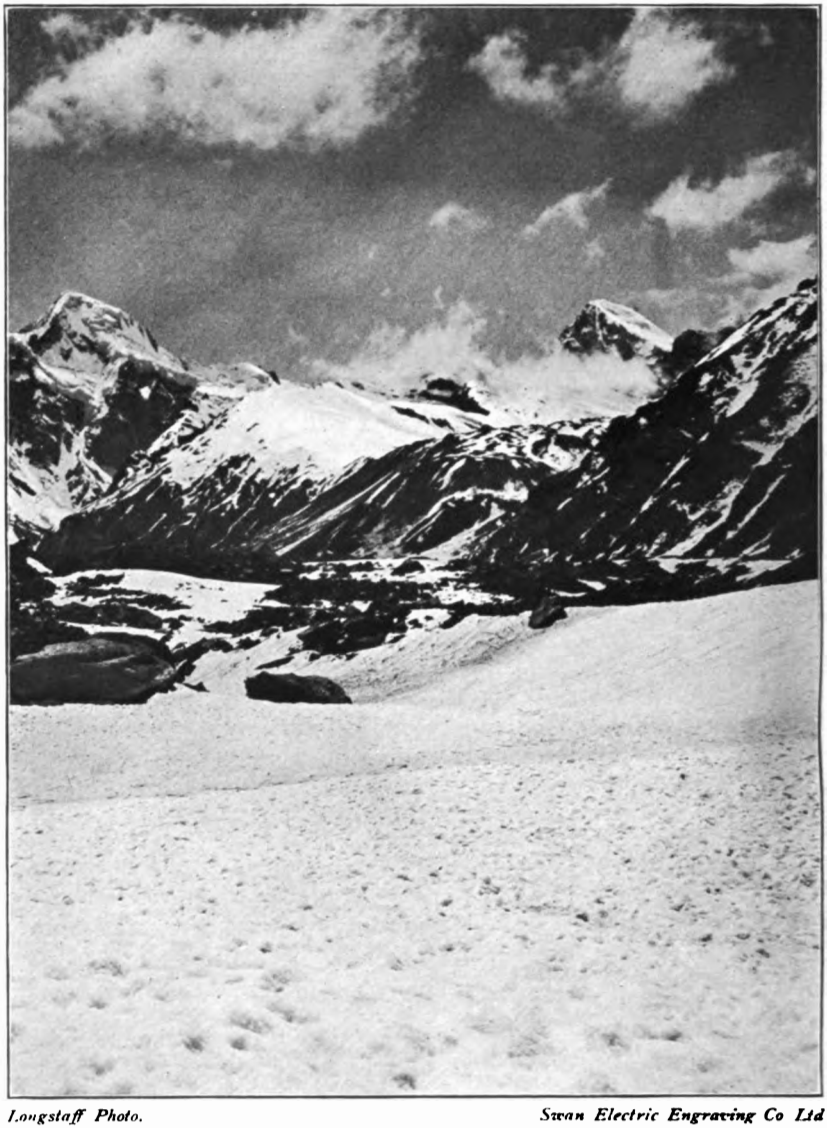
from the full yak hire I had already paid, and which had been forfeited owing to the flight of the Tibetan driver. This is a striking example, not merely of Tibetan honesty, but of the friendliness with which English people are regarded by Tibetan officials. Doubtless the epidemic of political aloofness which is at present so popular in this country will lose for us the good impression that we have made, for the position which we have taken up over the Tibetan question will inevitably be attributed to fear.

From Malari we sent our baggage up the valley through Gamsali village to Timor Shim, the encamping ground below the large Bhotia village of Niti (11,857 ft.), while we crossed the easy Kurkuti Dhar (15,064 ft.), getting fine views of the Hoti peaks and up the Gamsali glen.

At last we were able to persuade Karbir to pay some attention to his frost-bitten foot, from which he was now suffering acute pain. Leaving him in charge of the base camp at Timor Shim we started again along the Niti track with eighteen *jhobus* (half-bred yaks) and fourteen coolies.

On June 27 we crossed the Dhaoli by a natural bridge, and turning up the Raikana Nala deserted the track to the Niti pass, which constitutes one of the principal Bhotia trade-routes into Tibet. A local shikari related that many years ago goats used to be pastured in the Raikana Nala. One day some goats from the Mana side joined the flock. Another day a Mana dog came over, carrying a *chupatti* which he had stolen, and which was still hot. The latter phenomenon was taken to prove that the distance to the Mana pastures on the other side of the range was very short, the *chupatti* not having had time to cool. But if the distance had been only ten yards, that *chupatti* would have been eaten before arrival by any Bhotia dog I ever met. Still, 'the sahibs would be glad to hear that there was a route across the snows practicable for such wonderful sahibs as their honours.' If there was any truth in the tradition, the communication would have been from the Gamsali glen to the S., as there can be no practicable route from the Raikana basin direct to Mana.

Next morning we ascended the moraine of the Raikana glacier, but, owing to the badness of the going, had to stop at 11 A.M. and send the *jhobus* back to their scanty pastures at Raikana Kharak, a thousand feet lower. Our camp was pitched at 15,350 ft., on a level patch of moraine stuff adjoining the ice on the left bank of the glacier, and directly below Chango, 20,216 ft. We were able to obtain wood from the juniper bushes at Raikana Kharak.



Longstaff Photo. *Swan Electric Engraving Co Ltd*

KAMET

FROM THE KAMET GLACIER.

On June 29 I pushed on up the left bank of the main Raikana glacier with the two Brocherels. We passed several fine glacial pools, which might almost be accorded the title of *Märjelen* lakes, the larger ones containing small floating bergs. In three hours we reached a height of about 16,800 ft., the glacier being very rough and crevassed. To the N.N.W. was a snow pass leading into Tibet, and on this side easy of access. To the W. we were looking straight up a glacier, which leads to what I take to be Strachey's 24,670-ft. peak, about a mile to the N.E. of Kamet itself, and which I had seen from Gurla Mandhata, 100 miles to the E., in 1905. Owing to inaccuracies in the map, we had overshot our mark, which was the glacier leading to Kamet itself. After watching some *bharhal* feeding on the stony slopes opposite at over 16,000 ft., we turned back, crossing over to the right back of the glacier and skirting round a great buttress so as to reach the glacier which flows from the actual S.E. base of Kamet, and which, for convenience, I shall call the Kamet glacier. We had to climb high above some bad cliffs on the buttress, but eventually dropped down on to the Kamet glacier, and continued up it to a height of about 16,300 ft. Here we saw enough to show us that we were on the only possible route by which our peak could be attacked on this side, though we could not reconcile the map with what we saw before us. Descending the Kamet glacier, we found that it united with the Raikana glacier, its extremely broken and moraine-covered surface having doubtless deceived the surveyors into thinking that the two ice-streams did not join one another. We reached our camp late in the evening, after a very long and fatiguing day.

On June 30 we started to reconnoitre Kamet, taking with us the two Brocherels, six Gurkhas, and ten coolies. Crossing the Raikana glacier, we went up the Kamet glacier, and, after some rough walking, made a camp at 16,800 ft. on the left lateral moraine, where we found some big boulders on a grassy slope, which gave our camp a very luxurious air. As usual, we sent the coolies back at once. On July 1 we did not start till 6.30 A.M.; to follow the glacier further would have been very risky, owing to the dangerous hanging glaciers which drape the northern slopes of Mana peak (23,862 ft.), so we turned sharply to the N.W. up a very steep moraine-slope. This landed us on a glacier of the secondary order which we followed upwards towards the snowy saddle at its head. Another glacier joined the one we were following on our right hand, but it did not look particularly inviting, so we

continued on our way, hoping we could approach Kamet from the snow saddle.

Heavy clouds were blowing over the ridge from the S.W., and we were soon enveloped in their folds, but the echo from the cliffs on our right kept us straight. We pushed on over ever-steepening snow-slopes, and at 1.30 P.M. reached the crest of the ridge. The Watkin observation gives a height of 20,180 ft., but the morning's camp was fixed, as usual, by hypsometer, and using this as a lower station, and working by difference, the reading would be 20,870 ft. I think this tends to show that the other altitudes are not over-estimated. The clouds cleared somewhat, and we saw directly below us the avalanche-swept Kamet glacier winding down from the foot of that great peak (25,443 ft.). But we were completely cut off from it. Worse still, we never got a complete view of its stupendous S.E. face, which falls in a succession of red precipices more than 7,000 ft. to the glacier below. Damar Sing had brought the plane-table up with us, but with all the clouds about it was useless to set it up; indeed, the cold wind alone was sufficient to drive us down after we had waited for three-quarters of an hour in hopes of a clear view. We had seen enough to know that there was no practicable route by which the peak might be attacked on this (eastern) side. The upper Kamet glacier is horribly dangerous, lying in so narrow a gorge that it would be quite impossible to escape from the ice avalanches which constantly fall on to it. During the descent we could watch the clouds thin and dissolve as they were driven into the dry air of Tibet, and over the Chango ridge we could see those lofty plains over which it had been my good fortune to wander before we closed the frontier against ourselves.

Next day we returned down the Kamet glacier and crossed the Raikana glacier to our camp. One of the largest of the glacier lakes had emptied itself since we had passed it three days earlier.

As we considered it useless to attempt Kamet from the east, we now decided to cross the main range to Badrinath, in the valley of the Alaknanda. Our heavy baggage would have to go round by Joshimath, but, by using a snow pass known to the natives, we hoped to be able to cross with sufficient tents and supplies to keep us till our heavy camp could arrive. So we all returned to Niti, and on July 4 had the whole of our effects carried down through the wonderful Niti gorge to the encamping ground (11,190 ft.) opposite the village of Gamsali on the right bank of the Dhaoli river.

RATABAN (20,094 ft.) FROM THE SLOPES ABOVE ERI UDIAR.

A. L. Mumm, Photo.

On July 7 we started up the Gamsali valley with about twenty Bhotia coolies, and soon found ourselves among a chaos of huge rocks. These are probably the result of rock-falls overlying moraine stuff. The valley is shut in on either side by the most glorious gneiss cliffs, the general effect produced being similar to that of the Vale of Lauterbrunnen carved on a sublime scale, but without the forests. Further on we came to an unmistakable terminal moraine, its summit raised above the valley floor immediately ahead. At this time of year it was a veritable garden of flowers, and afforded excellent pasturage for the Gamsali flocks. We camped at a spot called Thur Udiar (13,000 ft.), close to the snout of the main glacier, to which the Gamsali people gave the name of Bańke *gal*. Next day we followed the left lateral moraine for two and a half hours, and camped on a flat shelf behind it called Eri Udiar (Cold Cave) (14,690 ft.). Here were the last of the juniper bushes; the fact that they had not all been cut for fuel long ago in itself showing how rarely the natives visit this spot. Facing us was a magnificent ice-fall, flowing down the slopes of G.T.S. peak (21,198 ft.) in a north-easterly direction, while from the steep slopes above our camp there was a splendid view of Rataban (20,094 ft.), and also of the beautiful little glacier lake at the foot of the former peak. The pass by which we meant to cross the range lay between these two fine mountains, but was completely hidden behind a subsidiary spur of the 21,198-ft. peak. It was crossed on November 1, 1862, by Colonel Edmund Smyth, who tells me that it had not then been used for many years. His Bhotias lost their way, and he was compelled to pass the night in the open on the pass.

I returned to Gamsali with Bruce, who had to make arrangements for sending Karbir round by the valley route with our heavy camp, while Mumm and Inderbinnen, in spite of very bad weather, explored the upper part of the Bańke glacier towards Mana Peak. Mumm found unexpected indications of a pass, which I regret we did not follow up by trying to get to Mana by this new route. But as it had never been explored, we could not be sure of getting coolies over; and so we left it for the consideration of future climbers, a most deserving and sometimes an indispensable class from the point of view of the pioneer.

On July 11 we all assembled once more at Eri Udiar, and started at 7 A.M. next morning to cross the Bhyundar Kanta, or Smyth's Pass, as we called it, taking about twenty lightly laden coolies with us. We reached the top of the pass

without difficulty at noon, and saw three *bharhal* above us. I found the altitude to be only 16,700 ft. The view to the S.W. into the green Bhyundar valley was very fine, and a great contrast to the stony desolation of the N. Due S. rose Gauri Parbat (21,747 ft.), well named the 'Brilliant Peak,' and over its shoulder we could see the top of Hathi Parbat (22,141 ft.), named after its resemblance to the body of a reclining elephant. Though the snow-slopes on the N. are much crevassed, and those on the S. are steep and require some care, this pass is not at all difficult as compared with the Alpine standard. The G.T.S. is inaccurate on both sides, but especially on the S., where the number and extent of the glaciers are greatly underrated, one of those left out being some 6 miles in length. Still, the map was of the greatest use to us, and would enable a mountaineer to plan routes with considerable confidence.

The descent is broken by a cirque of cliffs over which the ice of the G.T.S. Thiapap-ka-bank (Garhwali Bhyundar) glacier tumbles, but we avoided them by a long traverse to the W. on steep snow, and, scrambling down a rock gully, reached the dry glacier itself. Gradually we edged off the ice towards the high right lateral moraine. We now saw the full face of Hathi Parbat, from the western base of which a large glacier rises. At its head is a pass, practicable on this side at least, which, according to the G.T.S., would lead over on to the Juma glacier. It joins the Thiapap-ka-bank (Bhyundar) glacier about a mile below what is shown as its termination on the G.T.S. Opposite this junction we camped at 3.30 P.M. There is plenty of juniper and good shelter among the boulders, with water not far off, and the place is known as Shem Kharak (12,800 ft.).

We continued down the moraine next morning (July 13) for three-quarters of an hour, when we reached the snout of the Bhyundar glacier at an altitude of 12,000 ft. Our route now lay across the most luxuriant meadows I have met with in this part of the Himalaya. We waded through flowers up to our waists—ferns, yellow lilies and anemones, green fritillaries, purple monkshood, and in the drier spots a beautiful blue dwarf iris, and white and red wild strawberries, with forget-me-nots and large yellow king-cups by the streams. Swallow-tailed butterflies and small birds were flitting about us on all sides. Altogether, we found its charm so irresistible that we camped at 10.30 A.M. This spot was called Bhamini Daur by our coolies. It is situated at an altitude of 11,650 ft., just where the Bhyundar river, which has been flowing in a south-

westerly direction, makes a sudden sharp turn to the S. into the jaws of an extraordinarily abrupt defile. We were told, probably incorrectly, that this defile is quite impassable lower down. A fortnight later we passed the spot where it enters the Vishnu (Alaknanda) river, a mile below Pandukeswar.

We left this camp at 8 A.M on July 14, going due W. towards an obvious pass. After scrambling up a very steep grass slope beside a fine waterfall, we emerged into a hanging valley strewed with moraine heaps, and into the upper (N.W.) part of which a small glacier descends. Passing below its snout, up easy grass slopes, we reached the pass known as the Khanta Khal at 11 A.M. The hypsometer gave the altitude as 14,750 ft. and the corrected Watkin aneroid as 14,500 ft. The panorama of peaks and glaciers to the N. and E. was exceedingly fine. To the W. and S. clouds somewhat interfered with the view, but the wonderful snowy spike of Nalikhanta (21,713 ft.), dominating Badrinath, stood out glittering above them. We went down through a wild glen to Hanuman Chatti (8,500 ft.), the descent of 6,000 ft. in 2½ miles, with the usual allowance of unavoidable ascents, being accomplished in less than 3 hrs. The beds of avalanche snow in the nala extended almost down to the village, and we had some splendid glissades whenever we could get down into it.

At Hanuman Chatti we were on the great pilgrim route to Badrinath, which we passed through on July 15, pitching our camp at Mana village the same day. While Bruce was waiting for Karbir and our heavy camp to come up, Mumm visited the junction of Bhagat Kharak and Satopanth glaciers from which the sacred Alaknanda river issues, and I pushed on towards the Mana pass on the Tibetan frontier.

Just as the Garbyang Bhotias trade with Purang (Taklakhot) over the Lipu Lekh, the Milam Bhotias with Gyanema over the Untadhura, and the Niti Bhotias with Daba over the Niti pass, so do the Mana Bhotias carry on the trade with Tsaprang and Toling (Totlingmath) over the Mana or Chirbattia pass. The gradients are easy, but the going is extremely bad for yaks, ponies, or sheep, all of which are used for transport. The upper half of the route lies over a chaos of unstable rocks of all shapes and sizes. The distance from the highest village, Mana, to the pass is 25 miles. This can be done by men in four days, but pack-sheep take at least a week.

On July 18 I made a short reconnaissance towards Kamet.

Leaving Ghastoli E.G. (13,200 ft.) at 6.45 A.M., we proceeded up the valley past Khaiam E.G. for an hour and a half, and then turned E. up into a hanging valley over a steep moraine-strewn slope. The ice of what might fitly be named the Khaiam glacier descends to 15,400 ft. Ascending this glacier for some little distance, we struck up on to the ridge to the S., at 2 P.M. reaching the summit of one of its peaks at an altitude of 17,550 ft. To the W. across the Mana valley was the Bidum glacier, and to E.N.E. Kamet itself. The Khaiam glacier probably forms the most practicable route for the attack of this peak. There is no record of the actual spot attained by the surveyor, Mr. I. S. Pocock, in 1874, when he reached the great altitude of 22,040 ft. (G.T.S. Report for 1874–75, pp. 13 and 47*a*), but I think it was probably in this direction. I believe that the most likely route up Kamet is from the N.W., the approach being made up the Khaiam glacier. Mana village, only about ten days from Naini Tal, would form an excellent base.

We had quite a good climb down the rocks on the reverse (southern) side of the ridge to the glacier which enters the Mana valley just above Ghastoli, and to which I would attach that name. The ice descends to about 15,000 ft.

We reached the Bhotia camping-place called Jagrau (17,500 ft.) on July 20. The upper Mana valley is a most desolate region, nothing but snow and stones of all shapes and sizes. The dwarf juniper does not grow above Ghastoli (13,200 ft.), from which place we drew our supply of fuel. Game is very scarce, and the mountains are of a raw and ungainly aspect. The scenery is distinctly arctic in character, and in no sense alpine.

On the 21st we walked up the Mana pass (18,000 ft.), the crest being formed by the vast level plain of the Abijugan glacier. The view on the Tibetan side is too confined to be interesting, and nothing like so picturesque as my first view of Tibet from the Lipu Lekh in 1905.

During the whole of the week I spent in the upper Mana valley I suffered from the effects of the high altitude, but the guides and Gurkhas showed no weakening of their powers, though we had a hard time. We experienced very bad weather, with high winds and frequent snow-storms, and our doings were finally cut short by the breaking of the rains on July 23. So, abandoning all hopes of further ascents, the whole party descended to Joshimath, and on July 30 recrossed the Kauri pass.

Next day Bruce and Mumm left for Kashmir, taking the

guides, who had been quite invaluable but were no longer wanted, down with them, while I went off with Kulbahadur and Dhan Lal on a long-cherished scheme to visit the valleys to the W. of Trisul, and that of the Sukeram glacier to the S.E. By this means I hoped to link up the knowledge I had gained in 1905 with that of last year, and thus to be in possession of a fairly comprehensive view of the orography of the Nanda Devi group.

On August 4 I reached Sutol village, after a very long but beautiful march from Ramni through Peri, and camped at the junction of the Samudhar and Ghingtoli torrents. This upper gorge of the Samudhar torrent, which is the main source of the Nandak Ganga, heads from the actual foot of Trisul, and is well worth a visit. There is a story of a fossil monster somewhere up here, and also of an old pass closed by a fatal or fabulous avalanche. The difficulties of access are great, and I was told that only one sahib had ever been into the upper gorge. I was very anxious to visit the glacier, which lies in a deep ravine between Nanda Gunti (21,286 ft.) and Trisul, and to reconnoitre the cliffs, which I had seen from the summit of the latter peak, for a possible pass over into the Ronti valley which debouches into the Rishi valley just above Rini. However, the combined effects of leech-bites and bad weather forced me to forgo this most interesting excursion over new ground.

After a most enjoyable rest under the hospitable roof of Mr. and Mrs. Nash at Gwaldam, I set off, on August 17, towards Sunderdunga, a wild and rarely visited glen amongst the southern spurs of the main range which descend into Kumaon to the N. of the Pindar river.

This name is more correctly written Sonadhunga, which means the 'Golden Rock'; it is celebrated for the gold which used to be obtained by washing the river gravel there, and also for the number and malignancy of the local demons, who are particularly averse to the sound of the human voice. As the result of five observations, I obtained 10,636 ft. as the altitude of the shepherds' huts, which agrees very well with the barometrical value, 10,620 ft., of the G.T.S. The place is approached by a very bad jungle track up the valley of the Sonadhunga river, the distance from the hamlet of Jatholi, though only 6 miles, taking 6 hrs. to cover.

On August 24 I visited the Maiktoli glacier, which descends from between the peaks A_{29}, 22,360 ft. (sometimes known as East Trisul), and A_{58}, 21,858 ft., to a height of about 12,500 ft., according to the G.T.S. In the black gorge

which leads from Sonadhunga to this glacier is a permanent snow-bed, the walls of the gorge being so narrow that the sun can never penetrate its recesses sufficiently to melt it. It is formed by avalanches of winter snow, and on careful examination reveals most of the usual glacier phenomena, such as crevasses, lateral moraines, and ice-tables, all, of course, on a minute scale. This snow-bed is indicated on the map, and its altitude is between 500 and 1,000 ft. above Sonadhunga, which would make it about 11,000 to 11,500 ft. above sea-level.

On August 25 I started up the Sukeram Nala, and camped for four nights at the shepherd's cave, known as Sukeram Udiar, 12,570 ft. At this spot the beautiful blue poppy (sp. *meconopsis*) was very abundant. On August 28 I reached the great southerly bend of the Sukeram glacier, and mounting to the summit of the left lateral moraine, which is of a very unusual type, had a fairly good view of the upper part of the glacier from a height of 15,500 ft. In place of the ridge shown on the G.T.S. between the peaks A_{29}, 22,360 ft. and 20,010 ft., forming a water-parting between the Kurumtoli and Sukeram glaciers, I saw that these two peaks were entirely separated by the Sukeram glacier, which rises from the south-western flanks of the peak A_{29}, 22,360 ft., and the southern slopes of A_{28}, 22,490 ft., and is constantly fed by avalanches from the former peak. The massif centring in the G.T.S. peak, 20,010 ft., which the Danpurias of the upper Pindar valley call Simmu Saga, is entirely cut off from the East Trisul ridge, forming a southern outlying group of its own. Chakuri Jhaba was given me as the name of the second peak, 18,517 ft. This group sends down three glaciers towards the Sukeram, two of which unite with the main ice-stream. I have already pointed out* that the glacier shown by the G.T.S. as joining the Kurumtoli glacier on its eastern side does not in fact do so. It represents the head of the Sukeram glacier itself, which lies on a great shelf tilted up towards the W. On the lower part of the glacier I shot a *bharhal*. It was interesting to find that the local shikari did not recognise it, but called it a *thar*, of which there are large numbers about here. He was very loth to accompany me at all, and had it not been for the presence of the two Gurkhas would probably have run away from this demon-haunted glen. It appears certain that no European or native had previously visited the glacier itself, and I failed to find any

* *A. J.* vol. xxiii. p. 226; *Geographical J.* vol. xxix. p. 210.

sportsman who had ever heard of *bharhal* in this locality. It offers a very favourable field for the mountaineer who is not merely actuated by the desire to break records.

I hope that it is evident from what I have written that my criticisms on the work of the G.T.S. are made in no captious spirit. The triangulation of the main features of the country is well known to be extremely accurate, and, considering all the circumstances under which the survey was made, the errors in the topographical details are surprisingly few in number.

Still, in the snowy ranges of Garhwal plenty of topographical exploration remains to be done, and the supply of peaks and passes is practically inexhaustible. The region is easy of access, practically and politically, and the cost of travelling is very moderate. To those who enjoy such pleasures as mountaineering in the Alps affords, I do not believe that there is any other region in the Himalaya which can offer so many inducements. Superb forests, wild mountain streams, cliffs and gorges on a colossal scale, glaciers of noble proportions, and virgin peaks of overwhelming grandeur and every degree of difficulty, combine with an unwonted human interest and unusual opportunities for the naturalist and sportsman to render this one of the most fascinating regions of the Himalaya to which the mountaineer can turn his thoughts.

A Note on W. H. Johnson's Ascents in the Kuen-Luen.

By T. G. LONGSTAFF.

DR. WORKMAN'S paper printed in the January number of the 'Geographical Journal' (vol. xxxi. p. 26) contains a passage on the remarkable ascents of Mr. Johnson in the Kuen-Luen in 1864–65, which was, I think, inserted subsequent to the Meeting of the Society on November 25, 1907, and in consequence of my remarks (p. 41) during the discussion on that evening. Dr. Workman writes: 'If any camp which Mr. Johnson thought approached this altitude (22,000 ft.) was made, it must have been on the peak E 61, the only peak in the region exceeding 22,000 ft., which was measured in 1862 by a Survey *employé*, and its height given as 23,890 ft. This measurement was unchecked, and the details of it were so meagre that the Survey did not endorse it, expressly stating that, for reasons given, they considered it too high—as I have

PART OF THE GARHWAL HIMALAYA

constructed from a plane table survey by
HAVILDAR DAMAR SING RANA (5th Gurkha Rifles)
and from photographs by
Mr A. L. MUMM AND Dr T. G. LONGSTAFF
based upon
the trigonometrical points of the Survey of India.

Scale 1: 250,000 or 1 Inch = 3·94 Stat. Miles.
0 5 10

Heights determined by Dr T. G. Longstaff, by boiling point and aneroid, are shown thus 16140
Route in 1905 shown thus .....
" " 1907 " " .....
Heights in feet.

Scale 1:6,000,000 or 1 Inch = 94·7 Stat. Miles.
50 0 50
Route

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