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MORE EXPLORATIONS ROUND NANDA DEVI

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MOUNTAINEERS will have been interested to learn that the Survey of India is now engaged on a new half-inch survey of the mountain regions of Kumaon and Garhwal. Previous surveys, as produced on the present ¼-inch sheets 53 N and 62 B, had been confined almost entirely to the populated and revenue-producing areas in or near to the great arterial valleys. Most of the glacier-covered country and the remoter valleys of these sheets are very sketchily drawn, in many places indeed so sketchily as to bear no resemblance whatever to the ground in question. Over much of the country too it has been found necessary to extend the primary triangulation. While engaged on this task in the Badrinath-Kedarnath range, Major Osmaston found that the whole trunk of the Gangotri Glacier was in fact several miles west of the position allotted to it on the map. I hope that now at last we shall have a final solution to the topographical problems which, as a result of the vague data recently brought back by various expeditions, have excited so much discussion.

The usual method employed for hill surveys in India is plane-tabling by Indians, who are each responsible for a section of the area. They work with remarkable speed and neatness, and under close supervision of their officers they produce very good work. But in the high Himalaya they are faced by unusual difficulties. Not being trained mountaineers they have great difficulty in moving their parties about in the glacier regions and in reaching suitable stations. Owing to the peculiar difficulties presented by the country round Nanda Devi it was decided to depart from the usual practice and to send Major Osmaston, who is in charge of these mountain surveys, to carry out a photographic survey of the basin drained by the Rishi Ganga. As I had made a reconnaissance of the region in 1934, the Survey Department invited me to accompany the party in order to assist Major Osmaston with the route and in the selection of suitable stations.

A Wild photo-theodolite and one hundred plates were taken as well as a

plane-table. I took with me the Watts-Leica photo-theodolite belonging to the Society, partly to supplement the main survey, and partly in order to give a further test to this novel instrument.

Six Sherpa porters were brought from Darjeeling, including Angtharkay. The name Sherpa has almost become generic for all porters engaged in Darjeeling. Actually one of these men, Gyalgen, came from two months' journey north of Lhasa.

We left Ranikhet on August 27. We had to take an unusual route to the Kuari Pass as one of the bridges on the Wan route had been carried away by floods. We had terribly bad weather all the way to Joshimath. The rains reached their climax on the night of August 29 and our camp was flooded out. Later we heard that 10 inches of rain had fallen in Mussoorie that night. The 29th was the day on which Nanda Devi was climbed.

We reached Joshimath on September 3 and left again on the 6th. On the 7th we camped at Lata, near the mouth of the Rishi Ganga. As we were sitting in camp a bearded and tattered figure appeared rushing down the steep path. This proved to be Peter Lloyd, the first of the returning Nanda Devi party. From him we heard of their splendid achievement. In my opinion the climbing of Nanda Devi is perhaps the finest mountaineering achievement which has yet been performed in the Himalaya; it is the first of the really difficult Himalayan giants to be conquered. This expedition was a model of what such an expedition should be: their party consisted exclusively of mountaineers; they avoided the great mistake which to my mind nearly all the major Himalayan expeditions since the war have made, and did not handicap themselves with a vast bulk of stores and superfluous personnel; each man was prepared to carry loads up to any height, and indeed all were called upon to do so during the most arduous part of the climb; above all, they avoided newspaper publicity. I was delighted to hear that Tilman had been one of those to reach the summit. He had done more than his share of the donkey work, having earlier in the year ascended the Rishi Nala and dumped provisions in the "basin" and then returned all the way to Ranikhet to organize the transport of the party. Later that evening Graham Brown turned up. The rest of the party we met on the cliff track to Durashi, except for Tilman and Houston, who had crossed a very difficult pass to Milam.

The passage of the Rishi gorge was now quite devoid of difficulty. There were cairns at every turn, a small but adequate path wound across the steep slopes, and any rock pitches were cleared of loose rock and earth. The monsoon was still active and we had a lot of bad weather. However when we reached the basin on September 16 the days were gloriously fine and the nights clear and frosty. The rivers were already fast sinking to their low autumn level and they presented us with no difficulties.

Osmaston decided to tackle the northern section of the basin first. I was keen to examine the ridges and valleys leading from the main basin up to the peaks bounding the western flanks of the Rhamani and Bagini glaciers, as we had not had the opportunity in 1934 of exploring this area. This I was able to do while Osmaston was mapping this part of the basin. The peaks in this vicinity are mostly composed of a beautiful pale granite, and soar to their

21,000 feet in clean curving lines, supported below by wonderfully carved ice flutings.

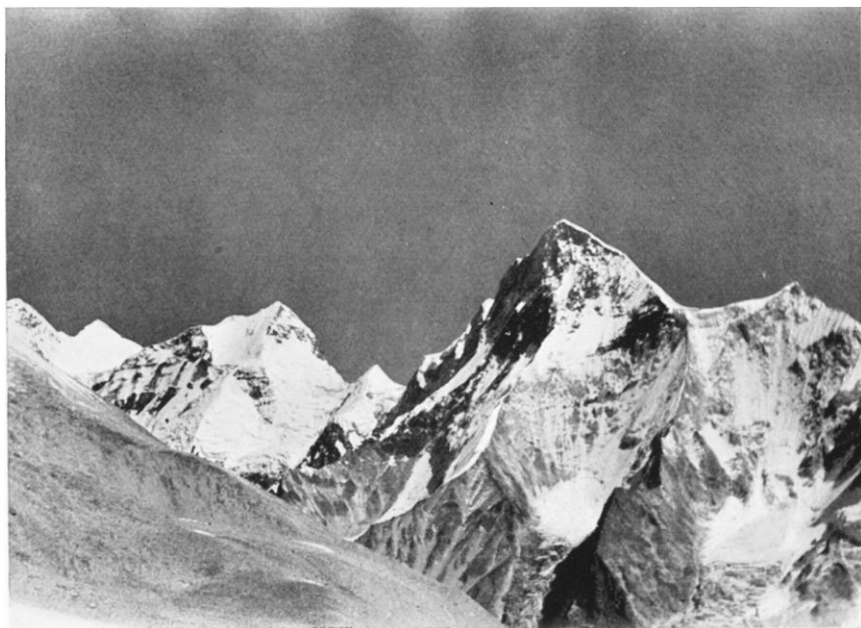
Tensing, one of our Sherpas, had developed some sort of fever in the Rishi Nala and every day for more than a fortnight he ran a very high temperature—often as much as 105°. Even when he had recovered he was no more than a passenger, as the fever left him very weak and thin. Owing to this we kept on two of the Lata men who had accompanied us into the basin. They worked splendidly and with a little training would be as good as the Sherpas. It is time that some one undertook the task of training the people of Garhwal as mountaineers. There is any amount of splendid material in the higher valleys. They have one tremendous disadvantage however and that is that their religion forbids them to eat either with Europeans or anything cooked or touched by Europeans, or by Indians of other castes. When a party is engaged in a long and difficult task this taboo would produce an impossible situation. With the Sherpas I am in the habit of eating out of the same dish and drinking out of the same mug and no one loses caste or feels embarrassed. Later in the year when we were employing some Dotial porters and the party ran short of food, the Dotials, who had finished their own food, allowed themselves to become feeble with hunger rather than eat the rice which we had been carrying in our rucksacks. Angtharkay always becomes infuriated by this prejudice, and taunts the victims unmercifully.

At the junction of the two great glaciers of the northern section we made a camp by the lake. We had brought a goat with us from Lata and at this camp we gave orders for it to be executed. It was a sad business as we had all become very attached to the animal. It had shared with us the fatigues of a long journey and the warmth and comfort of our caves and camp fires. It had been no easy task getting it up the gorge and Angtharkay who had been its keeper and principal helper was particularly distressed at the idea of killing it and had defended its life for some days with arguments for keeping it alive—the chief of these being that it might as well be made to carry its meat as far up the glacier as possible. That night however when eating fried liver and kidneys he had no regrets. The execution itself was performed by the two local men, who slashed open the belly and plucked out the heart before the animal had time to bleat.

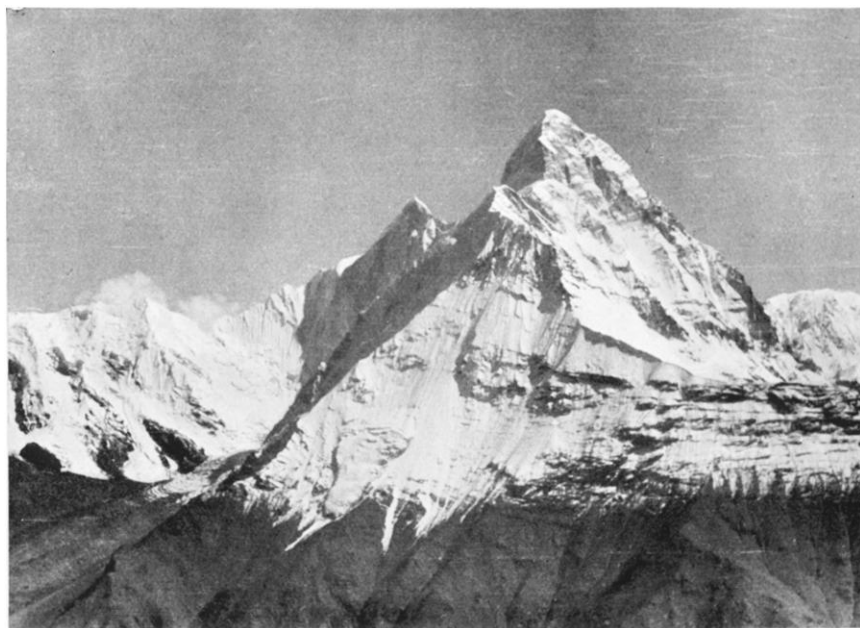
We crossed the Great North Glacier, which was a severe trial to Sen Tensing, who was now so weak that he found difficulty in walking. His temperature was still alarmingly high in the evenings, and we were beginning to get very worried about him. However in the large ablation valley on the other side of the glacier we made a base camp from which the remainder of the northern section could be reached. After a week's rest at this camp the fever left him. Angtharkay, Ang Dawa and I set out to climb a fine triangulated peak (21,770 feet) on the watershed overlooking the Milam Glacier. We camped at about 17,500 feet in a subsidiary valley and started before dawn the following day (September 23). We climbed up a steep and quite difficult ice ridge which involved a great deal of step cutting. The conditions were excellent however and the climb was pleasant and safe. Ang Dawa was quite the strongest of our six Sherpas: in fact he used to entertain us in camp with feats of strength. In the Rishi Nala too he had displayed considerable skill

on steep rocks and would run about over precipices without turning a hair. On this ice-ridge it was very surprising to see him crack up. He could not adjust his movements to the ground he was on and was terrified on steep snow slopes. He became exhausted early in the climb and a few hundred feet from the summit gave up the struggle. This delayed us a good deal and by the time Angharkay and I reached the top the Milam glacier was filled with cloud and I did not get the view I had hoped for. We looked down on two gorge-like glacier valleys running eastward from the two cols on the watershed on either side of the peak. Lower down we could just discern their junction with the Milam glacier. It would be possible to cross either of these two cols and so to reach the Milam glacier from the Nanda Devi basin, though it would be a difficult undertaking with the loads it would be necessary to carry.

Though the peak we had climbed is the highest on that part of the watershed, in common with most of the great peaks of the Nanda Devi basin it has no name. With the new survey of the range a complete revision of the nomenclature of the district is being made. It is no easy task to decide on the most appropriate name for peaks and glaciers. Each group of villages has a different name for the same feature and they do not agree even upon the names of the great peaks which dominate the whole district. Thus all the peasants of the Dhaoli Valley, in the vicinity of the mouth of the Rishi Ganga, call Nanda Devi Nanda Ghunti and have never even heard of the former name. The peak known to us as Dunagiri is called by these people Tolmai Pahar, and it is only in the vicinity of the village of Dunagiri in the Bagini valley that one hears the name Dunagiri used for the mountain. On the other hand, the shepherds of the Rishi call the glacier which flows down from Changabang into the Rishi Nala the Bagini, whereas Bagini is the name given by the Dunagiri villagers to the great glacier in their valley. This state of affairs is found throughout the district—and indeed throughout all mountain districts I have travelled in, in Africa as well as the Himalayas. It is not surprising that it should be so. The peaks and glaciers are as yet of no economic value to the peasants, and to them only the grazing grounds, streams, and forests are worth naming. Thus the most prominent peak standing above a grazing ground would simply take the name of that grazing ground as indicating roughly its direction when seen from afar, while the shepherds on the opposite side of the peak call it after *their* nearest grazing ground. In this way the traveller is confronted by several peaks known by the same name and several different names given to each of the peaks. It seems to me that the best solution is for the pioneer travellers to adopt the pleasantest sounding of the various names, for geographers to accept their suggestions, and for subsequent travellers to refrain from discussion. In the case of uninhabited areas such as the Nanda Devi basin, none of the glaciers or lesser peaks has a local name and there are a great many 22,000 and 23,000 feet peaks which, though triangulated, cannot be seen clearly from the inhabited valleys, and remain unnamed. In these cases it is the duty of explorers to invent suitable names for all prominent features, and map producers should make an effort to adopt their suggestions. A tremendous amount of confusion and misunderstanding is caused by procrastination in this matter. We have produced a list of names



Nanda Devi and the Bagini watershed



Twin peaks of Nanda Devi from the west



Dunagiri, Changabang, and Kalanka



The peaks north of the Bagini Glacier

for peaks, glaciers and lakes of the Nanda Devi region which will be considered by the authorities when the map has been drawn.

After accompanying Osmaston up the Great North Glacier (which will be given a more suitable name in due course) I returned to the lake, and from there went with Rinzing Bhotia up the Changabang glacier. The moraine which covers the greater part of the surface of the ice is made up of huge blocks of that remarkable white granite of which the cliffs of Changabang are composed. Half-way up we camped on the flat top of a glacier table. Except for the fact that the table might have collapsed, it made an excellent camp site. The weather turned bad, and that evening a good deal of snow fell. Starting before dawn the following day (September 27) we reached the head of the glacier which rises in a cirque of stupendous granite cliffs. We were making for a saddle at the foot of the southern ridge of Changabang which I hoped would offer a practicable route to the head of the Rhamani glacier. A gully in the granite slabs led us to the crest of the col without much difficulty, and from there we looked down on to the great snowfield which Dr. Longstaff had reached after crossing the Bâgini Pass in 1907. We were separated from it however by a vertical wall of rock whose smooth face it was quite impossible to descend. Although by now most of the peaks were covered by cloud, the view was magnificent and I sat for an hour fascinated by the gigantic white cliffs of Changabang. The great snow dome of Dunagiri appeared now and then from across the Rhamani glacier but I did not get a view of the main mass of the mountain. We descended to our camp in the afternoon and thence, in heavily falling snow, down the glacier to the lake. We returned to the glacier junction camp the following day to find that Osmaston had been delayed by the bad weather and still had one more station to do in the northern section. He had been right up to the head of the Great North Glacier and had completed the survey of that valley and its tributaries.

We descended the main glacier and crossed the rivers into the southern section. There I left Osmaston and went down the Rishi gorge to Dibrughata with Angtharkay and Sen Tensing, reaching there on October 3. We left again on October 4 and on the evening of the 5th reached a high pasture in the ablation valley of the Rhamani glacier. I was hoping to reconnoitre the south-west ridge of Dunagiri and, if time permitted, to make an attempt to climb the peak. On the 6th we went up a side glacier and camped on its moraine at about 17,000 feet. The following day we managed to reach a col nearly 20,000 feet high, connecting the south-west ridge of Dunagiri with a peak which on the old 1-inch maps bore the strange name "Niti No. 3." On the northern side of the col the ground fell away with tremendous steepness to the Tolma glen and we found ourselves looking straight down to Surai Tota in the Dhaoli valley. We turned right-handed and followed a narrow icy crest towards Dunagiri. Sen Tensing succeeded in dropping his ice-axe. We recovered it two days later, but its temporary loss produced a horrid feeling of insecurity for the whole party. Reaching a point where the ridge sweeps up with considerable steepness we pitched our tent under a great rock buttress. Later in the evening Angtharkay and I climbed several hundred feet further up the ridge to reconnoitre the route. We found that the going was over hard ice and that steps would have to be cut every foot of the way.

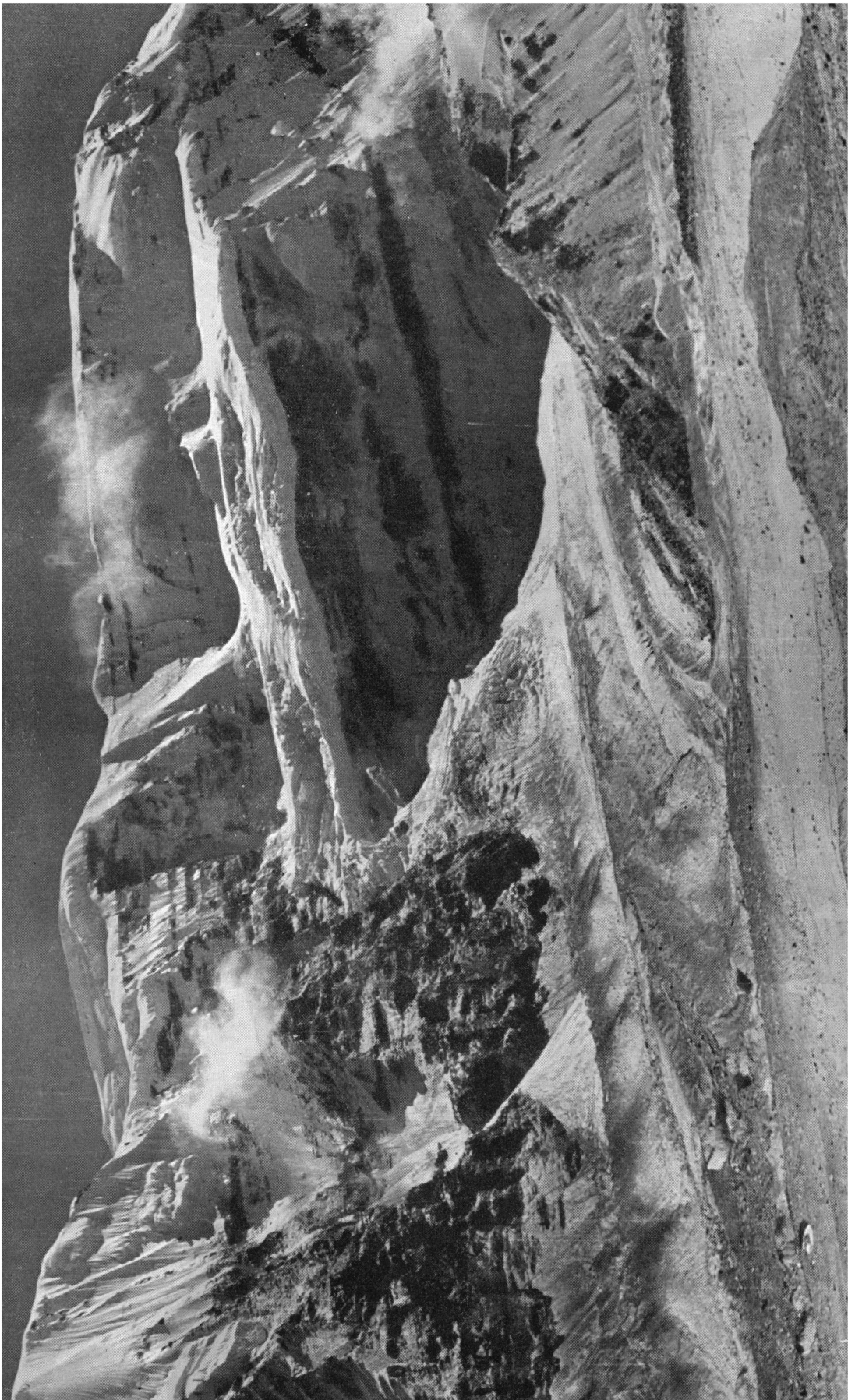
Our camp was in a superb position and commanded views from the great peaks of the Nanda Devi basin and the Trisul ranges to the mountains of Badrinath and Kamet. After a bitterly cold night we started before dawn, a very painful performance from which there was no relief until the sun appeared. We had left Sen Tensing behind in camp and Angtharkay and I took the labour of step-cutting in turns. It was very slow and tiring work, and when after some difficult climbing we reached the long, almost level ridge leading to the summit it was late in the day and we had not time to cut our way along the knife-edge crest to the top. The route however is quite feasible and, as far as I have been able to see, by far the best way of climbing this peak. We got to within 1000 feet of the top (23,184 feet).

We returned to the Rhamani glacier and camped at its head below the col which Rinzing and I had reached from the Nanda Devi basin. On October 10 we started to cross the Bagini Pass. I was rather confused by the topography at the head of the glacier. The western face of Changabang falls with its characteristic sweep of white granite to a col some 2500 feet below the summit. West of this the watershed ridge rises to a sharp conical peak, and then falls again to a long serrated granite ridge which nearly a mile further on abuts onto a peak (21,290 feet) of the great north-east ridge of Dunagiri. Between this peak and Dunagiri itself is another low depression which forms the watershed between the Rhamani and Dunagiri glaciers; this one however is almost inaccessible from this side. I was by no means certain which of these cols was the Bagini Pass which Dr. Longstaff had crossed in 1907 and as far as I know had not been crossed since. We chose the middle one and reached the crest of the serrated rock ridge at 12.30 on October 11, only to find that from where we stood there was no chance of descending on the northern side. We spent nearly the whole of the rest of the day moving ourselves and our loads along the knife-edged crest of the ridge before we could rope down into a gully through which a descent could be made. We were overtaken by dark when only about 200 or 300 feet down and had to construct a tiny platform on which to camp for the night. Early next morning we completed the descent of the rocks and ran down the snow-covered head of the Bagini glacier. The valley we were in was bounded on the east by a most magnificent wall of peaks, which form the north-western rim of the Nanda Devi basin on which we had stood two years previously. From lower down we could look up a small side glacier to the col under the western face of Changabang. I was extremely glad that we had not tried that route as it would have been almost impossible to descend from the col with our loads. The first crossing of the Bagini Pass must have been an anxious business; apart from the difficulty of the climbing Longstaff and his companions had no idea of where the pass would lead them, and even when they had negotiated the Rhamani valley they were still many days from habitation. We had none of these anxieties, and thus our passage was vastly easier.

The Sherpas were eager to reach fuel before nightfall, and we sped down the glacier without halting anywhere. Every step of the way was vastly interesting to me and I spent an absorbing day fitting in the topography of the Bagini glacier with our explorations of two years previously. We had magnificent views of the huge unnamed peaks of the Garhwal-Kumaon watershed.



The Nanda Devi basin, based on a plane-table survey by E. E. Shipton and H. W. Tilman



Immediately north of these peaks is the Girthi river which makes such a strange intrusion into this line of elevation. The sun had long set before we reached the first juniper on the southern side of the glacier and we were lucky enough to find a brook running down the ablation valley and soft turf on which to camp. The excitement of reaching juniper after some time on the higher glaciers never loses its force. In spite of the hardihood of this plant it is peculiarly sensitive to its position and at higher altitudes never grows on slopes with a northern aspect. For some miles that evening we had seen it growing on the opposite side of the glacier in tantalizing profusion, but it was not until the lateral moraine on our side became sufficiently large to produce a fertile south-facing slope that we came across any. The reverse is the case with rhododendron and birch, and at lower altitudes the aspect of one's camp is indicated by the different effect these woods have upon the food.

Next morning below the snout of the glacier we found a blaze of autumn colours. The bare, almost feathery branches of the birch woods contrasted with the brilliant green of rhododendron and juniper, and the whole valley was interlaced with vivid patches of red, flame, and copper. The glades were filled with long wavy grass the colour of ripe corn in the morning sunlight. In place of the raging torrents of muddy water which issue from Himalayan glaciers throughout the summer we found sparkling crystal streams. The air too had a sparkle of frost which enhanced the beauty of the autumn tints. Early in the day we reached the village of Dunagiri where we found all the population busily engaged in reaping their crops and storing the grain for the winter. The houses were decorated with huge yellow marrows and cucumbers. The whole valley seemed steeped in sunshine and the rich colourful ripeness of autumn hues.

The remainder of the day was spent basking in the sun outside one of the houses, chatting with the villagers who, to celebrate our arrival, indulged in a half-holiday. We were besieged with questions about our doings and the reasons for them; to these we gave the usual unsatisfactory answers, in return for which we received much interesting information about the valley and its people. It appears that in the autumn all the inhabitants descend as far as Karnaprayng and even further with their flocks, and the whole valley is deserted. All the farm produce is stored in the village for consumption during the following summer. The winter exodus takes place by slow degrees and was already in progress. The Sherpas spent a happy day trading old tins for food, and after some hours of hard bargaining had obtained, without spending a single *pice*, enough to keep us supplied for a week. The children in these villages are made to work from a very early age. In the evening I watched some tiny mites supervising with extraordinary skill the herding of enormous flocks into pens. There were innumerable lambs, each of which had to be placed by its mother. The children worked until long after nightfall settling the disputes and attending the bleated complaints of the sheep.

The following day I went up with Sen Tensing to investigate the so-called Dunagiri glacier and to reconnoitre the northern approaches of the peak. The glacier terminates in an immense wall of moraine debris which has been thrust into the birch forest high up the side of the main valley, a mile or

so below the snout of the Bagini glacier. It is very much alive and appears at the present time to be advancing; in former ages it must have flowed far down into the main Bagini valley. It rises, not at the foot of the peak of Dunagiri as I had expected, but in a rocky cirque culminating in a peak (21,290 feet) whose acquaintance I had made on the opposite side. The north face of Dunagiri itself was half hidden from view by this cirque, but from what I saw I should say that any route on this side would be a great deal more difficult than that which we had reconnoitred a week before. The best approach to the foot of the north face would probably be up the *nala* which joins the Dhaoli about 3 miles below Jumagwar. I do not know whether any one has been up this *nala*.

I regretted leaving our friends of the Bagini valley and their charming village; their hospitality and kindness matched their beautiful surroundings. Further down the valley the autumn tints were even lovelier than they had been near the glacier. I spent nine months in the Himalaya last year and at no time did I see such a wealth of lovely things as during this October; even flowers were not wholly lacking and occasionally in some well-watered glen we would come across drifts of primulas defying the rule of the seasons. In my opinion there is no better time to travel in Garhwal than the autumn; the days are cool, the nights not too cold, snow conditions are good (except high up on north-facing slopes), and the weather is usually fine. An added advantage is that, with the newly reaped crops, it is very easy to live off the country. In the forest we came upon several small encampments of peasants, busily engaged in collecting the stones of wild apricots, from the kernels of which they make oil. Further down the Bagini torrent enters the main Dhaoli valley through a fine canyon which is not the least impressive feature of the very beautiful valley down which we had come. Two more marches took us to Joshimath where we rested for two days. I had been there only a couple of hours when Professor Heim arrived, and I was delighted to be able to spend the two days in his company. They had just completed a tremendous season of geological work in the vicinity of the Almora-Tibet frontier.

I left Joshimath with the two Sherpas and three Mana porters on October 18. Half-way to Tapoban I met Osmaston returning from his work in the Nanda Devi basin. The excellent weather of the last three weeks had enabled him to complete the survey of the southern section a great deal sooner than we had expected, and he had been supported in the Rishi Nala by Fazal Ali, probably the most competent of his plane-tablers. Fazal Ali had surveyed the Trisuli Nala at a remarkable speed, averaging nearly 5 square miles a day, which is fast going for such difficult country. He was now working in the Rhamani Nala, and later completed the mapping of the lower part of the Rishi gorge. Only one section of the outer basin remained; this was the valley running north from glaciers between Trisul and Nanda Ghunti. It had been decided therefore that I should make a survey of this area with the Watts-Leica photo-theodolite, with the dual object of rounding off the Nanda Devi survey and of trying out this instrument in an independent survey. Osmaston went off up to Badrinath with the object of inspecting his surveyors in that district. Most unfortunately one of his camp officers had died in the Arwa valley, and

although Captain Crone had gone up to deal with the situation, much re-organization was required.

We camped our first night out of Joshimath at Rini which is situated at the mouth of the Rishi Nala. The following day we enlisted the help of a local man to show us the best way to the highest pastures in a valley we were making for, and to help me in naming some of the prominent features. Dr. Longstaff has referred to this valley as the Rinti Nala, though the name used by the people of this district is more like Ronti. We followed the main gorge for a while by a path which has been very cleverly engineered by the peasants, but soon the going became difficult and we turned right-handed and climbed up over steep, heavily forested slopes past another tiny village basking happily in its rich, self-contained isolation. Higher up, the Rini man introduced us to a variety of wild fruits which grew in the forest, some of which were new to the Sherpas. The commonest of these resembled a crab apple on the outside, though its internal construction and taste were more like those of a persimmon. All through the forest there was a wonderful profusion of autumn colours. We put up plenty of Monal pheasants which sailed over our heads, screeching noisily. During the two days we were going through this forest we must have seen nearly a hundred of these birds. Even in this remote valley they were very wild and very rarely gave us a chance to get near to them.

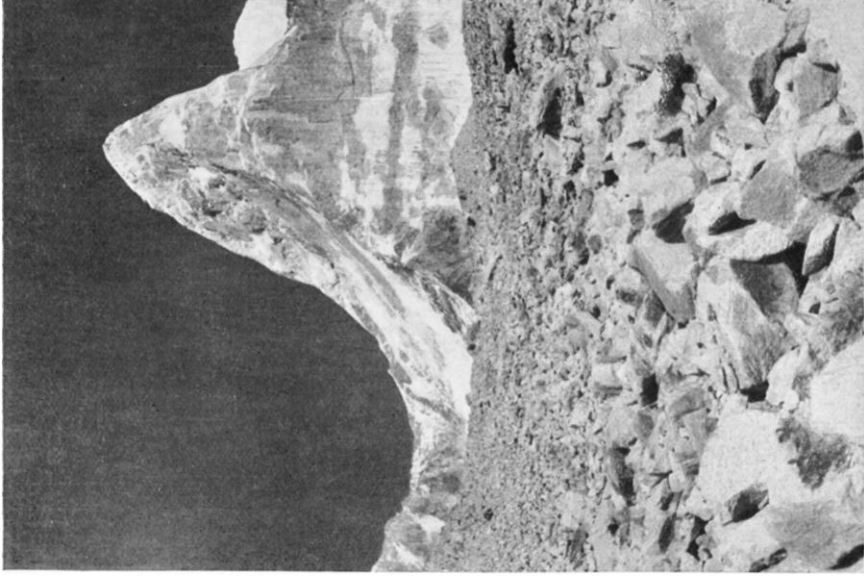
We entered the Ronti valley several thousand feet above its floor, and on October 20 camped in a cave high up on the side of the *nala* and commanding a magnificent view of the surrounding country. The lower section of the valley in which we found ourselves is bounded on the east by huge precipices which culminate in a line of jagged aiguilles; but the western slopes are gentle and well wooded and frequented by shepherds from the villages in the neighbourhood of Rini. Their grazing ground was pointed out to me by the Rini man who called it Chamba Kharak. This part of the valley is enclosed by a great ice-covered wall which forms the eastern ridge of a peak (19,893 feet). Round the eastern end of this wall the valley runs up through a narrow gorge to a large glacier basin which forms its upper section. Through this gorge we could see the tongue of the glacier protruding. There has been a good deal of confusion regarding this peak (19,893 feet) and its southern neighbour (20,700 feet), which is such a prominent feature seen from Ranikhet and Almora. The present map labels the former Nanda Ghunti and the latter Nandakna. Dr. Longstaff however has always referred to the higher peak as Nanda Ghunti, and certainly that is what it is called by the inhabitants of the valleys to the south-west of the range. We found that the Rini villagers refer to the northerly peak as Ronti, and I hope that these two names will be adopted on the new map.

One of the Mana porters had been with Tilman's party and entertained us in the evenings by voluble descriptions of their adventures in the Rishi gorge during the monsoon. I was amused to find that these men had nicknamed Tilman "Balú Sahib" (*Balu* meaning a bear) owing to the speed with which he moves over steep forested ground. On reaching the Ronti Nala I discharged the local men and set to work with the two Sherpas on the survey. But the weather broke and we were confined to our cave for three days. A good deal of snow fell and it began to look as if winter conditions would

prevent any further work. Also I was afraid that our food supply would run too short to allow us to attempt to cross the pass over the watershed. However we had brought another sheep with us and occupied ourselves concocting fancy meat dishes. The morning of October 24 was fine, and by starting before dawn we managed to reach a high spur in time to take a round of angles and photographs before the mists rose out of the valleys and swamped the view. The dawn views were magnificent and showed nearly all the great peaks of this section of the range like islands washed by an ocean of flame-coloured cloud. In the afternoon we humped our heavy loads over to Chamba Kharak, from which I was able to do another station. We repeated this procedure every day until five stations had been completed in the lower section of the *nala*. As the view was invariably obscured by nine o'clock each morning it was difficult to put the stations sufficiently high, and we had to do twice as many as would have been otherwise necessary. The great advantage of this method of photo-survey over plane-tabling is the very short time that it is necessary to occupy a station. Plane-tabling in the conditions which we were experiencing would have been almost impossible. The photo-theodolite which I was using weighs 18 lbs. including stand and cases; it is extremely simple and convenient to use; and if it is found possible to plot with sufficient accuracy from the tiny photographs, it will bring photographic survey within the scope of even the most lightly equipped parties. Moreover the use of roll films instead of plates makes it much easier to bring back the results intact. The film is held flat while being exposed by means of a pressure glass in the back of the camera.

On the afternoon of October 27, in a heavy snowstorm, we made our way through the bottle-necked gorge which lies between the lower and the upper sections of the Ronti Nala. We were climbing on the moraine-covered ice of the glacier which squeezes itself through the gorge. Our great difficulty was to find any water, as at this time of the year all the glacier pools are hard frozen day and night and we could not afford the fuel necessary to melt ice at this stage, being then above the limits of juniper. I was surprised to find Monal pheasant far up the glacier. Up there they seemed extraordinarily reluctant to embark on their gliding downward flight and we got so close to them as to tempt the Sherpas to chase them with a fusilade of stones. Although the Sherpas threw with great accuracy, the birds seemed to have a cunning knack of hopping over the missiles, and we failed to replenish our larder in this way.

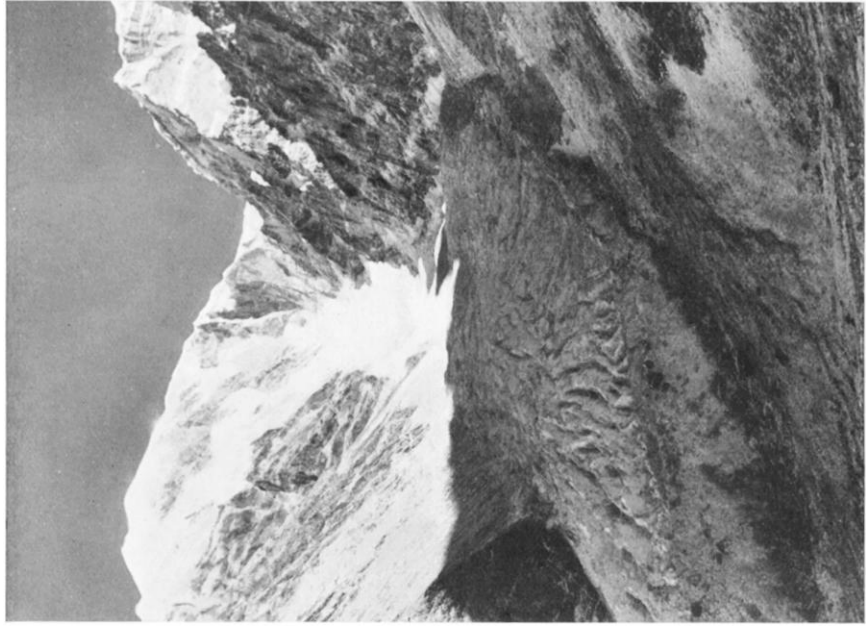
Fortunately the next day the weather became finer and we were able to make the best use of the short time in the upper glacier basin. We found it to be divided into three sections. Firstly, there was a large ice-stream coming down from the saddle between Nanda Ghunti and Nandakna. This saddle must lead to the headwaters of the Birch Ganga. I was very tempted to visit it but could not spare the time. Next there is a small tributary glacier rising under the western ridge of Nandakna; at the head of this is the saddle reached by Longstaff and Ruttledge from the other side. Thirdly, what is probably the main glacier flows under the ice-terraced cliffs of the north ridge of Trisul. Although the upper part of this was out of sight, I decided, when the survey was finished, to look for a way across the watershed in this direction.



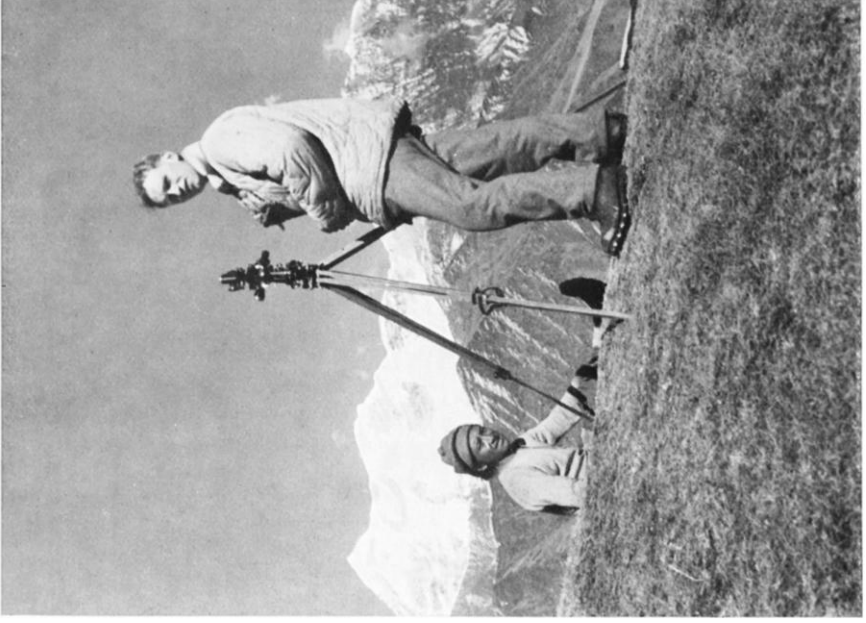
Changabang from the Rhamani Glacier



The Kurumtoli Glacier



Head of the Kurumtoli Glacier



Shipton, and Angharkay, with the Watts-Leica photo-theodolite

It proved to be the right line and we encountered no difficulties whatever. Our last camp and station were on the saddle itself and commanded glorious views on both sides of the range. The glaciers on the southern side are very small and we were soon back in heavily forested country. In the upper part of the Nandagini we saw large herds of game. Near the entrance to the Nandagini gorge, where we camped, we found signs of the visit of the surveyor who had been working in this area. In spite of this we found it quite difficult to follow his track in the jungle. Sen Tensing became separated from us, and Angharkay and I retraced our steps for a long way in search of him. Instead of him we found a good path, which we concluded he must have been following. It was not however until late in the evening that we found him. He had not struck the path and had been struggling along some hundreds of feet below it. Angharkay and I told him, untruthfully, that we had found a village in the afternoon and had been sitting there imbibing milk and baked potatoes. Angharkay told him to go back to get food for himself from the mythical village. However I thought that was carrying the joke too far and stopped him.

From Sutol we crossed the Wan Pass to Gwaldam; and later from Wan we crossed into the valley of what, on the existing map, is called the Kurumtoli glacier which Dr. Longstaff explored in 1905. He calls it the Keil glacier. In this region I did several photographic stations, which were intended to supplement the work of the plane-tableer who had not had time to complete his work in this part.

On my way to Bombay I went to Dehra Dun where I met Osmaston and Captain Crone, whom I had seen previously at Joshimath. Osmaston's photographs had come out well except for a certain amount of fogging round the edges. Crone calibrated the camera I had been using and appeared to think that there would be no difficulty in plotting the data I had brought back. He is working on it now and I am anxiously awaiting his report on the work of this very handy little instrument.

DISCUSSION

Before the paper the CHAIRMAN (Dr. T. G. LONGSTAFF) said: Owing to the regrettable absence of the President through illness it falls to my lot to introduce the lecturer this evening, though I expect most of you know him well already.

Mr. Shipton is a very experienced mountaineer. He learnt his trade in the Alps, which are still by far the best school. In 1929 he climbed Mount Kenya with Wynn Harris. In 1930 he made with Tilman a very fine traverse of Mount Kenya by a new route, a very memorable expedition. In 1931 he was a member of the successful expedition to Kamet in Garhwal. In 1932 he was in Ruwenzori. In 1933 he reached 28,000 feet on Mount Everest. In 1934, with Tilman and only three Sherpas, he succeeded in effecting the first entrance into the inner sanctuary of Nanda Devi, having forced the upper gorge of the Rishiganga which had previously defeated all comers. In addition to that, they made two exceptionally difficult glacier passes, one over the main range to the south of Nanda Devi and the other over the main water-parting of the Badrinath group. In 1935 Shipton led the so-called reconnaissance expedition to Mount Everest, during the course of which his party climbed twenty-six peaks of over 20,000

feet, which is more than all the other 20,000-footers that have ever been climbed in the Himalaya put together.

In 1936 he accompanied the Mount Everest Expedition. The monsoon arrived too early and it was not possible to do anything. Therefore in the autumn, through the courtesy of Brigadier Couchman, he got leave to accompany Major Osmaston, who had been detailed by the Survey of India to make a map of the basin of the Nanda Devi and the gorges of the Rishi. And now, without telling you more about the paper, I will ask Mr. Shipton to read it.

Mr. Shipton then read the paper printed above, and a discussion followed.

The CHAIRMAN: I think Colonel Lewis, Surveyor-General designate of the Survey of India, is here to-night. If so, I would like him to come on to the platform to tell us something about the country, because the inception of the new survey is due to him; and, furthermore, it is due to his interest that Mr. Shipton was able to accompany Major Osmaston.

Colonel C. G. LEWIS: Two years ago the Survey of India decided to start the survey of the Tehri-Garhwal and Kumaon Himalaya between the Punjab and Nepal borders. The existing maps, over fifty years old, are quite inadequate for present-day needs, and in addition it was decided to increase the scale from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch to the mile. In the first season we finished the area drained by the Bhagirathi River in Tehri State.

Last year, when we came to Kumaon, the problem of getting into the Nanda Devi sanctuary immediately presented itself. Some of our Indian surveyors who have had several seasons of training and experience in Chitral and Gilgit have become experts in the technique of alpine surveys but are quite untrained in mountaineering. It was unlikely that a surveyor by himself with local transport would succeed in penetrating into the sanctuary and unfair to ask him to make the attempt. It was therefore decided that Major Osmaston himself would have to do the survey, and at this juncture we found that Shipton was at a loose end. The Surveyor-General, Brigadier Couchman, was only too glad to avail himself of his help. The results, as you have just heard, were most satisfactory and successful.

I should like to say that the Survey of India has been considering for some years the question of names in uninhabited mountain regions. The situation was becoming almost intolerable. Last year the principle was adopted of selecting invented names given by explorers or by our own parties during the course of survey, so that names may now be given to peaks, passes, and glaciers which hitherto have been nameless.

I take this opportunity of thanking Mr. Shipton, on behalf of the Survey of India, for the great help he gave us last year in the survey of the Nanda Devi sanctuary.

The CHAIRMAN: Professor Graham Brown was with the British-American party which climbed Nanda Devi in 1936. We shall be very glad to hear something about that expedition, which was just prior to Mr. Shipton's.

Professor T. GRAHAM BROWN: In the summer of 1936 a party of eight of us—I wish there had been nine—started off into the Nanda Devi basin in order to climb that great mountain. I say I wish there had been nine because I wished to have Mr. Shipton with us on that particular occasion. His engagement with Everest delayed him and he was not able to join us. Had he done so he would not have been able to take part in this wonderful expedition that we have heard about to-night, and I am not quite sure whether we would not have been the chief losers in the long run.

We went up into the Nanda Devi basin, eight of us, seven climbers and one

not a climber, though through no fault of his own. There were four Americans, C. S. Houston, A. B. Emmons, Adams Carter, and W. F. Loomis; the four British were N. E. Odell, W. H. Tilman, Peter Lloyd, and myself. We set to work in that wonderful gorge, and I would like to say that, when going up there, it really seemed marvellous to me that Mr. Tilman and Mr. Shipton had been able to find a way up in 1934: a grand piece of work in itself.

We were a small party, travelling light, and travelling in the monsoon. We travelled in the monsoon because our summer holidays happened to coincide with it, and there was very little other time in which this particular party could have gone to the Himalaya. We came to Nanda Devi and then our Sherpas unfortunately went sick. We had six of them. One Sherpa paid one visit above Camp II, two Sherpas got to Camp II, and the rest did not get farther than the Base Camp or Camp I. We had altogether six camps on the mountain, so that I can say almost the whole of the work above Camp I, and the whole of the work above Camp II, was done by the seven British and Americans.

The final climb was made by Odell and Tilman, and nobody deserved it better than Tilman himself. He was a grand man: his first exploration had been in 1934, and he had done what Mr. Shipton, rather humorously I think, called the donkey work. We got to the top and it was a very gratifying thing because we felt that we were a small party, climbing cheaply and simply, climbing at quite the wrong part of the year, and climbing quite a decent bit of mountain. We hope it will be an encouragement to other small parties to tackle the same sort of mountain in the same way.

The CHAIRMAN: I will ask the Secretary to tell us something about the photo-theodolite. We are always at daggers-drawn, the Secretary and I, over this. I have always averred that it is absurdly heavy and cumbersome, especially the theodolite stand. I prefer light camera legs, wobbling in the wind, which can be carried in a rucksack. Now it seems to me, from what Shipton and Tilman have said, that if we can have a photo-theodolite of Leica type portability it will be an instrument which will give us the advantages of the too-heavy photo-theodolite, and we shall now be able to congratulate the designers on evolving something really suitable for use in the field. I ask Mr. Hinks to tell us something of the instrument.

Mr. HINKS: I am anxious to say something about the instrument which Mr. Shipton has dignified by the name of the Watts-Leica photo-theodolite; it is not so terrifying or so complicated an instrument as it sounds. It was in fact improvised here in the Society in the space of three days before the Mount Everest reconnaissance of 1935. We had an old 3-inch mountain theodolite which had been in the possession of the Society for about twenty years; we secured a second- or third-hand Leica camera for about £7 and had calibration marks put in, and had a cradle made to carry the camera on top of the theodolite, the whole idea being that the instrument should be as light as possible. To turn on the film for the next exposure you just take the camera out of its cradle, replacing it in its geometrical bearing without sensibly deranging the theodolite. It is what we used to call, in elementary wireless days, a "hook-up," but with a certain merit about it, as was proved in the Mount Everest region in 1935 and as Mr. Shipton proved around Nanda Devi in 1936. We are looking forward to having the instrument re-designed this year so that it may go out to the Himalaya again. It is hoped that in the course of time it will be improved without being made any heavier, and that it may be quite useful.

The CHAIRMAN: We have had a very delightful lecture this evening. I know the country fairly well. I was there in 1905 and in 1907, and again, for a short time, with Hugh Ruttledge and his wife in 1927.

What strikes me most is the speed with which Shipton moved. He always went with two Sherpas only. When I was in these parts thirty years ago no natives were accustomed to climbing above the snow, and as first-comers who go to any district must be careful not to offend the natives in any way, so as not to make it more difficult for those who follow them, we could not take natives high in those early days. I climbed with the two Brocherels of Courmayeur, the home of the great Italian guides who have covered themselves with honour in Europe, Asia, Africa, and America. There were just the three of us, and we used to go away for days at a time into the blue. Shipton reverts to the earlier practice: he goes off alone with two Sherpas, carrying everything on their own backs. It is impossible for any but the smallest parties to cover such an amount of ground.

In 1907, when I was beaten in the Rishi gorge, I had to go straight at it after climbing Trisul. I had one day. We climbed up the northern wall for nearly 3000 feet and could not see any way along. We saw that we could get along the south wall, but we had no time to try it. Even so I am exceedingly surprised at the success of Major Osmaston in getting delicate survey instruments undamaged along that route. I should think that Colonel Lewis was speaking with all sincerity when he said that the success of this expedition was probably in considerable part due to Shipton being with them, for he was able to show the way.

As to the ground he covered in the Ronti valley, I have looked that up in my notebook and I find I spelt the word *Rönti*, but when I got home I said to myself, "Now, how would the English pronounce that?" So I wrote it *Rinti* and, as Shipton has said, that is wrong.

I hope there will be an endeavour to preserve the name Nanda Ghunti, which means the Goddess Nanda in her bridal veil, Nanda being the bride of Shiva, whose abode is on Trisul. If you can keep Nanda Ghunti for the south peak and Ronti for the north peak I think it would be an admirable solution. Between those two peaks, Trisul, the Trident of Shiva, and Nanda Ghunti, the goddess in the bridal veil, there is a serpent 100 yards long who eats all who come near the bride and her bridal veil. And, that you may know it is so, I was told that at the mouth of the *nala* there is a pile of slippers belonging to the men the serpent has eaten.

I look forward to the publication of the new map of the Nanda Devi basin with the greatest interest, tinged with a slight anxiety that my own map of thirty years ago may turn out to be too many miles out for what remains of my reputation.

I ask you to express your appreciation of Shipton's interesting lecture in the usual manner.