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EDITED BY

KENNETH MASON

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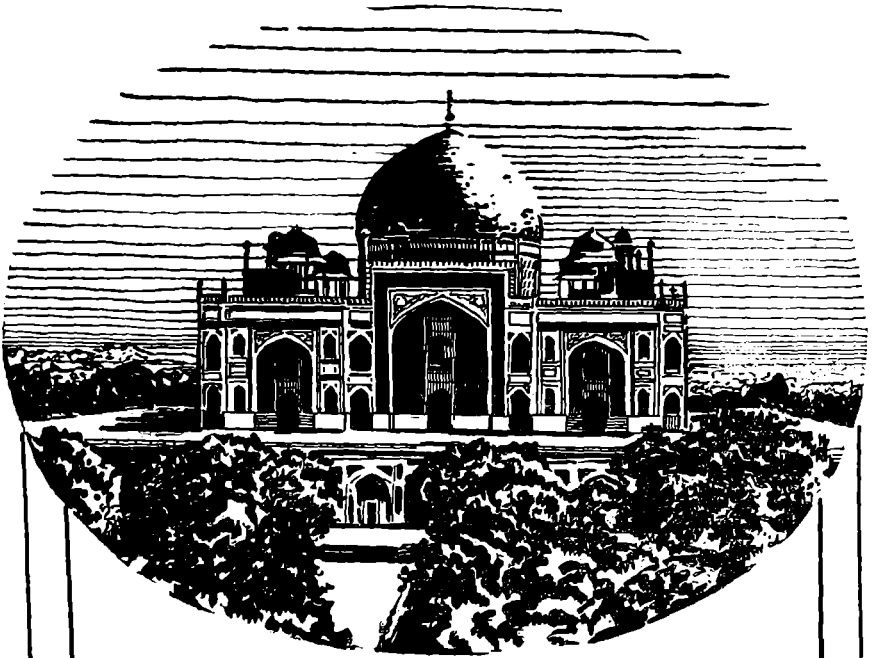

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NANGA PARBAT FROM BUNJI.

THE
HIMALAYAN JOURNAL.

APRIL, 1931.

(Vol. III.)

THE PASSING OF MUMMERY.

BRIG.-GENERAL THE HON. C. G. BRUCE.

TO-DAY, when climbing in the Himalaya has become almost common, it seems to me that that marvellous page in the history of mountaineering, which closes with the tragic loss of Mummery and his two Gurkha companions, might again be brought to the notice of those interested in all such strenuous enterprises.

In 1895 mountaineering in the Himalaya was considered in a very different light from what it is to-day. Officers of the Survey of India had made some adventurous journeys, which, considering the conditions under which they were undertaken, very often entailed much strenuous climbing; and travellers, such as Sir Francis Younghusband—whose crossing of the great Muztagh range, via the Muztagh pass, was one of the most daring feats of a completely unequipped party that ever occurred in the old history of Himalayan exploration—had accomplished much. But the *Art of Mountaineering* as understood in Europe, was little known in the Himalaya, nor had the Survey of India at that time any knowledge of even the most elementary technical use of ice-axe or rope. Knowledge of this art grew none too quickly in Europe and amateurs had to go through a very long initiation before they could form parties whose skill could compare with that of even average professionals. Nevertheless in Europe some very remarkable mountaineers of different nationalities came to the front during the 'nineties. Of these there were two outstanding parties of amateurs, all English and friendly rivals. The three best-known members of one of these parties were Mummery,

Hastings and Collie, and it was these three, under the leadership of Mummery, who in 1895 undertook the tremendous task of attempting to conquer Nanga Parbat.

Nanga Parbat is one of the most glorious mountains in the world. It is situated at the westernmost extremity of the Great Himalayan range and its summit looks down westwards directly to the Indus, 24,000 feet below. There may be in the Himalaya other tremendous faces of equal depth, but surely there can be nothing so imposing as this magnificent mountain, towering head and shoulders above anything in its neighbourhood, and containing all that goes to make a mighty and imposing mass.

There are three great Himalayan views familiar to English dwellers in India. Kangchenjunga from Darjeeling, Nanda Devi and Trisul from Naini Tal, and Nanga Parbat from the Murree hills or from Gulmarg. All these are wonderful and each has its own particular glory. But none is more stimulating or attractive to the true lover of mountain adventure than the mighty northern giant.

Mummery's expedition of 1895 was backed by no great Society, nor was it equipped regardless of expense. It was not much further furnished, either with special stores or tents, than an ordinary shooting expedition, except, of course, with mountaineering equipment.

In July of that year, 1895, I found myself, with my wife, high up in one of the side valleys of Kagan, a sleeve which runs up between Kashmir and the Indus Kohistan. We had our camp in a beautiful spot and I intended, with the help of my four Gurkha companions, to explore the surrounding mountains of Manur. Alas! In a little time, first the four Gurkhas and then myself were all down with mumps!

One morning a special postman brought with the English mail a letter telling me that Mummery and his party were coming out and asking for my help to arrange some transport to carry their kit to the Astor district, in which Nanga Parbat is situated. For the moment we were helpless, but, having partially recovered, I set out, taking two of my Gurkhas with me, and crossed over the mountains into the Kashmir valley. We arrived at Bandapur on the Wular lake in time to arrange for ponies and other things to meet Mummery on his arrival, and then, my leave being at an end, I started for India and ran into shocking weather. As usual, the Kashmir road had been carried away in a number of places, and on the ruins of a bridge I came face to face with Mummery, Collie and

Hastings, struggling with their tonga. It was here that Mummery urged me to join him and bring two Gurkhas.

A journey at full speed to Abbottabad—a telegram—a day to pack—and then off again. A mixture of ponies and carts brought us on the first day to the Jhelum valley, where we found an old-fashioned tonga awaiting us. We travelled so light that the three of us with our luggage fitted comfortably into the tonga ; then once again off at full speed, and we found ourselves in Astor and up at the British Agent's camp at Chongra, some 3000 feet above the village of Astor, within a week of leaving Abbottabad.

We could never have done this without a double outfit of ponies : but for training purposes the three of us ran along on foot. Having arranged everything with Captain Stewart, the British Agent, we set off for the Rupal valley, which is directly under Nanga Parbat, and just beyond the village of Tarshing we ran into Mummery's camp —empty, except for their Kashmiri *shikari*, a very scared individual, who had been taken on an experimental rock climb and had his life nearly frightened out of him. An indifferent *shikari*, and a thief of the worst type, he was rapidly discharged.

The village of Tarshing is some 9500 feet above sea-level and the great central massif of the mountain directly dominates it. Its prodigious precipices drop down for at least 15,000 feet, of which some 13,000 seem to be practically perpendicular. The Rupal valley extends along its foot to the west for some 25 miles, the east of the massif stretching for another 20 miles towards the Gilgit district and dominating the plains of Bunji. The highest point of the mountain is 26,629 feet above sea-level and the great massif contains other points on its ridges quite distinct from those actually belonging to it. Of these, to the east and north-east lie the Chongra and Rakiot peaks, 23,000, 22,000 feet and over. To me the most impressive sight was the mighty wall formed by the western ridge slowly descending to the Mazeno pass, which forms the only suitable connection between the Rupal valley and the Indus. On the south of this ridge lies the magnificent Rupal valley, its southern boundary formed by the Chiche and Thosha peaks, any of which would excite the greatest admiration were they not dominated and dwarfed by Nanga Parbat.

Over this Mazeno pass, 18,000 feet, Mummery's party had gone and had descended to Lubar, at the head of the Bunar valley. Thence they had traversed the slopes of the mountain to the next valley, Diamirai, from which they observed the north-west face of the mountain—that face which was afterwards to see those strenuous

attempts to conquer it and to witness the most skilful and desperate mountaineering which had been undertaken not only in the Himalaya, but possibly in any part of the world up to that time.

From this north-west face descends the Diamirai glacier, filling up the whole Diamirai valley. This first advance was merely an exploring enterprise, and the party had not yet got their sense of scale. It is curious how mountaineers, well accustomed to the Alps, fail at first to realize true heights and depths in the Himalaya. It often takes a considerable time before mistakes due to this under-estimation of scale, are rectified.

As food was running short, Mummery sent the luggage back the usual way and took only his absolute requirements in food for a short cut to the base. His party set out to cross the great western ridge, as they thought, thus evading the horrible grind over the Mazeno. For this pass, when fairly clear of snow, is a horror, the whole of its south face, miles of it, being composed of the loosest and roughest collection of big stones and moraine to be found almost anywhere, even in the Himalaya, which is saying a good deal. A dip in the great ridge, Mummery had considered, would probably bring the party down to the south of the Mazeno pass; but after leaving at midnight and climbing till dawn, they found themselves still a long distance from that dip. On their ascent to the ridge they now experienced, as Collie afterwards described, as fine a snow and ice expedition as they could wish to have, but to their dismay they found on arrival that they were merely on a subsidiary ridge and could look straight down at the *north* side of the Mazeno pass, directly at their feet. They now had to descend many thousands of feet and join the path that their porters had already taken and from there begin the ascent of the Mazeno pass.

The last atom of solid food was eaten at the foot of the pass as night was falling, and they now started a march of five-and-twenty miles over as horrible a road as it is possible for any man to traverse in the dark. Their way was lit by candle-lantern, they were dead tired, without food, and with no prospect of getting any.

Meanwhile there was I waiting for them in their camp at Tarshing. In the afternoon of the 23rd July I saw a figure stumbling along towards the camp, the first of the party, Collie. On his way he had passed two Rupal men with a couple of ponies, and had sent them back to help Hastings and Mummery, who, towards evening, came in singly, pretty well done up. Their powers of recovery were, however, remarkable, for by dinner-time they all seemed pleased with

themselves and rather amused at their adventures during that awful night on the Mazeno pass.

After a suitable rest, Mummery, Collie and myself started out with the Gurkhas to see how they shaped, and also to explore the lower southern face and ridges of Nanga Parbat. Mummery was immensely pleased with one of the Gurkhas, Raghobir, who was indeed a first-class hillman and rock climber. But neither of the two men who were with me, though thoroughly reliable in most ways, had any real experience of organized mountaineering. Raghobir had been on the rope once or twice, but his companion had never used one nor seen an ice-axe until his arrival in Astor. But like many of the mountaineers of the Himalaya, both had great natural ability and wonderful balance. Raghobir was tried pretty hard by Mummery, and his later performances proved that he had the makings of a really first-class man.

We returned to the base after a magnificent scramble, very pleased with ourselves. Mummery now proposed to move a permanent or semi-permanent camp over to the north-west face, whence he thought there was a better chance of attacking the mountain. The astounding difficulties of the southern face may be realized by the fact that the gigantic rock-ridges, the dangers of the hanging glacier and the steep ice of the north-west face—one of the most terrifying faces of a mountain I have ever seen—are preferable to the south face.

And so we started. Porters were engaged at Tarshing, and additional supplies for a prolonged stay in the north were taken. The camp was to be in charge of one of the Gurkhas, Guman Singh, assisted by an experienced Kashmiri servant of mine who had been with Sir Martin Conway's expedition in 1892 to the Karakoram.

Mummery, horrified by the Mazeno pass, voted for an attempt to cross the great west ridge of Nanga Parbat further up from where they had failed before, climbing to a point whence we could descend direct to our camp in the Diamirai.

Camping some hours short of the track leading to the Mazeno, at the foot of the Rupal glacier, our party, consisting of Mummery, Collie, Hastings, Raghobir and myself, started at midnight and climbed over the moraine to the snow and ice, whence we gained an arête leading up to the great west ridge soon after daybreak. Then hour succeeded hour, and the ridge seemed as far away as ever, until by five o'clock in the afternoon, when it became certain that, even if we reached the crest, a night must be spent on it, Collie, Raghobir

and myself determined to seek a less-exposed place for the night. Mummery and Hastings said they would try and reach the ridge if they could, but they failed to do so. Meanwhile the rest of us descended for some distance, and, turning west in the direction of the Mazeno pass, climbed down a steep rock and ice-face until, luckily for us, we found a little outcrop of rock situated on a steep ice-ridge. Collie, in his account of this adventure in *Climbing on the Himalayas*, writes as follows :—

" Finally, as the sun was setting, we found a crack running through the arête, into which a flat stone had got jammed, just large enough for three people to sit on. Here we made up our minds to stop for the night. Roughly, we were 19,000 feet or 1000 feet higher than the Mazeno pass, and two or three miles to the eastward of it. A stone thrown out of either side of our small perch would have fallen many hundreds of feet before landing, so we did not take off the rope but huddled together to keep ourselves warm. How we tried in vain to get into a position so that the freezing wind would not penetrate! How Bruce and Raghobir groaned, and how we suffered! I will refrain. Anyone who may be curious should stop a night on a rocky ridge at 19,000 feet and try it himself, placing himself in such a position that twist and turn as he may, he still encounters the cold, jagged rocks with every part of his body and though he cover himself ever so wisely, he must feel the wind steadily blowing beneath his shirt."

After some time we heard Hastings and Mummery climbing down towards us, but owing to the difficulty of the ground in the darkness, they were unable to reach us and found themselves another little perch higher up. So there we were, and there we had to remain till daylight. We huddled together as tight as we could, as described by Collie, and put our feet together into rucksacks. Unfortunately for all of us, we had brought a very inadequate supply of food, and to our horror we found that this had been exhausted at breakfast on the morning we had set out. For the whole of that evening and that horrid cold night, we had nothing to eat. In the early morning Collie showed himself a master of the art of extempore cooking. Two or three bits of chocolate were discovered, and with the help of the climbing-lantern and some snow, a few sips of hot cocoa were available for the three of us, cooked in a little mug. It was a real *tour de force*. Then Hastings and Mummery, as soon as they could unfreeze, descended to us and we all very slowly crept down to the glacier below, where we joined the Mazeno route. Here we lay down and rested for a considerable time.

Once more we five tired men set out for the 18,000 feet pass. There was nothing for it. We had to go, for our only means of obtaining nourishment was to rejoin our camp by crossing that horrible Mazeno again. What a procession it was! We stumbled along for a hundred yards over the boulders, rested, then stumbled on again. Collie and Raghobir led, I came along a little later, and was followed by Mummery and Hastings. After some hours Collie and the Gurkha reached the top of the pass, the Gurkha, who had had nothing to eat the day before, due mainly to his own want of forethought, being completely exhausted. Collie writes:

"On arrival at the top of the pass, it was already midday, and here was I with a Gurkha who could scarcely crawl, and the rest of the party in a worse condition far behind, so after a short rest I started down over the pass on to the west side, leaving Raghobir behind, and then I waited for him. Repeating these tactics he was enticed along until, after crossing an ice-couloir, rendered dangerous through falling stones, I walked on to a rock to await him. Very slowly he crawled down and then in the centre of the couloir, though I screamed to him he was to hurry, he was nearly hit by a huge rock, weighing about a hundredweight, falling from two or three thousand feet above. Although it only missed him by a few feet he never changed face, and when at last he reached me seated on a stone, he dropped full length on the ice absolutely refusing to move and groaning. He had eaten nothing for forty hours."

In the end the rest of us joined Collie and Raghobir and we all descended the Lubar glacier some 7000 feet below the pass as far as the shepherd's settlement at Lubar Alp, as one might call it. Nothing rejoices me so much as the prospect of food, especially under such conditions, and luckily we were able to get from the shepherds not only milk in great gourds, but also a sheep. The milk revived Raghobir immediately; food was really all that he required; and between us, with the help of a shepherd, we very soon killed, skinned and cooked the sheep, although we had no utensils whatsoever. It was roasted on pieces of stick round the fire, and I do not think I have ever seen anyone enjoy a dinner more than we did that night.

The height of the Lubar Alp was about 11,000 feet and the nights were very cold. There was, however, plenty of wood, so the following night was not so unpleasant as it might have been, though we had to pass it with no covering. But we were all so tired that not even the hoar-frost which covered us in the morning could wake us up

Breakfast off milk and the remains of the sheep soon set us on our legs again and we had sufficient enterprise to make what was to us a new pass over a ridge some 6000 feet above our bivouac.

A rest on the pass was rewarded by one of those views which is occasionally granted to the mountaineer—a view which in itself we almost looked upon as a sufficient reward for all our struggles. Far away across the ranges to our north-west we could see the last great group of high mountains—the Hindu Kush of Chitral, Tirich Mir and the whole of the Hindu Raj, which seem to form the extension of the range so curiously named "the Kailas." North of us lay the Indus, directly under our eyes. Such masses of unexplored country were enough to excite the ambition of any man. But for the moment our travels were almost over for we could see our camp almost directly below us.

Then came two days of complete repose in camp. And my leave being nearly over, my own activities with the expedition came to an end. On 5th August, to my grief and disappointment, I was obliged to trudge back over the Mazeno pass and away to Abbottabad. The day which I spent skirting the great ridge which cut me off from the Lubar Alp was not at all monotonous. I could look right down the Diamirai valley, down to Bunar and into the Indus valley. The scale is so prodigious and the view contains so much country which even now is unknown to Europeans, that no man with the least imagination could suffer from boredom. We made a fine march the next day over the Mazeno pass and camped within easy reach of our old camp at Tarshing, which I left next day on my 250-mile march to Abbottabad.

After I had left, Mummery and the others commenced to explore the upper Diamirai with a view to attacking the great mountain. They found what appeared a practicable ridge and Mummery made a great reconnaissance of it, but discovered that it led up through the most uncompromising mountain face it is possible to conceive. At first sight it gives the impression of being like the south-east face of Monte Rosa, but it is infinitely greater, the face being a full 13,000 feet of snow and ice. The little ridge that led through the centre appeared to be threatened from the great overhanging glaciers above which circled the route by which Mummery proposed the assault. As on an Alpine mountain, so on Nanga Parbat, the upper part appeared less dangerous and less difficult than the middle. In the Himalaya, however, it is more difficult to be certain of this, for ice and snow conditions vary so much.

Mummery on that day accomplished some of the finest rock-climbing he had ever done and was greatly encouraged by finding a route which he considered possible. Unfortunately the weather was doubtful, and it was not till 8th August that the party again set out to complete the exploration of this ridge, having with them Raghobir and a splendid specimen of a young man of the Indus valley, a Chilasi called Lor Khan. They carried with them a certain quantity of food and stores which they placed in what they thought would be suitable sleeping-places for the climb.

After a few days' wet weather, there followed a most sporting ascent of the Diamirai peak, south of the camp, where Raghobir and Lor Khan saw Mummery at his very best, and had a further insight into how ice and snow should be handled. It was on this peak that they had one of the most unpleasant experiences that mountaineers can be called upon to meet—a serious slip on an ice-slope. Lor Khan, wearing his native *taoties*, nothing more than strips of raw hide wound round his feet, suddenly slipped out of his steps when crossing a steep ice-slope. Luckily the rope between him and his neighbour, Collie, was taut, while Raghobir and Mummery had both turned upwards, so that the strain did not come entirely on the horizontal party. Fortunately also, Lor Khan kept his head and so employed his fingers and ice-axe that he produced a minimum of danger,—but it was a near thing. Often has the question been argued as to whether it is possible to hold a man who slips out of his steps on pure ice. The doubt remains!

Now followed the attempt on Nanga Parbat.

Hastings had been despatched over the Mazeno to the base to bring up more supplies. He had not yet returned and Mummery was beginning to get nervous that if he delayed much longer he might be unable to make any attempt on the mountain at all. He therefore rather reluctantly moved to a little advanced depot up the glacier slope at about 15,000 feet. Collie, unfortunately and to his great grief, was overtaken by trouble caused by the rough food, and was not fit enough to undertake such a great exertion as was required for the assault on Nanga Parbat. One of the secrets of getting a team fit for such an assault is diet. Diet cannot be too carefully studied, and many men coming from Europe unaccustomed to food of the rougher kind, are apt to fall sick at such altitudes owing to lack of a little experience.

Lor Khan also, having been sent on a commission down the valley, was not available for the climb. Mummery and Raghobir

therefore started on their attempt on 19th August by themselves. They followed up the great rock-ridge which had been previously explored by Mummery and his earlier parties, taking with them certain rucksacks of food and the lightest possible tents, weighing some 2½ to 3 lbs. each, the invention of Mummery himself. They followed this ridge through the central north-west face, which separates two large couloirs on either side, down which almost continual avalanches fall from the glacier above. The ridge is broken in places, where ice and snow problems have to be tackled, but finally the third outcrop of rock joins the great ice-field immediately below the summit of Nanga Parbat. If this ice-field could be reached, it seemed comparatively easy to traverse it eastwards to a point where a ridge descended to it to the north of Nanga Parbat, and it was hoped that a route could be found up this to the summit. But even this involved at least another 5000 feet of ascent, and success depended largely on how much the axe would have to be used.

Mummery and Raghobir had a tremendous experience, but probably owing to his ignorance of Raghobir's language, and not realizing the irresponsible outlook of the Gurkha—Raghobir, though a very gifted mountaineer, was mentally on a plane with the average Gurkha—Mummery did not discover until they had been out two days that Raghobir had either brought no food with him, or had finished it at the first bivouac. The result was that on the third morning, after having spent two nights out on the mountain, reached a height of 21,000 feet and almost arrived at the great ice-field, Raghobir collapsed. Mummery naturally was desperately disappointed; but it is a remarkable fact that these two, neither understanding one word the other spoke, had carried out together one of the most strenuous feats of mountaineering ever accomplished. The climbing all the way up was over very difficult rock, the intervening ice-work being of the highest order. Dr. Collie describes the ridge as typical of the Chamonix Aiguilles, together with snow and ice of a distinctly difficult and trying kind. The dangers from avalanches were inconceivable. Avalanches passed them tearing down the troughs on either side of them. One was of such desperate energy that it took in its bound the rock-ridge on which they had spent two nights, and carried away the tent and rucksack which they had left for use on their return journey. A more hazardous and desperate feat has seldom been undertaken in the whole history of mountaineering.

Mummery now came to the conclusion that his attempt from the Diamirai glacier must be abandoned, and it was agreed that the only chance of success was by finding a suitable snow route. The ridge mentioned above as descending to the north of Nanga Parbat to the ice-field, divides the Diamirai valley from the valley of Buldar-Rakiot, known also as Yoway, and it was considered likely that a route might be found at the head of this valley, which would provide a far less difficult approach to the mountain than that by the desperate north-west face. The expedition therefore determined to cross to Rakiot. The north ridge descends to a col, beyond which it rises again to a subsidiary peak known as Gonalo. From the Diamirai side, a trough filled with a glacier called Diama leads up to this col.

The main camp of course could not go by the col, and in order to get to Buldar-Rakiot, a long and laborious march of some two or three days, skirting the sides of the mountain, was necessary. Mummery loathed that kind of work and determined to take the Diama glacier route, cross the col, and drop down directly to the Buldar valley beyond, while Collie and the main outfit skirted the mountain. Lest he should find his route impossible, he took men with him to leave rucksacks containing food, at suitable places on the way up, so that in case of retreat they could pick up the food and follow Collie's tracks.

On the 24th August Mummery, with the men carrying his spare rucksacks and accompanied by both Gurkhas, Raghobir and Guman Singh, started for the col. The rucksacks were deposited by the men. Mummery, Raghobir and Guman Singh proceeded on their way. They were never seen again.

Meanwhile Collie moved the camp round and pitched it in the Rakiot valley, from where he could look up to the pass over which Mummery was to come, and he has often told me since of the uncompromising character and desperate steepness of those ice and snow slopes descending from the pass. As soon as he had seen them he realized the utter impossibility of Mummery's party being able to face that col. In his own mind he was perfectly certain for some days that Mummery had beaten a retreat and would rejoin him by the route he had himself taken. But when at last there was no sign of him, even after Lor Khan, who had been round to reconnoitre, reported the rucksacks still in position, Collie knew that a disaster had occurred.

Hastings had joined him just before Mummery had set out. On receiving Lor Khan's report it was agreed that Hastings should return

via the Diamirai, and that Collie should follow round the mountain to the eastward until he rejoined the main road to Astor.

Hastings pushed up the Diamirai valley as far as he dared go, every sign showing him that there had been heavy snow. Overhanging the route beyond from the high slopes of Nanga Parbat were the ends of the great glacier-field, hundreds of feet in height. Avalanches fell continuously. The scale was immense, and it is impossible to describe it to those who only look through Alpine spectacles. Hastings retrieved the last of the rucksacks left as a reserve by Mummery on his advance, thereby showing that the latter had not turned back. The valley itself was now too dangerous for a single unequipped man to penetrate. There was no other outlet from this valley save by the col. It became obvious that the disaster must have occurred further up this valley. Hastings therefore returned, descending to the stifling heat of Chilas, where he got into communication with both Collie and the British authorities.

Then once more Hastings and Collie determined to penetrate into the Diamirai, if possible to ascertain exactly what had occurred. But once more on arrival at the mouth of the Diama valley they realized that any attempt to penetrate the upper glaciers was entirely and absolutely out of the question. Snow had fallen in great quantities. Avalanches tore down the face of Nanga Parbat. Entry to the Diama valley was a complete and utter impossibility.

Such was the passing of Mummery, one of the greatest and most adventurous of British mountaineers of all time. Perhaps I may quote the last sentences of Collie's account:

"The pitiless mountains have claimed him and among the snow-laden glaciers of the mighty hills he rests; the curves of the wind-moulded cornice, the delicate undulations of the fissured snow cover him, while the grim precipices and the great brown rocks, bending down into an immeasurable space, and the snow peaks he loved so well keep and guard and watch over the spot where he lies."

THE NETHERLANDS-KARAKORAM EXPEDITION, 1929.*

JENNY VISSER-HOOFT.

IN THE spring of 1929 we arrived for the third time in Srinagar to make our final preparations for another Karakoram expedition. Panamik was to be our base, and from it we hoped to visit the unknown side-valleys and glaciers of the lower Nubra and upper Siachen. As second and third items on our programme were placed the western valleys of the Shyok to the south of the Saser pass and the unsurveyed region to the east and north-east of the Karakoram pass.

Besides our faithful companion of both other occasions, Franz Lochmatter, one of Switzerland's best-known guides, two new members joined our expedition : Mr. A. Sillem, ornithologist, and Dr. R. Wyss, geologist. Another important member was Khan Sahib Mian Afraz Gul Khan. We had already learnt to value his services as a surveyor in Hunza in 1925, and we were most grateful to the Survey of India for allowing him to accompany us once more.

Our last few days in Srinagar were spent at the Residency where we were the guests of Colonel and Mrs. Ogilvie, whose hospitality created for us a charming parting remembrance of civilization. The beautiful garden was looking its best, with rows of tulips glowing against the background of the Takht. It was hard to believe, as we set out on the familiar road up the Sind valley, that a few days would bring us into the heart of winter on the ill-favoured Zoji La. In Baltal the first crocuses were peeping forth among the patches of melting snow ; beyond, the narrow cleft was filled with masses of fallen avalanches. The mountains around were white.

However on the 7th May we managed without great difficulty to cross with a caravan of ponies. We found that the soft snow reached down to Dras, lying bleak and forlorn in the wintry scene. In Leh our last arrangements had to be made, including the engaging of our permanent porters, and the settling of various matters regarding

* This account was written in Yarkand in January 1930, but reached us too late for publication in Volume II. The region of the exploration here described falls in Survey of India maps 52 E,F,I,J. A brief account of the expedition during 1930 is given in the section "Expeditions." This has been compiled from letters.—Ed.

food supplies, transport, postal arrangements, etc. Dr. Peter of the Moravian Mission, the only European at the time in Leh, kindly gave us his valuable assistance. Our 34 permanent porters were a fine lot of picked men, several of them already having had experience of the hardships of mountain and desert travel with Major Kenneth Mason and Dr. Emil Trinkler.

Besides these men and the members of the expedition already mentioned, we had with us two stalwart Indian boys, Paulus Anthony and Francis Xavier Khan, both of them boy scouts and pupils of the Roman Catholic Mission at Baramula ; also Fazal Husain, Mr. Sillem's Indian servant, and Sultan Mir, our Kashmiri cook.

The spring of 1929 was exceptionally late. A heavier snowfall than usual still blocked the Khardung pass. The crossing with baggage animals was reported to be out of the question. For ponies it certainly was ; and as for yaks, those useful substitutes for ponies on the snow, they were practically extinct in Leh, owing to an infectious disease which had created havoc among them.

Seen from the Joint Commissioner's garden, the steep white barrier, which separates the Indus from the Shyok, appeared singularly beautiful, but undoubtedly forbidding. However, cross it we must and on the 30th, Dr. Wyss with two porters started to reconnoitre the pass. Leaving Leh at 10-30 a.m., he returned twenty-four hours later, having walked all through the night. His report was satisfactory ; he had reached the summit without difficulty. I had however to give up the idea of taking the pony across, which I had recently bought in Khalatse. It was not till two months later that it was possible to send him on to Panamik.

Besides our permanent porters we had to employ additional coolies for the Khardung pass, and to cross in three groups on three different days. In Khardung village pony transport was again available. Emerging in the Shyok valley, we forded the Shyok river, the bridge higher up, which was swept away as long ago as 1926, never having been repaired.

We found the Nubra a valley of roses. The profusion of blossoms was amazing and the bright spots of colour in the arid desert were a joy to the eye. Confined in the narrow lanes and patches of fields between the menacing thorns, the reality of being literally hedged in predominates too much in Panamik to make it an agreeable halting-place ; we were therefore relieved when, after some delay owing to transport difficulties, we were once more on the road leading to the head of the valley.

The second day after leaving Panamik, on a grey morning, we crossed the river opposite the steep cliff where the track mounts to Umlung. Already the swiftly-flowing water had an angry look. We had now left familiar ground. The first village we came to was Kimi, whose worthy lumbardar welcomed us at the head of an excited crowd of villagers. In fact, the whole population had turned out. There were ten or twelve women, all with offerings of roses, including the village beggar-child, the leading Kimi matron with a rich, be-turquoised head-dress, and the local great-great-grandmother, a bundle of rags and crazy wits. Among the men the most picturesque were a couple of lamas and three male dancers, who attired in a weird kind of fancy-dress crowned by enormous hats, performed a solemn dance in our honour.

The dwellers on the right bank of the Nubra we invariably found to be friendly and cheerful folk. Rarely seeing Europeans, they are quite unspoilt, and contrast most favourably with the unobliging and grasping inhabitants of the Panamik region, who live on the caravans.

On the following march the number of stones and boulders bearing sacred inscriptions was particularly remarkable. I looked forward with interest to seeing the last inhabited spot in the valley, marked on the map as Gompa, as I recalled various discussions I had read about the miraculous light said to be visible on the rock above the monastery.

In the narrow lane, among the rose-bushes, the kindly abbot was waiting for us. He had drilled his little world well, for, as soon as we came into sight, the red-clad lamas sitting on the roof of the sanctuary commenced blowing their horns with a vigour that made the mountains echo with long drawn-out blasts, sounding like the gruesome laments of wandering souls. A mighty bowl of *chang* was produced, and standing by the road-side, where the sown abruptly verged into the desert, and where his small rose-bedecked domain ended, the old abbot, with a benevolent smile, filled each wooden bowl held out to him, as our porters, one by one, bending under their loads, passed out into the wilderness. It was a kindly act and a picturesque scene.

On being asked to show us the illuminated rock, the lamas indicated a smooth slab on the sheer rock-wall above us. We could however see nothing that might account for the story. Probably the most important factor, the eye of faith, in our case was lacking. One of our Nubra coolies affirmed, when questioned afterwards, that

he had seen the light, describing it as being " like a flame ; like gold !" Standing actually near the place, it was not to be seen, he said, but only from afar, from a spot near the river. He mentioned two other places in the Shyok as also having these " lights," one of them being Rondu.

In the evening, after leaving Gompa, we came to a melancholy halt in the bend of the valley, where the Nubra dashed its foaming water right at our feet. The ford, if indeed a place for crossing existed, looked most unpleasant. A cold wind was blowing ; the evening closed in, grey and gloomy, as we stood surveying the stretch of the right bank where the steep cliff in the distance seemed to descend straight into the water. Another five minutes, however brought us to a dense grove of rose-bushes. It evidently had been the site of a shepherd's encampment, and we solved the immediate problem of where to spend the night by pitching our tents among the shrubs.

Our transport consisted of the permanent porters and a number of pack-ponies from Kimi, which were to take supplies up to the Siachen glacier. The next morning our party split up into two divisions ; my husband and Franz, going on foot with the porters, decided to try and force a way on the right bank, which would not involve the crossing of the main stream ; the rest of us, riding and taking charge of the baggage animals, proposed to ford the river opposite the camp and to continue on the left bank. Both parties agreed to re-unite at the foot of the glacier, where we intended to camp. However, as we found later on, things turned out very differently.

The pony-caravan began the day with an adventurous crossing. Fortunately the river divided its mass of turbulent grey water into three main channels, but even so, it caused us some anxious moments before all had landed safely. Once on the left bank the going was easy enough, but as we at last approached the glacier in the late afternoon, we realized that even quite near the snout it would be quite impossible to re-cross the seething volume of swiftly-flowing water to the opposite bank. The large stones, turned over by the torrent, made a curious rumbling noise and testified to its impetuous force.

A way over the ice might be found, although it looked equally forbidding, but it would certainly mean a difficult passage along a sheer precipice of rock, and probably a certain amount of step-cutting on the glacier itself. It was a case of being so near and yet so far ! In the meantime the party on the right bank had safely arrived at

their end of the glacier snout, but although we tried to communicate with each other by shouting across the water, it was impossible to hear anything. Each group then retired gloomily to the best camping-place it could find, only to discover that those on the right bank had all the bedding, but no tents,—and the cook, but no food !

Late in the evening Dr. Wyss managed to find a route across the glacier to the other side, and the next morning he and Franz brought over a party of porters to fetch the loads left behind by the pony transport. A long rope was soon dangling down the face of the steep cliff, which was the chief obstacle on the way, and the whole morning was spent in hauling up and letting down the porters and their loads, both safely secured and held from above by the guides.

On an icy hummock of the stone-covered Siachen, we at last were all re-united.

The next day a wide side-valley was discovered on the left bank leading in an easterly direction. Part of the descending ice of the Siachen flowed into this valley. It can thus be said that the Siachen shows the rare feature among glaciers of having two snouts.

While I returned to establish a base-camp at the head of the Nubra, my husband continued up the Siachen side-valley, which, penetrating into the heart of magnificent mountain scenery, and confined between steep walls of rock, offered no easy admission. The water here again was the cause of serious difficulties. Further on, a debris-covered glacier was found to fill the entire width of the trough. On the second march upwards after leaving the Siachen, it became evident that this new glacier flowed down from a northern side-valley.

Proceeding to the junction of two ice-streams, Dr. Wyss and the Khan Sahib now explored immediately north, while my husband and Franz followed the great flow of ice coming from the east, an adventurous journey among terrific seracs, rendered dangerous by stone-avalanches. One of these fell among the porters, but fortunately no damage was done.

In spite of the threatening sky—snow was already falling—the whole party crossed the glacier to the other side. It proved to be a three-hours' scramble. The next morning the névé plateau was reached. An ascent of a peak of about 21,000 feet afforded a comprehensive view of the surroundings. The length of this glacier was about 19 miles.

Before returning to Panamik after the completion of this exploration, two more tributaries of the Nubra, one on each side, were explored by various members of the expedition.

June the 29th saw us again advancing upon Gompa. Across the endless wilderness of stones, the white walls of the friendly little monastery, first human habitation of the valley, became visible hours before we reached it. This time we kept entirely to the left bank and no crossing was found to be necessary. The sight of the rising flood however caused some anxious speculations as to how our return to Panamik, on the opposite bank, was to be achieved.

The passage of the river eventually took place on the morning of our departure from Aranu, a delightful rose-embowered village, with ruined chortens and masses of frail blue aquilegias nodding between the hedges. The hour was carefully regulated according to the time when the least volume of water rushed down the Nubra. It was eleven o'clock when the two wild-eyed individuals who, in their function of water-experts, were to look after our safety, announced that the auspicious moment had arrived. With voices uplifted, they urged our ponies into the swiftly-gliding river. Men and beasts followed, struggling frantically against the current, echoing the encouraging cries of the leaders. The ordeal of entering the cold and cruel water had to be faced several times, as the various channels, the existence of which made the crossing possible, were divided by strips of sand and mud.

Our friend, the *lumbardar* of Kimi, took pride in personally conducting us across the river. Mounted on his ragged white pony, the old man kept a watchful eye on the struggling caravan, and he must have heaved a sigh of relief when he saw us all land safely on the hot dry sand below Umlung. In the afternoon we entered the stony lanes of Panamik.

On the 24th July, in a burning heat, we definitely turned our backs on the Nubra and ascended the steep track to Umlung. The transport problem had at length been satisfactorily solved, but only after much deliberation and no little obstruction, emanating from the Panamik *Zeldar*. This worthy, finally reduced to a more helpful attitude, was a far from gallant figure in our camp, nervously telling his beads and casting terrified glances at Patiala, my big Tibetan dog. A contract with a trader in Panamik settled the question of our transport right through to Turkistan. The surplus baggage was to be temporarily dumped at Saser Brangsa, while for the exploration of the Shyok valleys we intended to rely entirely on our permanent porters.

At Skyangpo-che the weather was bad, but for the crossing of the Saser glaciers on the 26th July the sun shone brightly and we

safely accomplished the dreaded journey,—dreaded mostly by the unfortunate ponies, wending their painful way past hundreds of fellow-victims of the road, who having succumbed, lay along the track in all stages of frightful decomposition.

The Shyok valley gleamed far below us as we stood on the last snow-slope of the Saser. Viewing the grand mountain scenery, the realization came forcibly that a new range of marvellous colours is revealed to the traveller. And as evening fell, flooding the camping ground on the barren hills with warm light, the fairy-tinted rocks vermilion and purple, were clothed in supreme majesty. This impression of a new and different country, abounding in strange new colour, fantastic reds and crimsons, ever glowing deeper or softly fading to palest orange, to which the Ladakhi and Turki wanderers respond with their " Red Valleys," " Red Rocks " and " Red Rivers,"—this first sense of another land, persisted even as we daily grew more familiar with it. Before ascending, however, to the wind-swept plateaux of " Black Gravel," the problems of the Shyok first awaited us.

On the 27th July we entered the first big valley south of Saser Brangsa, where we got once more into difficulties owing to the water. Several crossings could not have been undertaken safely without the ever-useful rope. During the stay at the head of the valley various peaks were climbed and several glaciers explored. Soon the map of the unknown region, thanks to the Khan Sahib's zeal, showed another blank space filled.

Our tents were pitched at the foot of the gigantic seracs, above which towered the great snow-peak of the Saser. From the main valleys it is nowhere visible, but during our explorations in 1922, we had already admired it from the other side.

On the right bank of the stream, we found clear water and a delightful little grazing-ground for my pony. It was the only spot of verdure in the valley. There were signs of former camps and we thus concluded that it is known to the Yarkand traders who come here to graze their animals.

The second big valley to the south of Saser Brangsa we also explored, but on the 6th August we had to return, as on the morrow our pony caravan was due to be here.

As we leisurely progressed along the Shyok, we instinctively cast many a glance upwards at the mountains on our left. Would, in case of necessity, an escape in that direction be possible ? If the famous dam broke—and the catastrophe was said to be expected any

day,—our calm progress through the Shyok valley was doomed to develop into a wild scramble up the hill-side. At one place, where smooth slabs of rock overhung a pool of wonderful sapphire blue, we acknowledged that we would have been beaten. Flight at that point would have been quite out of the question.

However all remained quiet, and with a feeling of relief we reached our old camp at Saser Brangsa. These sentiments would have been even more intensified, could we have known that exactly a week later the dam would burst. Although we missed seeing the flood, we became aware of the catastrophe happening by the repeated occurrence of dull but distinct sounds, recalling the reports of a cannon a long way off. We were at the time at Daulat-Beg-öldi, a distance of about 20 miles from the dam.

Daulat-Beg-öldi was our starting-point for our last field of exploration, namely the region to the east and north-east of the Karakoram pass. During the few days we stayed there, loads were re-packed, food-supplies carefully counted, and the porters were given a rest. Here we had a visit from Mr. Ludlow, who had just left the Shyok dam, which he had been investigating with Mr. Gunn. It was the caravan season, and nearly every day we could watch from our tents a long string of ponies and camels on their way to the Depsang plains. Our projected route, however, branched off immediately from the caravan-track into the unknown wilderness. We first followed the upward course of the Chip-chap river. As it was to be foreseen that no grass would be found, and as he visibly suffered from the high altitude, I sent my pony to graze at Yapchan, at the head of the Shyok, where a month's rest completely restored him. The altitude not only proved a severe strain to the animals crossing the Depsang; we ourselves found that the continued sojourn at more than 17,000 feet affected us, although during the whole time we were all in perfect health. Having to rely for transport entirely on our 34 native porters, we travelled light, reducing the loads to a minimum. This necessary measure made food-supplies scanty, and our hopes of supplementing the larder by shooting any game were doomed to disappointment. Three Tibetan antelopes were the only bag we shot, and except on one or two rare occasions, no other animals were seen. In this desolate region no animal life is possible. At times, even *burtsa*, that blessing to the wanderer on the high plateaux, failed us, and in spite of diligent search, not even the scantiest plant could be found. The worst camps however, were those where the meagre water-supply was lacking, although now and then our hopes were

raised by a salt lake, which was found to have lured us on with a deceitful promise.

We had indeed left behind us the wild peaks and glaciers, the deep gorges and rushing streams, the gigantic awfulness of Muztagh's chaotic world. Here colour supplied the chief interest in the scenery, colour weird and unreal : blood-red walls of rock and orange-hued sands, miniature lakes changing from turquoise blue to fantastic green, and in the distance, shadowy and mysterious, the purple barrier of the Kun-lun. The great chain held deliverance from the endless undulating high desert-land of sand and gravel, where death seemed to reign and neither man nor beast was tempted to linger. Somewhere along the purple line must flow the Kara-kash ; and the porters turned tired eyes to it as to a land of promise.

Afraz Gul, as we advanced, worked feverishly at his plane-table. Time was short ; soon winter would fall upon us, and the blank space on the map was large enough to daunt the most zealous worker. However at the end of September, to our great satisfaction, his task was completed.

A few words will suffice to describe our route. The first marches took us up the Chip-chap valley. We discovered that the branch of the river, marked on the map as being the principal stream, does not contain the greatest volume of water. This issues from the north, from the mountain-group into which we penetrated on our way to the Kara-tagh pass. From here we reached the Khushku Maidan, and finally after an exciting search, struck the route to the Kawak pass. Traces of this route having been used—although certainly not recently—brought us once more into human contact. The finding of a bit of charred wood was an event to be compared with the discovery of Man Friday's foot-print.

The most interesting immediate result of the exploration of this tract of country was without doubt the discovery of glaciers, of which more than twelve were noted, in an area where they were unexpected.

The whole region is about 17,000 feet above sea-level. It is intersected by mountain ranges, generally running parallel to each other. Geologically it is of considerable interest. Many fossils were found and Dr. Wyss made an excellent collection. Both salt and fresh-water lakes were met with. But for the botanist and sportsman it is disappointing. The very sparse vegetation is confined to a few desert plants.

In the central group my husband and Mr. Sillem, with Franz and Dr. Wyss, climbed a summit of 21,000 feet. A steep ice-slope

rendered it an Alpine adventure. But at this season—it was September,—and at this altitude, cold is the climber's greatest enemy. The weather on the whole was good, although a bad snow-storm showed us how dangerous a blizzard on these trackless plains might be. The mornings were agreeably calm, but later in the day a sudden wind regularly sprang up, often blowing with such force that all hands were needed to keep the tents from collapsing.

Came at length the parting of the ways. At a short distance below the Kawak pass, the Khan Sahib and his porters turned back to resume once more at Daulat-Beg-öldi the road to India. After a sincere farewell we wandered along the gently-undulating slope towards the pass. Hardly perceptible on the southern incline, it falls more steeply to the north, but even so there is nowhere the slightest difficulty. Our main interest was now concentrated on where it would bring us. Would we reach the Kara-kash river in one day from the pass ? As we found later, it could be easily done, but our porters were tired, and double-marches were necessary to bring down the loads.

Traces of cattle were found as we eagerly descended over patches of stunted yellow grass. Evidently this spot had been used as a summer grazing-ground. Then once more an arid region filled the landscape, until suddenly, far below us, a green valley came into sight.

On the rocks we halted, gazed down and gazed again, while a strange emotion took hold of us.

" Green grass ! Trees ! Water ! "

Trees, yes, trees, they were the most wonderful sight of all—although they were mere shrubs—to our desert-weary eyes. After many weeks of barren country, that night we pitched our tents once more on grass. Two porters who had wandered off in search of wood brought sensational news. They had seen a woman ! She apparently belonged to a Kirghiz settlement lower down the valley. The next morning two men appeared with a sheep and an invitation to visit them on the way down. We were, they said, quite near the Kara-kash.

Feeling our troubles to be at an end, we marched to the Kirghiz camp in high spirits. The red-clothed women, with their tall white head-dresses, gave us milk and bread and welcomed us to their tents. The men and boys looked as if they had stepped out of some rustic operatic scene. A short walk took us to the junction of the Kawak and the Kara-kash. Hundreds of sheep and yak were grazing in the broad valley. To us it seemed a land of plenty and of peace, though to others it would appear a desert.

Our evening's camp was pitched at a delightful place. At the tent doors flowed the wonderfully clear and blue water of the Kara-kash, the peaks of the Kun-lun, forming the background, rising immediately from the other bank. The mild climate of the lower altitudes was pleasant to our chilled bones, food was plentiful and the night was soft and warm. By the murmuring water the porters sat in a circle round the fire and told tales of Gessar Khan.

Two more marches brought us to Suget Karaul and on the 4th October we started on the journey to Yarkand via the Sanju pass.

A SKETCH OF THE GEOLOGY OF INDIA.

SIR EDWIN PASCOE.

THREE Geological Regions.—Geologically India may be divided into three regions : (i) the Peninsula ; (ii) the Extra-Peninsular region, including Baluchistan, the North-West Frontier, the portion of the Punjab north-west of the Jhelum including the Salt Range, the Himalaya, Burma and the Andaman and Nicobar islands ; and (iii) the Indo-Gangetic Alluvial Plain, between the first two. The Shillong Plateau belongs to the Peninsular region.

Antiquity of Deposits and Physiography of the Peninsula.—The keynote of the history of the peninsula is immeasurable antiquity—antiquity even according to geological standards. This applies emphatically to the formation of the rocks themselves, but also in no small measure to their elevation above the sea to form land. Of the rocks, omitting a few small but highly interesting coast deposits, omitting the coal basins, and omitting a vast lava flood which poured over the older rocks, probably none is younger than the Cambrian, the earliest geological period in which organic remains are definitely recognizable. By far the greater bulk of the Peninsular rocks, however, date back to still older periods which have left no record of life upon the globe. Soon after the Cambrian period practically the whole of the Peninsular region was raised to form part of a continental area. Land it became and land it has been ever since.

Dharwar System.—The oldest recognizable rocks are Archæan in age and have been assigned the name of Dharwar after the district in the Bombay Presidency where they were first studied. The Dharwar rocks include true sediments and lava flows, and these, of course, must have been deposited upon some floor. For many years it was thought that most of the gneiss, which covers such a large proportion of the Peninsula, represented this most ancient ocean floor upon which the earliest sedimentary deposits of India were laid down. During the past few years, however, it has been shown that much of the gneiss is the altered product of a molten magma which was intruded into the Dharwar sediments after they had been deposited ; this gneiss, therefore, though of great age, must be looked upon as younger than the Dharwar strata. So much of the gneiss has been shown to be

intrusive into the Dharwar that it is now impossible to point to any of it as being definitely a remnant of the primeval ocean floor of the Dharwar period—the floor which received the first sediments, of which any record remains, brought down by the rivers from that very early land.

Primeval Ocean Floor.—Nevertheless, an ocean floor there must have been or the Dharwar sediments could never have been deposited, and it seems unlikely that the junction between the sediments and the floor has everywhere been completely obliterated by the subsequent intrusion of molten rock. In places the lowest horizon of the Dharwars in contact with the gneiss is a conglomerate of what appear to be pebbles of the gneiss, and this was originally regarded as conclusive proof that the gneiss was the older of the two and had supplied pebbles to the Dharwar rivers. Most of these conglomerates are now regarded as subsequent to the induration and folding of the rocks and produced by fracture and relative movement, the so-called "pebbles" being merely fragments detached and ground into more or less globular shape by the movement of the two uneven walls of the fissure against one another.

Himalayan Gneiss.—Great thicknesses of gneiss of varying character form the cores of the Himalayan ranges but here, owing to the great intensity of a vastly younger N.–S. earth movement—a movement which in fact may be still proceeding—it is even more difficult to decide whether any of it is metamorphosed Dharwar sediment, or whether any of it belongs to the primeval ocean floor of igneous rocks on which the first sediments were deposited. Some of it is obviously younger than either and can be seen to have intruded itself in the form of molten granite magma into older rocks. The Chor *massif* near Simla is an example and is thought to have been intruded into the Jutogh rocks which are possibly the local representatives of the Archæan, during the earlier half of the Purana period. Some of the Himalayan gneisses, again, are merely metamorphosed Palæozoic sediments. Considering the great size of the Himalayan uplift, it seems highly probable that the Dharwars, if they ever extended so far north, or the igneous crust which in the peninsula formed the floor on which they rested, or both, have been forced up to high altitudes and laid bare by the intensive denudation which followed. Himalayan geology is in its infancy, but systematic geological mapping on large scale maps will no doubt in time unravel most of the complications which metamorphism and movement have produced, and decide whether this ancient system is present in the heart of this giant uplift.

Mergui Series.—In the Tenasserim division of Burma are some ancient metamorphosed clays and volcanic material which are regarded as the probable equivalents of the Dharwar system. Amongst the fragments of a volcanic agglomerate were found a few rounded pieces of a granite which has not, so far, been observed *in situ*. These are interesting as being representatives of a rock older than the deposits in which they occur; if the correlation of this "Mergui series" with the Dharwar be correct, this granite is the oldest rock we definitely know of in the Indian Empire.

Dharwar Sea.—Of the extent of the Dharwar Sea we have very little knowledge; it covered the northern and probably also the southern half of Madras and stretched northwards at least as far as the alluvial belt. Whether it covered any portion of the Himalayan region or beyond we cannot at present say. It probably covered the Shillong plateau and extended as far east as Burma. It is from the Dharwar beds that the Kolar and other great goldfields of Mysore and Madras derive their gold. Manganese, iron and copper are also valuable products from this very ancient system.

Folding Movement.—Whatever the mutual relationship between the Dharwars and the gneiss may have been, we know that the two were afterwards folded up tightly together by a compressional movement acting in a more or less E.–W. direction. The two groups were thus thrown into sharp folds running generally N.–S. but veering to N.W.–S.E. This folding movement was accompanied or followed by upheaval and the formation of land. Of the shape and extent of this land area—this forerunner of India—we know scarcely anything; the tightness and frequency of the folds, together with the enormous quantity of rock which must have been stripped off by subsequent denudation, point to lofty mountainous country which may have stretched far beyond the confines of the present peninsula. Should the Archæan, including the Dharwars, be represented by any of the Himalayan gneiss, it would of course be difficult to recognize therein any of these N.-S. folds, owing to the severity of the younger movement referred to above, which long afterwards produced more or less E.–W. folds and would have largely obliterated any older N.–S. folds. Nevertheless any old N.–S. folds in the Himalayan region would have affected the result of the later movement, and it is not impossible that some of the transverse strikes, faulting and orientation of outcrops amongst the Himalayan rocks may owe their existence partly to the effect of these older folds. After the E.–W. movement an immense period of quiescence ensued, during

which the continent was subjected to atmospheric denudation so prolonged as to wear off almost all the old Dharwar deposits. The decrease in size and increase in isolation of the Dharwar outcrops as one passes south lead one to infer that the total area these beds now cover is not to be compared with that which they formerly occupied. All that now remain are relics of the troughs of a few of the compressed N.–S., or N.W.–S.E. folds.

Submergence.—During the next epoch, christened by Sir Thomas Holland the Purana, India sank again beneath the sea. Between this submergence and the end of the preceding one, the interval, known as the great Eparchæan interval, is thought to have been so great as to exceed the time which has elapsed since the first records of life on the Earth up to the present day.

Purana Period.—Upon the submerged and highly inclined edges of the denuded Dharwar and gneissic rocks were deposited a great thickness of sand, clay and limestone, which in the Cuddapah area of Madras amounted to some 20,000 feet. The outcrop of these beds in this basin, including the portion concealed beneath some overlying younger deposits, occupies an area of about 14,000 square miles. The Purana sea covered the northern half of Madras, the Central Provinces and Rajputana, and stretched probably as far as the Himalaya. The Chail and Jaunsar series of the Simla area, for instance, are allotted by Dr. Pilgrim and Mr. West to this group; the Jaunsar series in Jaunsar includes lava flows and volcanic ash. One may conjecture that much of the region of that part of the Himalaya lying to the south of the main range of snowy peaks was covered by this shallow sea, and that it was bounded to the north by a Tibetan continental area. Eastwards the Purana sea may have extended to Burma, in which province the system may be represented by some of the rocks of the broad belt which lies between the gneiss of the Ruby Mines area and the fossil-bearing strata of the Shan plateau. The beds containing the vast and rich deposits of iron ore in Orissa and its Feudatory States were at one time considered to belong to the Purana group, but are now assigned to a late phase of the Dharwar system.

Aravalli and Central Indian land: Vindhyan Period.—The next event seems to have been a corrugation of the sea floor by a movement having a direction N.W.–S.E. One of the effects of this movement was the initiation of the Aravalli range in Rajputana, and here the folding was comparatively intense; elsewhere it appears to have been gentle and broad. This change ushered in the Vindhyan period and produced land in the Aravalli area; this we deduce from the

absence of the earliest Vindhyan sediments along the flanks of this old mountain chain. Over a broad belt stretching from the Malwa plateau and the so-called Vindhyan range to the Son valley the Lower Vindhyan deposits consist predominantly of sandstone and clay. In the Son valley they include volcanic ashes and more rarely lava flows, indicating the proximity of paroxysmal vents; similar volcanic deposits on a large scale are seen in the Rajputana desert west of Jodhpur. Further away from the Aravalli land-area, over what is now part of Madras, the deposits comprise more limestone; the lowest beds are, however, coarse conglomeratic sandstone and were evidently derived from a not very distant coast. There is evidence of such land in the form of a broad flat ridge, parallel to the Aravalli ridge and distant from it some 450 miles away to the south-east. This more southerly ridge extended from the region south of the Son valley through the Mandla, Seoni and Chhindwara districts of the Central Provinces, probably across Hyderabad to the Bombay Presidency. This ridge seems to have formed a barrier sufficient to separate two different basins of deposition, the Central Indian to the north and the Kurnool to the south. It is perhaps not entirely fortuitous that this ancient ridge, which has never since sunk beneath the ocean, still forms an important watershed in spite of the topographical changes produced by the Deccan lava; from the Amarkantak section of this ridge rise the Narbada flowing ultimately westwards, the Son flowing northwards and north-eastwards, tributaries of the Mahanadi flowing to the south-east, and the Wainganga and Wardha flowing to the south.

Earliest Organic Remains.—The most interesting feature of the Lower Vindhyan deposits is the occurrence in them in south Indore of organic remains. These have been pronounced recently to be the chitinous shells of brachiopods allied to Cambrian forms of *Acrothele*; on this account the beds have been assigned to the Cambrian. These, if rightly identified, are not only the earliest known fossils of the peninsula, but the only marine fossils found in the peninsular area at all, if we except a few isolated coastal deposits along the Coromandel and Malabar coasts, and a recently discovered exposure of Carboniferous in the Rewah State of Central India containing *Productus* and *Spiriferina*.

Extra-Peninsular Cambrian.—In extra-Peninsular parts of India the Cambrian is represented by definite marine faunas. In the Salt Range of the Punjab is a trilobite and brachiopod fauna of a very individualistic type but showing some affinity to Chinese, American and Australian forms. In the Spiti valley of the Punjab Himalaya is

another and more extensive fauna which, like that of the Salt Range, contains no species definitely recognizable in any other part of the world; it has, however, a marked resemblance to the Cambrian fauna of the Rocky Mountains. Its only link with the Salt Range is the trilobite, *Redlichia noetlingi*. In all probability these Cambrian beds extend through the Himalaya with possible interruptions at least as far as the frontier of Nepal. In places such beds, with any fossils they contained, may have been metamorphosed out of all recognition into schist and gneiss, but travellers passing through country in the line of strike of any known outcrop of Cambrian—or indeed of any of the other fossiliferous systems—would help to locate these elusive bands by keeping a look-out for organic remains or markings. Such relics are more especially noticeable in stream-courses where broken rock accumulates and where the action of water tends to make organic structure more conspicuous. More doubtful occurrences of Cambrian strata are those of Kashmir and the Hazara district of the Punjab, but there is some reason for supposing that the Cambrian sea extended as far as Afghanistan and the Hindu Kush; it did not reach as far as Europe, as the differences in the respective faunæ prove. This Tethys Sea, as it has been called, had receded temporarily northwards from the Salt Range region, which became land—probably part of the peninsular area—during the latter part of the Cambrian period and remained so until the closing centuries of the Carboniferous.

Lower Palæozoic of the Peninsula.—In the northern half of the peninsula the Lower Vindhyan series is invariably succeeded by the Upper Vindhyan. This is a sandstone series and yields the pink or purplish sandstone so largely used for building purposes. It was especially so used by the Pathans and Moguls; Akbar employed it in building his city of Fatehpur Sikri. The Upper Vindhyan must represent a later series of the Lower Palæozoic, but has so far yielded no determinable organic remains; its sandstones, however, exhibit records of "fossil weather" in the form of ripple-marking, sun-cracks and rain-pitting. No representative of the Upper Vindhyan has so far been identified in the Himalaya.

Ordovician.—Ordovician sediments overlie the Cambrian in Spiti, and contain a brachiopod fauna showing a clear relationship to the fauna of the American Chazy or Trenton formations. North-westwards the beds extend into Lahul and are probably found in Kashmir. To the south-east Ordovician beds have been recognized in British Garhwal, where they contain a Spiti fauna. The best development of the Ordovician is seen in the Northern Shan States of

Burma ; here there is a rich fauna which, curiously enough, is much more closely related to that of North Europe than to those of the Himalaya (Spiti) and America. There seems to have been an effective barrier—presumably of land—between the Central Himalaya Ordovician sea and a sea stretching from North Burma through China and Siberia to Scandinavia. The central Himalaya sea was probably connected with the North American sea by way of Southern Europe through the forerunner of the present Mediterranean.

Silurian.—The Silurian follows the Ordovician in Spiti and Garhwal, and has been identified in Kashmir ; its fossils have elements in common with the American fauna, but their predominating resemblances are with north European forms. Silurian beds with a fauna including a rich assemblage of graptolites succeeds the Ordovician of Burma. Graptolites were minute polypes which grew in colonies arranged along a rachis or stalk. They exhibited a preference for muddy waters and for this reason their remains are more likely to be found on slate or shale than in sandstone or limestone. These remains form on rock surfaces black markings which remind one of the business part of a fret-saw arranged in various ways. This interesting and widely scattered group became extinct during this period. One continuous Silurian ocean seems to have spread round the northern hemisphere, including the old interior sea of North America, but to have been shut off from a precursor of the Pacific.

Devonian.—The only places where the Devonian system has been definitely identified are Chitral and Burma, but certain quartzites in Kashmir, Spiti and Garhwal, from their position above the Silurian, and some unfossiliferous beds underlying the Trias of the Hazara district, may provisionally find a place here. The Chitral beds contain characteristic brachiopods and corals, while the Burma strata contain a rich assemblage of Devonian forms, including the characteristic and ubiquitous coral *Calceola sandalina.*

Carboniferous.—Carboniferous strata containing marine fossils have been found in the Salt Range, Kashmir, Spiti, Garhwal, Chitral and Rewah State ; the same beds also occur in the Northern Shan States, the Tenasserim division and probably in the intervening tracts in Burma. The discovery of *Productus* and *Spiriferina* in Rewah State, Central India, is interesting as pointing to the invasion by the early Carboniferous ocean of the peninsular or continental area to this extent ; this Carboniferous Tethys was still continuous with the European sea.

The Gondwana Continent.—Towards the end of the Carboniferous and the beginning of the Permian periods we find India forming part of a great southern continent stretching across the Arabian Sea and Indian Ocean, over the site of the Seychelles Islands to Madagascar and South Africa, and thence, south-westwards to South America and Antarctica ; to the south-east it was united to Australia and may have covered the rest of the Indian Ocean. To the north, girding the greater part of the Earth, was a latitudinal sea, the Tethys, of which the Mediterranean is a dwindled relic. The backbone of the Indian end of this old continent of Gondwanaland was the Aravalli Range, the oldest mountain range in India, which at that time must have formed a lofty snow-clad chain comparable to the modern Himalaya ; from its south-eastern flank flowed glaciers which fed streams in whose basins the coalfields of India subsequently accumulated. The cold, however, was not confined to the mountain heights, for evidence of the proximity of glaciers in the form of ice-scratched and facetted boulders and pebbles is widespread over the whole continent from Australia to the Argentine and the Antarctic regions, in the rocks belonging to this final phase of the Carboniferous, which in India is known as the Talchir. This extremely interesting series has a representative in the Himalaya in the Blaini stage of Simla. It was long suspected that the scratches found on a few of the boulders from the boulder-beds of this stage were the result of ice action. On two of the boulders, found in 1908, one by Sir Thomas Holland and the other by the writer of this article,* the scratches and polished surfaces offer unmistakable evidence that the boulders are relics of ancient moraines and, according to Mr. R. D. Oldham's hypothesis, must have been carried out to sea upon floating ice and dropped upon the sea bottom. In no other way is it possible to explain satisfactorily the association of scattered boulders, some of them two or three feet across, with a fine silt whose bulk exceeds the total bulk of the boulders. A marine type of the Talchir boulder-bed is found in the Salt Range and there is evidence that these boulders, many of which are ice-scratched and facetted, came from the direction of Rajputana. The Kashmir area at this time was the scene of great volcanic activity and seems to have formed a volcanic archipelago whose islands poured out streams of lava—the Panjal Trap—and emitted quantities of ash which fell into the sea and became inter-stratified with marine lime-stones.

* Exhibited in the Indian Museum, Calcutta.

The Arctic climate of the boulder-beds was followed by one probably less severe but still cold. A dense undergrowth of ferns and cycads, apparently of Antarctic habit, covered the land and gave origin to the beds of coal which characterize the strata which succeed the boulder-beds; the best known of the ferns have been named *Glossopteris* and *Gangamopteris*. These coal-bearing stages are not found in the main mass of the Himalaya, their place being taken probably by slates with bands and lenticles of brown grit, forming what has been called the Infra-Krol, and a sandstone stage known as the Krol. In this Permian period, as the presence of the *Gangamopteris* flora shows, Kashmir was connected with the mainland to the south for a time, but soon sank and remained beneath the Tethys waters until early Tertiary times. To the east of Kashmir the Himalaya appears to have formed part of the continent for a period of sufficient length to allow of the denudation of several thousand feet of beds; during the following Triassic period, however, it was again submerged.

The Tethys Sea.—Meanwhile the Tethys Sea persisted as the northern boundary of Gondwanaland and, although much reduced by the upheaval into land of a large part of China, in Triassic times stretched from north-east of Darjeeling through Kumaon and southern Tibet, Garhwal and Spiti into Kashmir and westwards into Europe across the Pamirs, Bokhara, Afghanistan and Baluchistan. Its course can be traced by deposits with Triassic fossils. North of it was a land-mass covering the greater part of China, Siberia and north Russia, to which the name of Angaraland has been given. Either a southerly prolongation of the Tethys or a separate sea occupied the greater part of Burma, for we find Triassic coastal deposits along the Arakan Yoma; to the west of the Yoma was land which in all probability was continuous with the Madras area over what is now the Bay of Bengal.

Separation of Africa from Asia.—It was probably during the Permian period that an arm of the Tethys commenced to extend slowly southwards along the Red Sea over that portion of the Gondwana continent which now forms the eastern margin of Africa. Whatever its time of commencement may have been, we know that during the following Triassic period it had penetrated as far as the north of Madagascar.

Jurassic.—During the next period, the Jurassic, the face of Asia changed considerably and the old Gondwana continent began to break up. The sea-arm from the Tethys pursued its way to form the Mozambique channel, separating Madagascar completely (for a time at least) from Africa, and then seems to have expanded eastwards

to produce the southern and eastern parts of the Indian Ocean including the Bay of Bengal. The land connection between India and Madagascar was maintained still across the site of the present Arabian Sea. In some deposits along the east coast of Madras occur a few coastal fossils of Jurassic age, including an ammonite found in Madagascar and South Africa. This occurrence affords us a dim picture—amply confirmed by evidence from later deposits—of a free sea connection along a continuous coast from this part of India to Madagascar. The Coromandel coast and a large portion of the Indian Ocean including the Bay of Bengal, therefore, date from the Jurassic era. Meanwhile southern Tibet was occupied by the dwindled Tethys which still maintained its connection with the European sea. The Salt Range once more, as also parts of Baluchistan, southern Afghanistan and Persia, lay beneath this sea. In Burma sea and land seem to have changed places during this period, the Arakan Yoma forming a coast to the newly formed Bay of Bengal, while the eastern parts of Burma became land. This change was brought about by an E.–W. earth movement, initiating the N.–S. topography of Burma which has persisted to this day.

Cretaceous.—Of Cretaceous deposits we find patches along the east coast of Madras just as we do of Jurassic. From these younger beds, however, an extensive fauna has been obtained and this is identical not only with that of similar beds in Madagascar and South Africa but also with that of beds of the same age in the Shillong plateau of Assam, showing that the old Gondwana coast-line not only persisted from Madras to Madagascar but extended north-eastwards during the Cretaceous period as far as the Shillong plateau. In the north the Cretaceous period was characterized by an extension of the sea over a large part of Tibet, but the southern shore still remained close to the present Indo-Tibetan frontier, as the coastal nature of the south Tibetan Cretaceous deposits shows. The presence of this sea can be identified along the northern frontier of Sikkim.

Deccan Trap.—Towards the end of Cretaceous times there commenced a period of disturbance and earth movement which brought about further striking changes in the geography of Gondwanaland. A movement from the north caused the recession of the already dwindled Tethys from Central Asia, and initiated the Himalayan chain and the Tibetan plateau along the northern coast of the continent. At the same time a continuation of the movement from the east elevated the Shan plateau and raised the Arakan Yoma above the level of the sea. These movements in their early stages were

accompanied by the outpouring of floods of basaltic lava on a colossal scale. This lava, the Deccan Trap, was ejected through fissures in the Earth's crust and issued in such quantities that the relics to-day, after millions of years of denudation, cover over 200,000 square miles in the Bombay Presidency, Hyderabad, Berar and the Central Provinces and Central India. Since the eruptions took place along the flank of the Aravalli watershed, they did not seriously disturb the drainage scheme of the area.

Early Tertiary.—During early Tertiary times the slow rise of the Himalaya along the Tethys coast produced along its southern flank a gulf which extended as far south-east as the meridian of Lansdowne. At its north-western end it curved southwards to enter the Arabian Sea which was formed about this time in the following way. As a result probably of earth movement, a large block of Gondwanaland west of what is now the Bombay coast was broken off and submerged beneath the waves. The age of the Malabar coast and the Arabian Sea is, therefore, probably early Tertiary ; some small coastal deposits near Quilon with early Tertiary fossils confirm this. The straightness of this coast-line and its lack of indentation are due to this fracture or faulting and to its comparatively recent age. The same cause brought about the truncation of the Aravalli drainage, and for this reason all the important rivers of Madras and Southern Bombay are easterly flowing and rise within a few miles of the west coast ; they are in fact but the lower portions of older rivers which rose in the old Aravalli watershed further west. The disjunction of the submerged part of the continent was assisted by faults in other directions ; one of these seems to have coincided with the southern boundary of the Kathiawar Peninsula and to have initiated the Narbada, the middle section of which has an unusually straight course. The Eocene or early Tertiary epoch along the Indo-Tibetan border was one of great volcanic activity, beginning with an intrusion of granite into the rocks of southern Tibet. Afterwards there followed the outpouring of basic lava in Ladakh, Ngari Khorsum and western Tibet. This volcanic phase seems to have culminated in the region around Lake Manasarowar.

Petroleum Deposits.—In the early Tertiary gulf of the Punjab were accumulated the petroleum deposits which are now being exploited in the Pindigheb district. Similar gulfs, in which petroleum deposits were formed a little later on, were also produced further east, one passing up into Assam from the Bay of Bengal, and the other up what are now the Irrawaddy and Chindwin valleys. Thus

originated the Digboi oilfield of Upper Assam and the rich oilfields of Yenangyaung and Singu in Burma.

Initiation of Rivers.—As the Himalayan chain continued to rise, the gulf along its base became silted up and gave place to a river, the lower section of which coincided with part of the modern Indus. The gulf in Burma also silted up and was also replaced by a river coinciding with the present Irrawaddy and its chief tributary, the Chindwin. This old Chindwin-Irrawaddy river is thought to have been continuous with the Tibetan part of the Brahmaputra, the Tsangpo, which was subsequently captured by the backward cutting of the Brahmaputra proper, i.e., the Assam Brahmaputra. The compressional movement which piled up the Himalayan chain produced a deep trough in front of it which was simultaneously filled and is still being filled with river sediments. The movement is, in all probability, still persisting and the Himalaya still rising.

Himalayan Gorges.—The great depth and steepness of most of the Himalayan gorges are witnesses to the recent nature of the uplift. The position of the longitudinal gorges may be looked upon as having been determined in nearly all cases solely by the presence of a more easily eroded band or rock. Like the transverse gorges they are the result of denudation. They do not normally occupy the troughs of the folds ; in fact they are more likely to have been initiated along the arches or crests which would split open to the weather more than the troughs as a result of the folding movement. The transverse drainage was initiated when the Himalayan region first rose from beneath the Tethys Sea. The deepening of these transverse valleys kept pace with the uplift of the range and its plication. As the uplift increased so did the speed of the transverse rivers and consequently their power of erosion. The effect of the upheaval was merely to make them bite the deeper into the rocks along their beds. That is why the courses of so many of the Himalayan rivers run right across some of the loftiest ranges, one after the other, the reason being that the rivers were there long before the ranges reached their present altitudes. To affect the course of a river, uplift or depression would have to be comparatively rapid. An earthquake, a landslip or the ejection of volcanic material would be likely to produce far greater changes than the slow diastrophic uplift of even such a mighty mass as the Himalaya, which, though it has attained an average altitude of something like 19,000 feet above the Ganges plain, has taken something of the order of six or seven million years to do it in.

A JOURNEY FROM YARKAND TO THE KARA-TASH.

F. WILLIAMSON.

IN THE summer of 1928 I made a long official tour from Kashgar to Yarkand, Khotan and Kerya. It was a great mistake to go in summer, as the maximum daily temperature was usually over a hundred degrees and no facilities for keeping cool, such as *punkhas*, exist in Chinese Turkistan. At the beginning of July I was back in Yarkand and, in order to get cool as much as to escape for a time from my work and official entertainments, I decided to cross the Kizil-tagh, or "Red Hills," and to spend a few days with Sherriff, the Vice-Consul, at Kaying-bashi, the "Happy Valley," which was discovered by Skrine in 1922.*

On the 8th July I left Yarkand and crossed the Kizil-tagh to Kichik Karaul in the Kin-kol valley, by the same route as that followed by Skrine in April 1923. Most of the baggage was sent to Kashgar by the main road and I only kept seven pack-ponies. The first three marches were hot and arid, and it was a great relief on the fourth day to get into real hills and among Kirghiz in the higher portions of the Kizil-tagh. I shall not describe this part of the journey, as it is impossible to improve on the description given by Skrine.†

Between the valleys of the Kin-kol and the Kara-tash there is a tract of country marked on maps "unexplored," and in order to reach Kaying-bashi by a direct route it was necessary to cross it. Kichik Karaul is a tiny village of three or four houses at a height of about 6700 feet and, although the inhabitants were quite friendly, they professed to know very little about routes to the Kara-tash valley. One man told us that it was a single day's journey to Khan Terek, while several others said it was four marches, that ponies could not use the road, and that it was only passable by yaks. A *chaprasi* was sent five miles down the valley to bring the local *yuzbashi* or

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* An account of Skrine's explorations appeared in *Geographical Journal*, Vol. LXVI, pp. 385 *sqq*. See also his book, *Chinese Central Asia*. Kaying-bashi is situated in the Kaying Jilga, a tributary of the Kara-tash, one of the peripheral valleys of the eastern Pamirs (Survey of India Map 42N).—ED.

† *Chinese Central Asia*, pp. 129-131.

headman. When this worthy arrived he said it was an easy three marches.

About two hundred yards to the south of Kichik Karaul a broad stony valley, the Ordalung Jilga, leads westwards into the unexplored tract, which seems to be known generally as the Ordalung-tagh. We left Kichik Karaul, accompanied by the *yuzbashi*, at 8 A.M. on the 13th July. The Ordalung Jilga was about eight hundred yards wide at its mouth and very stony. After three or four miles we passed one or two deserted Kirghiz crofts and a good many *toghraks* or desert poplars. The valley then closed in and varied in width from one to three hundred yards; bare, brown waterless hills towered above us on either side. After about nine miles the valley again opened out and we camped at half-past eleven on a beautiful grassy plain at a height of 8756 feet. At this place, which was known as Chat, there were two deserted houses, while a few ponies were grazing near them. At this point the valley divides, the main Ordalung Jilga continuing westwards, while a shorter steeper valley, known as the Achik-su Jilga enters from the north. The *yuzbashi* appeared unwilling to commit himself by declaring which valley we should take to reach the Kara-tash, but he finally decided we should take the Achik-su Jilga. Late in the evening, however, a man named Said Akhun, whom we had found useful at Kichik Karaul, joined us. His verdict was that we should on no account go by the Achik-su Jilga, but should follow the Ordalung, which would lead us to a pass, called the Kizil Dawan, which, though not easy, was passable by ponies, while we could get yaks a little further up the valley to help with the loads. On the other hand, the Achik-su route was very difficult, only passable by yaks, and would entail the crossing of five passes.

The *yuzbashi* seemed so unreliable that we decided to take the advice of Said Akhun. The uncertainty and obstruction which we met is quite usual when one tries to cross country which has not been entered before by Europeans. Skrine encountered it when he first made his way to Kaying-bashi in the autumn of 1922. As soon as the Kirghiz get to know one and realize that one has no ulterior designs, they become quite friendly. On the 14th July we started up the Ordalung Jilga from Chat at a quarter to seven. It rained heavily in the morning and rained or hailed at intervals during most of the day, which was very unfortunate, as it became almost impossible to take satisfactory photographs. For five miles the track was easy and led up a very pleasant valley, the sides of which

were rocky and precipitous, but had patches of grass here and there. A small clear stream flowed rapidly at the bottom. We then came to a terribly steep and narrow gorge, up which there was no track, and of which the bottom consisted entirely of stones, usually the size of a man's head. At the foot of the gorge we found a couple of Kirghiz felt tents or *akois*. The people seemed afraid of us and at first refused to hire us their yaks; but by leaving a *chaprasi* and the *yuzbashi* behind and going on myself, nine yaks were quickly produced and to these the kit was speedily transferred.

After ascending the gorge for about two miles we came to a place whence we could see two *akois* perched on a grassy hill high above us. We therefore left the gorge and climbed the almost vertical grass slope towards them. This slope was intersected by sheep tracks, but owing to the rain it was very slippery and we were only able to climb it with difficulty. Through breaks in the clouds we had a wonderful view to the east down the Ordalung Jilga. As we arrived at the *akois* the rain turned to hail and it became very cold, but we were hospitably received by the old man and his wife, who gave us tea, "Devonshire cream" and bread.

To the west of this spot the country was steeply rolling and grassy, and was surrounded by forbidding black hills of slate and shale. After an hour's halt we climbed a steep grassy knoll, covered with snow and very slippery. From its summit we could see the Kizil Dawan straight ahead of us, apparently not much higher than we were. There were high mountains carrying a little snow to the south and south-west, and a small glacier lying in a high valley about three miles away to the south-west. The Ordalung Jilga was clearly visible to the east. The knoll was situated between two valleys, one half a mile to the south perhaps five hundred feet deep, the other the same distance to the north, perhaps twice as deep and with steep sides. The two valleys join at the place where we had hired the yaks.

From the knoll the track led down-hill to the south and south-west, across a broad grassy down about a mile wide, after which it turned north-west and ascended steeply for about 1500 feet to the Kizil Dawan. On the way we saw a number of snow-cock, which I failed to shoot. The ascent was not difficult, but as the height was 14,384 feet it was very tiring, especially as the weather was most unpleasant and the country covered in thick mist. I had hoped to be able to identify Kungur or some other fixed peak, but nothing of the kind was visible. To the north, the country looked arid and deeply intersected by valleys; as far as I could see, it looked as if any track

across it would be extremely difficult, and it is quite possible that Said Akhun's description of the Achik-su Jilga route was correct. At intervals, when the mist cleared slightly, I could see the plains of Kashgaria, but not for long enough to identify any known spot.

Continuing westwards from the pass we crossed a stony plain for about a mile and reached a second crest, after which the track dropped very gradually and the country became a very attractive rolling grass-land. We passed a pretty lake about a hundred yards in diameter, known as Köl-tuz, near which we saw hundreds of horses grazing. Here the ground was almost level and the higher hills receded to a distance. After a couple of miles of this plain, which is known as the Köl-tuz Yailagh, "the Summer Grazing ground of the Salt Lake," we reached the upper slopes of a broad grassy valley, whose waters drained into the Pitlik Jilga, a tributary of the Kara-tash. The valley appeared to have no other name than Köl-tuz Yailagh. The country was delightful, covered with grass, while steep mountains rose to the south. Large numbers of marmots were seen.

After a gradual descent of about a thousand feet we arrived at a point where a small tributary came in from the north and found three *akois* pitched on a level stretch of grass. Here we camped, having come about fifteen miles. The valley continued south-westwards, quickly becoming much steeper, and we could see a point, perhaps a mile away, where the pines began. Here at our camp at 12,970 feet, we were too high for them. The Khirghiz were somewhat startled at our arrival, but quickly became friendly and provided us with milk and mutton. Presents of cheap jewellery were much appreciated by them. The temperature dropped at night to 34° F. and it seemed very cold after the heat of the plains.

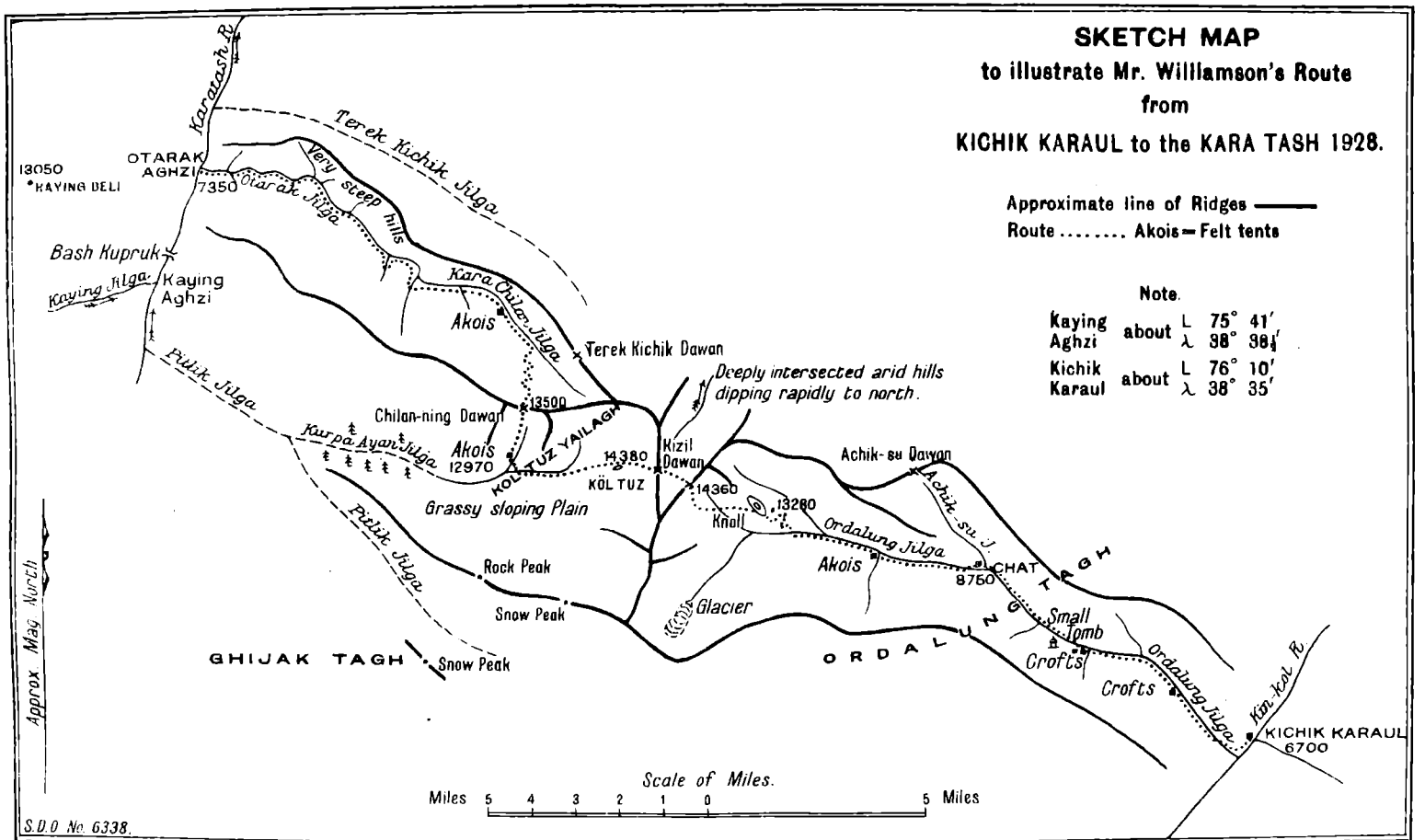
The next day, the 15th July, the weather was much better, although there was still a good deal of mist at times. I had hoped to follow the main valley into the Pitlik Jilga and to cross the Kara-tash river somewhere near the junction of the two. I was told however that this was impossible as there was now too much water in the Kara-tash. We therefore turned northwards for about a mile and a half, and crossed an easy pass of 13,500 feet, known as the Chilanning Dawan. On the north of this pass the country dropped very steeply to the Kara Chilan Jilga, and an even steeper track led up the other side of the valley to the Terek Kichik Dawan. From here one could reach the Terek Kichik Jilga, down which an easy track was said to lead the Kara-tash river. The Kirghiz with me wished me to

take this route, but I preferred to follow the Kara Chilan Jilga and see where it debouched into the Kara-tash.

The Jilga was very steep, stony and winding. We passed four *akois* near its head, but found no sign of habitation or cultivation from there until we were within a mile of its junction with the Kara-tash, where were a few fields and one or two deserted crofts. The lower part of the Jilga is known as the Otarak Jilga, and we reached its mouth soon after one o'clock after a march of about twelve miles. The Kara-tash river, which was three or four feet deep and swift, is here at about 7350 feet and is shut in by dry, brown and extremely steep hills. It took us two hours to get the baggage across, the Kirghiz constantly remarking that it would have been much better to have come down the Terek Kichik Jilga, which joins the Kara-tash a mile or less further down to the north. We camped in a grove of desert poplars and willows on the left bank.

The next day we had hoped to reach and camp at Kaying-bashi and were much looking forward to spending a week or so among pine-forests and friendly Kirghiz before returning to the heat of Kashgar. We followed the left bank of the Kara-tash for about a mile to the south, passing an interesting bridge at Bash Kupruk, which is only passable for foot-passengers and consists of parallel trunks of poplars roughly tied together, with no cross-pieces at all. We then ascended the stony bed of the Kaying Jilga for three hours until we sighted junipers and pines. Here we were met by a man with a prong gun, who was shooting *chikor* and was apparently looking for us. He told me that Sherriff had left Kaying-bashi the previous day after receiving a letter from Kashgar, and that he had left a note for me at Kaying-bashi. I wondered what could have happened. We went on another three miles to Kaying-bashi. The country was perfectly lovely, great snow mountains and pine-trees, but it continued to rain heavily and the view was usually blotted out by mist. The local Kirghiz were most friendly and hospitable and seemed to be really delighted to see me. Their attitude was a great contrast to that of the Kirghiz in the Ordalung Jilga, who evidently did not wish me to enter their valley.

I stayed at Kaying-bashi an hour and a half before the man to whom Sherriff had given his letter appeared. From this I learnt that the Governor of the province had been murdered at Urumchi and that Sherriff was hurrying back to Kashgar, intending to do the five marches in a day and a half. It was impossible to say what political complications would result from the murder, or indeed what


SKETCH MAP
to illustrate Mr. Williamson's Route
from
KICHIK KARAUL to the KARA TASH 1928.
Approximate line of Ridges
Route ..... Akois = Felt tents
Note.
Kaying Aghzi about L 75° 41′ λ 38° 38½′
Kichik Karaul about L 76° 10′ λ 38° 35′
Karatash R.
Terek Kichik Jilga
13050
KAYING DELI
OTARAK AGHZI
7350
Otarak Jilga
Very steep hills
Bash Kupruk
Kaying Jilga
Kaying Aghzi
Kara Chilan Jilga
Akois
Terek Kichik Dawan
Deeply intersected arid hills dipping rapidly to north.
Pilik Jilga
13500
Chilan-ning Dawan
Kurpa Ayan Jilga
Akois
12970
KOL TUZ YAILAGH
14380
KÖL TUZ
Kizil Dawan
14360
Grassy sloping Plain
Knoll
13280
Achik-su Dawan
Achik-su J.
Ordalung Jilga
Akois
CHAT
8750
Pilik Jilga
Rock Peak
Snow Peak
Glacier
Small Tomb
Crofts
Crofts
Ordalung Jilga
Kin-kol R.
KICHIK KARAUL
6700
GHIJAK TAGH
Snow Peak
ORDALUNG TAGH
Approx Mag North
Scale of Miles.
Miles 5 4 3 2 1 0 5 Miles
S.D.O. No. 6338.

complications had caused it. So I immediately turned back and followed the road by which I had come. After going three miles I met the baggage and we crossed the Chopkhana pass into the Chopkhana Jilga to the north, and pushed on to Kurghan in the Kara-tash valley once more, some eight or ten miles below the point where I had left it in the morning. The Kirghiz, both at Kaying-bashi and at Kurghan, could not have been more friendly. They remembered the Skrines with the greatest affection and constantly expressed their pleasure at receiving visitors from the British Consulate. Mrs. Skrine had made herself particularly popular with the Kirghiz ladies.

The next day I left very early. It was a bright sunny day with weather that would have been much appreciated on the three previous days. But now the lower part of the Kara-tash valley was very hot and trying. To avoid the river, which was too deep to ford, we crossed a continual succession of most unpleasant arid hills, where the air was like a furnace. We left the kit behind to follow us slowly and bivouaced that night in a disused garden near Tashmalik, reaching Kashgar the next morning.

Perhaps before closing my account of this journey I should make it clear that the track from Kichik Karaul to Otarak Aghzi is only open in summer, probably only from July to September. The only really difficult part is the ascent to the Kizil Dawan, which we would have found almost impossible for the baggage, if we had not been able to supplement our transport by hiring yaks.

NOTES ON THE WESTERNMOST PLATEAUX OF TIBET.*

DR. EMIL TRINKLER.

(*Maps at end of volume.*)

DURING the expedition I undertook in 1927-28 I twice crossed the high mountains separating the upper Indus valley from the Tarim Basin of Chinese Turkistan. As the ranges were crossed on two different lines we were able to study two different sections right across this part of Central Asia. This was very important for the geologist of my party, Dr. Hellmut de Terra, who consequently formed a good idea of the geological history of this part of our globe.

The main aim of my own researches was to investigate the former glaciation of these regions during the Ice-Age. Professor Dainelli, the geologist of De Filippi's Karakoram expedition, has proved that there was at one time extensive glaciation of the regions of the upper Indus valley and Baltistan† and the question that interested me was whether the westernmost Tibetan plateaux and the Kun-lun mountains had also been covered by ice and snow.

My expedition started from Leh, crossed the Chang La on the 16th July 1927, spent some days on the western shore of the Pangong Lake and arrived at Phobrang on the 28th July. This route has been described before, so I need say little about it. I may, however, call attention to a few observations of mine which tend to show that these regions were once completely buried by ice and snow during the Ice-Age. After crossing the Chang La, for instance, the traveller generally pitches his tents on the shore of the small lake of Tsultak. This lake has been dammed up by a moraine-wall which shows that a

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* I have retained the title "Westernmost Plateaux of Tibet," because geographically the Lingzi-tang and Aksai-chin are Tibetan, though politically they are situated in Ladakh. The areas described are shown on the Survey of India reconnaissance maps 52 F, K, J, M, and N. An extremely interesting summary entitled "The Ice-Age on the Tibetan Plateau and in the Adjacent Regions," collecting the results of all previous travellers together with his own conclusions, was written by Dr. Trinkler and published in the *Geographical Journal*, Vol. LXXV, pp. 225 *sqq.* (March, 1930). A brief notice of a valuable paper by Dr. de Terra appears in the Review Section of this *Journal*.—ED.

† G. Dainelli: *Studi sul Glaziale*, 2 vols. Bologna.

glacier, descending at some time from the Chang La, ended at this spot.

Again, I am convinced that the present form of the Pangong Lake itself owes its origin to glacial action, although the big longitudinal valley, in which the fjord-like basin of the lake is now embedded, is due to tectonic disturbances. My companion, Dr. de Terra, can show that two large faults run along the shores of the lake, one on either side.

A former higher water-level can be traced nearly everywhere. At the westernmost end of the lake there are clay deposits covered with moraine-debris, a fact which proves that these clays were laid down before the last glacial advance. Such a lake-period has been shown by Dainelli to have been in existence before the last glacial period in other parts of the upper Indus valley. The extensive stratified clay deposits in the Tankse-Drugub (or Durgu) valley also belong to this period.*

The enormous boulder-deposits which stretch between the western end of Pangong Lake and the small village of Phobrang are another point of interest. These can be nothing else than moraine-deposits which must have been brought down by glaciers descending the valleys from the Marsimik La and Keptung La, which no longer exist.

After leaving Phobrang we entered the absolutely uninhabited regions of the great plateau. Only very rarely do *Changpas*, the nomad herdsmen, lead their flocks of sheep and goats to the lonely grazing-grounds north of the Marsimik La. As we were likely to meet nobody for two or three months, we had taken all provisions for this period for ourselves, our ten Tibetan coolies and our two Indian servants. I knew that Captain Biddulph had crossed these high plateaux with sheep as transport-animals,† and that sheep could stand the hardship of such a journey much better than ponies. My caravan therefore included 70 sheep besides 31 yaks and our riding ponies. We next traversed the upper Chang-chenmo district, which is fairly often visited by sportsmen. Future travellers may be interested in the following notes about the geology and morphology of this region.

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* In a scientific work, which I hope to publish before the end of 1931, I shall indicate all the data about the Pangong Lake, and I shall review the different ideas which have been postulated about the origin of that lake-basin.

† Trotter and Biddulph: *Report of a Mission to Yarkand in* 1873. *Calcutta*, 1875. Chap. VII, and Geog. App. G. Route III.

When traversing the big gravel-terraces to Chor-Kangma below the Marsimik La, near the junction of the Lungser valley with the Lunkur valley, the track leads along big moraine-deposits. The Lungser is a hanging valley, and on the slopes of the mountains, rising to the south of the Lunkur valley old valley-bottoms may be seen.

An interesting field for morphological study is the mountainous region lying south of the Chang-chenmo. I paid a visit to the Togum Tso, a small lake lying in the mountains due north of Phobrang. Like the Tsultak lake the Togum Tso has been dammed up by a moraine-wall. Beautiful hanging valleys can be studied in this region, while many mountains are capped by an absolutely flat plane of denudation, which in its first origin certainly dates from pre-glacial times. The country north of the Marsimik La also shows traces of its former glaciation. A trough-like valley can be seen above Spanglung where the upper Rimdi river often flows in a deep gorge cut into the old valley bottom. Needless to say that in these regions, which were formerly much more glaciated than nowadays, large firn-reservoirs or "cwms," can be seen everywhere.

The valleys here are also filled deeply with gravel-deposits, often cut into two terraces. In the area between the Rimdi river and the Chang-chenmo there rise some beautiful snowy peaks. The topography is not quite clear. On the old reconnaissance map of the Survey of India (No. 52J) there is marked a snowy peak (Pk. 26/52J),* which, as far as I could make out, is identical with the one shown in the illustration.

From a geological point of view this region is interesting. Dr. de Terra can prove that a big fault runs along the Chang-chenmo river. Here the Palæozoic, Triassic and Jurassic rocks of the Karakoram are separated from older Palæozoic rocks by this big and important zone of rupture. The hot springs of Kyam are directly connected with this fault.

Further to the east we entered the hunting-grounds of Deasy and Rawling. The colours of the landscape were beautiful. Especially remarkable are the deep red sandstone mountains, probably of Tertiary age, and the greenish crystalline schists and light red cliffs of Jurassic age. My plan was now to try and reach the Lingzi-tang plain from a place called Shum on Deasy's map, but we moved on until we reached the region that must be the Tomar of his

* *Triangulation Pamphlet* 52 I and J. Dehra Dun, 1925, p. *ii*.

Photo. W. Bosshard.

PEAK 26, CHANGCHENMO, (SHEET 52 J).

map. Here we had a beautiful view of the marvellous glacier-crowned range bordering the large longitudinal valley which leads from the Lanak La (18,000 feet) to the east. The glacier-type here is extraordinary. The glaciers are creeping down from the mountains like big tongues, which often, but not always, enter the main valley. They show a type distinct from those of the Karakoram and of Turkistan. With great sheets of ice they bury the mountains, often having an inconsiderable area from which their ice is fed. The formation of such glaciers in a region which is said to have a more or less continental climate is rather a puzzle. Either the precipitation is greater than we suppose, or we can perhaps recognize in these big glaciers the last remnants of those of the Ice-Age.* Only if we have more observations at our disposal will we be able to say more about the origin of the Tibetan glacier-type.

From this side the ascent of the Lingzi-tang was easy. Once having reached the edge of the plateau we had to wend our way for two days amongst red and greenish hills. We discovered there two small beautiful lakes and on the 21st August reached the absolutely flat clayey and sandy plain of the Lingzi-tang. The first Europeans who visited these desolate regions were the Schlagintweits (1857), Johnson (1864-5), and Hayward, as well as members of the Yarkand Mission. † They discovered the easy passes leading from the Changchenmo valley to the plateau. These passes are known as the Chang-lung-barma and the Chang-lung-yogma; both were used by the members of the Yarkand Mission, and lie some fifty miles or more to the west of our route. While the journeys of all these explorers led more or less from south to north, Crosby, Hedin and Dainelli crossed the northern rim of the plateau in an east-west direction. ‡ The Lokzung mountains separate the Lingzi-tang plains from the "Soda Plains" of Johnson, which are called the "Kuen Lun

* I noted this same curious type of glacier north of the Muztagh range and called them "Saddle Glaciers." The type was most remarkable on the Aghil-Depsang, where the glaciers rested on the surface of the plateau and were certainly the remnants of a much more extensive glaciation, resting on an older plane of denudation composed of loose stones, mainly silicious brecoia. Young valleys were being freshly cut in the old denuded material (*Records, Survey of India*, Vol. XXII, pp. 88 *sqq.*).—Ed.

† Schlagintweit, H., *Reisen in Indien und Hochasien*, Jena, 1880, Vol. IV, p. 229; Johnson, W. H., *J.R.G.S.*, Vol. 37, 1867; Hayward, R., *Journ. Geog. Soc.*, Vol. XII, 1870.

‡ Drew, F., *The Jummoo and Kashmere Territories*, 1875, p. 344; De Filippi, F., *Himalaia, Caracorum e Turchestan Cinese*, 1923, p. 365.

Plains" by Drew. To the north-east the Lingzi-tang is bordered by a range of reddish mountains, which separate it from the broad Kun-lun valley bearing in this region the name of Aksai-chin.

Generally speaking, the ranges and mountains rising here and there on the plateau consist of Jurassic and Cretaceous rocks. Especially the white hippurites limestone and the red Tertiary sandstone form bright steep-sided cliffs which are very characteristic. The big table-like surface of these plateaux is covered with sand, clay and salt deposits. Johnson has already pointed out that these thick layers of salt must be the last remnants of big lakes which have been desiccated, while Drew has given more details of these ancient lakes.

From Shum my caravan marched to the lake marked some twenty miles to the north-north-west and called Sarigh-Jilganing Köl on the Survey of India map. It is still a puzzle to me who invented this name, because before my expedition no European had ever visited it. Perhaps some members of the Yarkand Mission saw the large blue sheet of water in the distance. They may have been told by their followers that this was its name. It means " the Lake of the Yellow Valley," which is not inappropriate, for the old lake-deposits and beach-lines are of a deep yellow colour (see *sketch-map at end of volume*).

My explorations about this lake have absolutely proved that its waters must at one time have covered at least three or four times the area they do now. I did not visit its extreme westernmost end, but, from a high spur on the southern shore, I could clearly recognize the yellow clay deposits as far to the west as point 17,380 of the Survey map. I think the big Sarigh-Jilganing Köl must formerly have been connected with the salt-lake near Tso-tang, which we could see in the distance. To the east also the lake must have been much more extensive and was probably joined to the lakes situated on the Soumjiling plain. The beach-lines bordering this latter plain show that the Nopta Tso, the Tsaggar Tso and the Mangtza Tso formerly belonged to one large lake. The small threshold at the eastern end of the Sarigh-Jilganing is some 115 feet above the present surface of the lake.

I was also able to study the old lake-deposits. At the bottom of the sections that I examined I found a layer of drywater-plants. Similar deposits have been observed by Deasy on the shores of the Sagüz Köl in the upper Keriya Darya district.* These layers of

* H. H. P. Deasy: *In Tibet and Chinese Turkistan*, 2nd Ed., p. 184.

Photo. H. de Terra.

GLACIER-CROWNED RANGE SOUTH OF THE SOUMJILING PLAIN, W. TIBET.

plants are covered by a big layer of stratified clay. It is therefore very probable that after a period of shrinkage the lake again expanded and buried the older deposits under newer layers of clay. The highest level of the lake is also marked by a distinct beach-line cut into the face of the rocky islands and promontories rising on the northern and southern shores. On the Survey Maps the lake is marked as " salt " ; this is not so, the water being only slightly brackish, and there were at the time of my visit many water-fowl on it. A lower terrace has been scooped out of the yellow clays. Great broad valleys, almost entirely dried up when we saw them, lead down to the lake from the west and from the south. In order that future explorers may be able to estimate any shrinkage or extension of the lake since 1927, we built a rock pyramid, height two metres, at a distance of exactly 150 metres from the southern shore.

We now have to consider the belt of rough mountains separating the Lingzi-tang from the Aksai-chin. These are called the Lokzung mountains. Drew gives the following description of this range :

" Its length is sixty miles, its width from fifteen to twenty miles. It is a region of rocky hills with flat stony valleys between them."*

This description fits that section of the mountains we had to cross between the Lingzi-tang and the Aksai-chin. I must confess that I have rarely seen such utterly barren and desolate mountains. There is practically no grass and the only vegetation available for transport-animals is the occasional *burtsa*. I fixed on my plane-table a large number of peaks rising from this range, amongst which I must mention that very remarkable peak (Pk. 1/52 M), height 21,040 feet, reproduced in Drew's book on page 343. This peak is visible from several points and I observed it again on my return journey via the Karakoram.

Amidst these Lokzung mountains there are broad gravel-filled valleys containing here and there small springs of fresh water. Disintegration is going on rapidly and the mountains are buried below the decomposed rocks. Huge fans and talus-slopes are to be observed everywhere. At several places the slopes show shoulder-like steps—certainly the remnants of ancient valley-bottoms. The big broad valley descending to the Aksai-chin from the snow-covered peaks north-east of Sarigh-Jilganing Köl was in its upper portion certainly glaciated during the Ice-Age. A section across its upper end shows the typical U-trough form, and old shoulders can be traced along the slopes of the mountains bordering the valley. Right across it there

* Drew : *Jummoo and Kashmere Territories*, p. 342.

has been at one spot a moraine-wall. These are certain indications but generally the rocks are so much disintegrated here that any trace of former glacial action has been destroyed.

There is no question to my mind that ice has covered these plateaux with one large sheet. Prinz has recently in his book on the glaciation of the Tien Shan and of the Kun-lun shown that the plateaux of the eastern Pamirs also were completely covered by ice during the Ice-Age.* So also the great glaciers of the Tibetan mountains, whose tongues even to-day often reach the broad valley-like plains, were during the Ice-Age united into extensive ice-sheets covering those plains and plateaux. We need not be astonished that we do not discover on the Tibetan plateau, so far as it is without outlet, any typical through-shaped valleys which can be compared with those of the Alps. The pre-glacial dissection and erosion did not affect the Tibetan plateau very much, or if it really took place, the valleys were afterwards filled up with detritus and gravels. We know that those beautifully scooped-out glacial troughs, that we see elsewhere, can only be formed in regions where pre-glacial erosion had already excavated deep valleys. Therefore we meet these trough-valleys in the peripheral regions of the Tibet plateau.

I should like only to mention here the Pangong basin. In the form of big sheets the ice must have covered the great plateaux and mountains. After the ice had melted, few traces of the former glaciation were left in these central regions, because the strong insolation quickly destroys the rocks, and the detritus then fills the valleys. The traveller very seldom succeeds in finding glacial striæ. Sven Hedin points out that probably even old moraine boulders may have been totally destroyed in these regions by insolation and corrasion. I have myself seen in the moraine deposits near Phobrang, as well as near Suget Karaul, big boulders from which only the outer crust was left. So it is not easy to discover traces of former glacial action in these regions. The best we can do is to look for moraine-deposits, the presence of hanging valleys and old shoulders, and for a broad concave form to the valleys themselves.

We made a comparatively long stay on the shores of the Aksai-chin lake. The mountains bordering the broad Kun-lun valley in the south are covered with grass, especially to the south of the Aksai-chin valley. This is contrary to what might be expected from Sir Aurel

* Prinz: *Ergebnisse der Forschungsreisen durch Innerasien*, 1928.

Stein's experience on the southern slopes of the Kun-lun, where he had the greatest difficulty in obtaining any grass at all for his pack-animals.* A beautiful fresh-water spring, probably situated on a fault-line, yields plenty of clear water to the south of the lake. Like all the others of the Tibetan plateau, the bitter lake on the Aksai-chin is shrinking steadily. Old clay deposits give an idea of the former extension of the lake. The big Kun-lun valley running from the Yeshil Köl to Lake Lighten and the west follows a large fault. White quartz veins crop out here and there alongside the mountain-slopes, and silicious material is intruded along the zones of rupture. When skirting the Aksai-chin lake I discovered a considerable stream running into the lake from the east. On the slopes of the mountains bordering the Aksai-chin on the south old valley-bottoms occur ; corresponding terraces were seen on the southern slopes of the Kun-lun.

We crossed the mountains to the west of the Aksai-chin lake at a point south of Sir Aurel Stein's route. They are deeply disintegrated here and there is no water at all. The valley, from which the nullah leading to the Khitai Dawan is tributary, is dammed in its upper part by enormous moraine-boulders. Likewise this tributary leading to the Khitai Dawan and the one descending the other side of the pass to the west were formerly glaciated. This can be proved by the presence of old rounded shoulder-like terraces on both sides of the valleys. And further down, enormous deposits of morainic-boulders stretch across the upper Kara-kash valley near Haji Langar.

In order to reach the Tibetan plateau from the upper Kara-kash, it is not absolutely necessary to go by the Khitai Dawan. There is another fairly easy route which is covered by many salt lakes. Owing to considerable losses amongst our yaks I had to leave behind on the Aksai-chin a good deal of baggage and to send back a caravan from Suget Karaul to fetch it. This caravan took the alternative route, which I believe has been followed by no other European except Schlagintweit. The members of the Yarkand Mission crossed the Khitai Dawan. Drew's description of these Kun-lun plains is so good that I need say no more about them. He seems to me quite right in his statement that at one time they were covered by a large inland lake which has gradually grown smaller.

When wandering through the Kara-kash valley I was able to fix several peaks of the Kun-lun range. I could write much of this valley, but here I need only point out that at the lower ends of many of the

* Stein: *Ruins of Desert Cathay.* London, 1912, Vol. II, Chapter XCIV.

tributary valleys there are terminal moraine accumulations. The polished rock-terraces with the appearance of *roches moutonnées* on the southern side of the valley tend to show that the combined ice-streams, fed from the snow-reservoirs of the Kun-lun in the north and from the plateaux-regions of the south, once united in a large glacier-stream which found its way by the Kara-kash valley downwards.

My explorations in the Kun-lun also indicate that this range was covered by big glaciers during the Ice-Age. At the maximum extension of the ice the glacier-tongues stretched down to 9200 feet on the northern slopes. I therefore conclude that it is highly probable that during the Ice-Age the whole mountainous region, from the Kun-lun mountains in the north to the Himalaya in the south, was buried under ice. It seems likely to me that during or perhaps after this glacial period a general uplift of mountainous Central Asia occurred, for everywhere in the peripheral regions, in the Kun-lun as well as in the Himalaya, the rivers, which frequently have cut for themselves deep gorges, show signs of heavy "working erosion" everywhere.

IBEX GROUND NEAR THE SIACHEN GLACIER.

(Being Extracts from a Diary written in 1909.)

LIEUT.-COL. O. L. RUCK.

IN May 1909 I went up the Nubra valley to the Siachen glacier; and I give these notes and extracts from my diary in the hope that they may be of use to sportsmen who wish to try their luck in those parts. I believe that no better ground for ibex can be reached on a two-months' shoot.

17*th May.* Marched from Leh and camped under the Laswan La. The Khardung La is still impassable, and up to now no party has yet crossed the Laswan La this year.

18*th May.* Crossed Laswan La (about 16,400 feet): Joined by a dozen Ladakhis, who came over with us. Heavy snow. Camped at Digar. Quite warm.

19*th May.* Marched to Kharchar, about 16 miles; very sandy and hot. Forded Shyok twice, 2½ to 3 feet of water. Passed Tsati, 2 P.M.

20*th May.* Left Kharchar 6 A.M. Thirit 8 A.M.; changed yaks to ponies. Panamik, 8 P.M. A hot, sandy march, over alkali plain. Welsh terrier's feet got blistered and we had to carry him in a basket.

21*st May.* Marched from Panamik 7 A.M.; passed Arunu and Kimi; changed ponies at Arunu; reached Zongsa, 4 P.M., passing the big moraine at the entrance to the Saser route.

22*nd May.* Marched up to Laguyok, fording the Nubra three times; passed a *Gompa* with yellow-capped Lamas—the last habitation up the Nubra. Formation after *Gompa*, 1000-ft. cliffs straight up each side of Nubra bed. Saw 4 male ibex.

23*rd May.* Saw several herds, nothing big; four with horns over 40 inches and one very old male with no horns.

24*th May.* Marched up to the head of the Nubra valley and camped under the snout of the Siachen glacier, under a cliff on right bank. Went about a mile up the glacier, but found ground near snout most promising. At the snout, on left bank, immediately opposite my camp was a grand-looking amphitheatre, about 1500 yards wide, and a mile and a half deep—very good grazing, water, ice, snow and precipitous peaks to take cover in, all handy. I called

it the "Punchbowl" from its shape. A "Punchbowl" cut in half vertically describes it, the back of the bowl being a mass of 22,000 to 24,000-ft. peaks, on the other side of which is the Rimo glacier.* Spotted a herd with 14 bucks in evening from camp. Estimated two heads at over 45 inches; visibility poor.

25*th May*. Crossed the Nubra with three ponies, blankets and grub and two men. Found a nasty ford about 50 yards below the snout. The stream flowed from underneath the snout, which was 15 to 20 feet high, black and dirty, and seemed to be in retreat. There were two separate channels, each being about 50 yards wide, with 50 yards between them; depth anything from 3 to 10 feet; bottom consisted of boulders as big as a cow—one or two seemed to be the size of a cottage; current about 8 miles an hour; Nubra bed 300 yards wide.

We crossed over and into the "Punchbowl" fairly easily. Found yesterday's herd about 600 feet up. Shot a good head 47¼ inches, and saw three more, one about the same and two bigger. I put them down at close on 50 inches.

26*th May*. Up the "Punchbowl" looking for yesterday's "big three." At midday, from about 1000 feet up, I looked at the camp across the river-bed, and could see through my glasses that the stream was now a swift-foaming torrent in a single main channel, although at 8 A.M. it was as we had crossed it yesterday.

My companion, a Takza man, and I did not take long to descend that thousand feet, meeting on the way the other Arunu man who—stout fellow—had loaded up the ponies and come to find us. There was no way out of the "Punchbowl" except across the river. We were in a *cul de sac*, so we each put our arms round the neck of one of the little Yarkandi ponies, and half swimming, half scrambling and floundering, they took us across to a point on the opposite bank about 200 yards below.

The stream was then five to fifteen feet deep, with a current of about 15 miles an hour, and about 200 yards wide. I take off my hat to the Yarkandi pony as being the toughest but one of God's transport animals—the first place, of course, going to the army mule.

Two hours later we should have been caught in the "Punchbowl." There was no apparent reason for the sudden rise, sky and temperature remaining unaltered.

* The map at that time was hopelessly inaccurate. No part of the Rimo glacier basin adjoins the "Punchbowl" watershed. The recent surveys of the Visser expedition show the topography correctly.—ED.

27*th May.* Marched down to Zongsa. Missed an ibex about 44 inches en route. Water increasing.

28*th May.* Up Zongsa nullah; rough going. Saw several herds—nine good heads—in evening; one 45 inches.

29*th May.* Up Zongsa nullah after a good head. Came up with him after a 4-hour stalk, but he bolted with a smaller one; and in the hurly-burly shot the smaller one, 40 inches.

30*th May.* Marched down to Arunu. Picked up a 39-inch head brought down by ice.

31*st May* to 2*nd June.* Marched up the Thulanbuti valley to Tutyailak to look for burrhel. Saw many but all small round the Thulanbuti. Went up to Mamostong glacier and saw several herds, one of 200 head. Saw nothing bigger than 24 inches, which I shot under the Mamostong.

3*rd June.* Marched to Panamik. Saw a herd of ibex in Zingmoche and shot a 45½-inch head.

4*th June.* Panamik to Thirit.

5*th June.* Thirit to Leh over the Khardung pass (17,600 feet). Marched 3 A.M.; reached crest of pass, 12 miles, at noon; Leh, 3-30 P.M. Yaks arrived in evening, having done very well, 24 miles with Khardung pass in the middle.

In the above extracts I have given notes from my diary from Leh onwards, but details of the journey from Leh to Panamik can be found in any good Kashmir guide-book. Distances are approximate, and where I have been unable to verify them, the names of places are as I jotted them down according to the pronunciation of the "locals."

It will be seen that the left bank of the Nubra is better for sport than the right. I only saw a few herds on the right bank and one or two pairs of horns brought down by the ice and snow. The difficulty is to get on and off the very best ground, which I have called the "Punchbowl," owing to the very heavy and sudden spating of the glacier stream. To avoid this difficulty as much as possible, the crossing of the range between Leh and the Nubra should be made as early as the passes are practicable.

The notes are twenty years old and several men must have been there since I shot over it for the first time. Nevertheless I believe that the "Punchbowl" will never be shot out, owing to the uncertainty of access. Even if the "Punchbowl" cannot be reached, there are good heads to be had lower down the valley.

SKI-ING IN KASHMIR.

M. D. N. WYATT.

MY WIFE and I recently spent the best part of seven months' leave in Kashmir, arriving there at the beginning of December 1929. During this time we did a considerable amount of ski-ing over country which from a ski-runner's point of view was unexplored.

The most popular form of ski-ing in Kashmir, and that which we first enjoyed, is obtained at Gulmarg during Christmas and the New Year. Of its kind it is excellent. The snow, at any rate up to about a thousand feet above the tree-limit, is at that season almost always perfect powder-snow, and, in this condition, for the large number of ski-ing enthusiasts who go to Gulmarg, it ensures a cheerful and pleasant holiday. The 'Xmas Gully, Lone Tree, Gadarene and Gully-Gully runs, all of which are in the immediate neighbourhood of Gulmarg, are first-class and equal to anything obtainable at an ordinary Swiss resort, while wood-running in general is much above the average. Winter is, however, not the best time of year for long expeditions, as the days are short, extreme cold at heights above 12,000 feet has to be reckoned with, and the snow at these heights is often wind-swept.

By the 10th January we were the sole survivors of the Christmas party. We were therefore obliged to leave Gulmarg, as the minimum number of people for which a hut could be kept open was five. Two days in Srinagar were more than enough as it rained and sleeted continuously; we therefore started off on the third day in our house-boat for the Wular Lake and remained there for nearly a month, enjoying excellent shooting and indifferent ski-ing. Most of the hills on the east side of the lake are steep and either too heavily wooded or too thickly strewn with boulders to be good for ski-ing, but the country above Baramula looked much more promising. Soon after we arrived, however, there was a very heavy fall of snow, so that, but for our ski, we should have been confined almost entirely to our house-boat for days on end with nothing to do. During this time we shot geese, duck, teal, snipe and chukor off ski; we also could have shot a Kashmir stag in the same way.

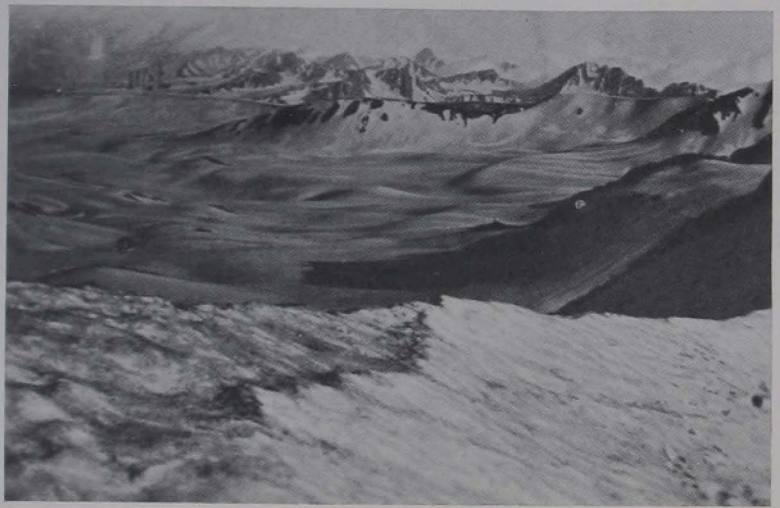


Photo. M. D. N. Wyatt.

LOOKING EAST TO PIR PANJAL RANGE FROM NEAR SHIN MAHINYO. 2 JULY.

At the beginning of March we again went up to Gulmarg, where we were joined by a number of fellow-members of the Ski Club of India. In the interval since our last visit there had been exceptionally heavy falls of snow and there must have been a depth of from twelve to fifteen feet on the golf-course—double the amount that falls in a good year in Switzerland. Spring conditions set in soon after we arrived and the sun became so powerful during the middle of the day that the snow became water-logged and soft ; it was then not only useless for ski-ing, but extremely liable to avalanche. We had to get up at about four o'clock each morning and close our ski-ing by about nine-thirty. The rather grim start for these early morning runs was more than compensated by the wonderful dawns and excellent ski-ing on the hard morning snow. Ski-ing in the cool of the evening, when the sun was leaving the snow, was not so satisfactory, for although down to the upper tree-limit conditions were excellent, the snow in the woods was slow in hardening and the last thousand feet were usually run on vile 'trap-crust.' April would probably be a better month on the whole.

During March three of us set out to climb Shin Mahinyo, which rises to 15,113 feet and is the highest mountain at the Gulmarg end of the Pir Panjal range. This expedition necessitated camping for two nights at Pajanpathar (10,800 feet), and some difficulty was experienced in persuading coolies to venture so far above the snow-line. However, eventually a party of coolies and a cook, in charge of a so-called *shikari* who knew the country, were sent from Gulmarg on the 18th March with instructions to prepare a camp at Pajanpathar.

At 7 A.M. the following morning Major Dyce, Captain Curteis and I left Gulmarg and proceeded via the Ferozpur nullah to Pajanpathar. This proved the most difficult part of the trip, for the sides of the nullah are precipitous and the bed was much obstructed by fallen avalanches. The snow-bridges over the stream after a light frost the previous night were far from secure, and two of them, in fact, collapsed under the party, fortunately with no more serious results than the loss of two sticks and much time. It took us about eight hours to reach Pajanpathar, where we found an excellent camp had been prepared among the trees. The snow had been dug away to a depth of several feet and the inner fly of a Whymper tent had been pitched in the hollow so formed on a deep layer of fir boughs, an arrangement which we found warm and comfortable. The coolies had made a lean-to shelter of fir-branches for themselves, and gathered round a large camp-fire, cheerful and comfortable.

Next day we left at 1-30 A.M., as soon as the moon rose. The snow being hard and easy to climb on foot, we took two coolies to carry our ski. After about two hours we reached Basam Gali, 12,200 feet, where Major Dyce, who was not well, decided to go no further. A long traverse caused us to gain height so slowly that at dawn we had only reached about 13,000 feet ; it was then discovered that our direction had been slightly wrong and a detour had to be made. The last two thousand feet are over a fairly steep open slope which is monotonous to climb but presents no technical difficulties.

The summit was reached at about 9 A.M., though actually the final pinnacle—somewhat less than a hundred feet—was not climbed, for without crampons the precipitous knife-edge leading to it would not have been safe. Nanga Parbat, Haramukh, Kolahoi and the Nun Kun filled the northern and eastern horizons, Apharwat and Hadbal the western ; the main backbone of the Pir Panjal range, with Tatakuti's prominent pyramid, completed the circle of peaks. It was a marvellous panorama of mountains, opening up enough ski-ing ground to keep the most enthusiastic runner busy for a number of seasons.

After about an hour's halt we began the descent. The first two thousand feet gave excellent running on Telemark-crust and it took us only 12 minutes to come down ; but the sun had been on the lower slopes by Basam Gali too long, so that soft slow snow was encountered here. Camp was reached two hours after leaving the summit.

The following day the party climbed to a height of about 12,000 feet and enjoyed a very fine run back to Tangmarg, mostly through the woods.

My wife and I left Gulmarg towards the end of March, and after a day in Srinagar collecting equipment, we started off on a shooting-trip to Ladakh. We came across the first snow in the Sind valley some miles below Sonamarg and from there as far as Kargil—some sixty-seven miles—we relied entirely on our ski. When we arrived at Kargil we found that there was snow almost the whole way to Leh, and by then we were so sick of it that we changed our plans turned left-handed down the Indus valley and hunted markhor and ibex, instead of *ovis ammon* and burrhel, as we had originally intended.

The conditions we met beyond Sonamarg were quite exceptional. The villagers assured us that the winter snow-fall had been much heavier than usual and that the spring had set in late ; but there is no doubt that any party crossing the Zoji La early in the year, even

in ordinary seasons, would find ski of great assistance. On ski one can get from the top of the pass to Matayan in half the time taken by an unladen man on foot, so a rucksack with food and extra clothing must not be forgotten. A *lang-laüf* expert would of course find ski of even greater benefit.

From Matayan onwards it was painful and wearisome slogging over innumerable avalanche-beds, with the rest of the way almost entirely on the level. The last day on snow between Shimsa Kharbu and Kargil was eventful, for owing to the large number of avalanche-beds to be crossed, we made much slower progress than we had anticipated and were still a long way short of our destination when the hot midday sun had thoroughly melted the snow and so made avalanches an imminent danger. Much of the route traverses steep open slopes ending in a drop into the Shigar river which rushes below. If one were caught in an avalanche there would be little hope of escape. Actually one fair-sized avalanche did start some hundreds of feet above us, but fortunately fell between two parties of our coolies. Immediately afterwards a very thick snow-bridge, which completely spanned the river, caved in as the last man crossed, so that it was with more than ordinary relief that we arrived at the end of the march after thirteen hours' hard going.

We spent April and May in Baltistan and the Haramosh region where, of course, we had no ski-ing. The 6th June found us at Dras on our way back to Kashmir. Here there was still a considerable amount of snow on the surrounding hills and we had two days' excellent ski-ing on a mountain on the east side of the valley marked 14,850 on the map. We did not succeed in reaching the summit, for at about two hundred feet below it we found a very steep open slope which had been exposed to the sun all day, and which would have almost certainly avalanched had we attempted to cross it. Through our glasses we saw some very promising country and a strong party with a light camp would get excellent ski-ing in April or early May, using Dras as a base ; while between the Zoji La and Dras there are a number of nullahs opening off the Treaty Road which would be well worth exploring. The drawback to all this country is that it takes some time to reach, and coolies over the Zoji La are expensive before the 15th May, by which time the best of the ski-ing is over. Nevertheless a ski-ing trip in this direction would be less expensive than a shooting holiday in the same area, and one would undoubtedly get some excellent sport on new ground with quite a good chance of shooting an ibex or a red bear off ski.

On our return we found the valley of Kashmir hot and enervating, so, after a few days in Srinagar, we went up to Khelanmarg and camped just below the Ski Club hut. There was still a considerable amount of snow on Apharwat and ski-ing was possible as low as the marg, but we soon discovered that the only really practicable route was via 'Xmas Gully to the top of Apharwat. Beyond the survey station there was much more snow and we made several expeditions in the direction of Linyan Marg and beyond the Frozen Lake. The snow down to about 11,500 feet was generally good, but below that height it was too much covered with debris and did not harden until after dark. We found that the best running was obtained about half an hour after the sun had left the slopes. We therefore used to leave the top about sunset and arrived in camp with the last of the light. There is no doubt, however, that if we had been sufficiently energetic, the conditions in the very early morning would have been much better.

On Midsummer Day we were caught in a sudden heavy snow-storm near the top of Apharwat and being quite inadequately clothed we suffered severely from cold. On this day it snowed down to below 12,000 feet.

After a week at Khelanmarg the possibilities of the neighbourhood had been exhausted, so our party, which now numbered seven, moved via the Ferozpur nullah to Pandanpathar. This was a fair day's march across country, but the route we followed would not be practicable with snow on the ground, and early in the year it would be necessary first to descend almost to Tangmarg and then climb left-handed by Pajanpathar—a much longer route. At Pandanpathar we found much better conditions and these lasted until the 10th July, when our leave was up. During the last few days that we were there the snow melted very rapidly and I think, even if we had had the time, little would have been gained by staying longer. From several points in this district views of the hills above the Tosha Maidan between Shin Mahinyo and Tatakuti were obtainable and there was still much snow on them, though the Tosha Maidan itself was almost bare. This would be delightful country to explore on ski during April and May, as there is a large expanse of ski-ing ground, giving runs of every degree of difficulty. During the time we were at Pandanpathar we skied every day and enjoyed much good running, but we were at least a month too late and the snow was nothing like so fast or good as spring snow, except in the very early morning. Also the conditions were rather too easy. Simple rock-ridges led to the top of every

Photo. M. D. N Wyatt.

LOOKING WEST FROM EAST SIDE OF PANDANPATHAR NULLAH. NOTE RIBBING CAUSED BY HOT SUN IN LEFT FOREGROUND.

climb, so that we had nothing worse than an easy scramble with a coolie to carry our ski. Nor was there any need to beware of avalanches, so that, although the conditions were perhaps pleasanter, the ski-ing was less interesting than it would have been in spring or winter.

On the whole, snow conditions in Kashmir, which may be taken as typical of the Himalaya throughout the wet zone, are not very different from those in Europe; but ski-runners must realize that, with the exception perhaps of a very few of the best shikaris and some of the porters who have climbed on Everest and Kangchenjunga, there is really no native mountaineering skill obtainable in India.* This affects the ski-runner in two ways: For ski-touring he must have a sound knowledge of snow and mountain craft to be able to select a *safe* route—one which will not lead across slopes that are liable to avalanche or be swept by avalanches—and except possibly in December and January, he must know enough about the effects of wind, sun and thaw on snow to enable him to plan expeditions that will give fast good snow for the run down. Without such knowledge he will run unwarrantable risks and at least half his pleasure will be lost.

In Europe all this is done for the inexperienced ski-runner by good local guides. In India, unless he has an experienced friend with him, he must rely entirely upon himself. There is no better means of getting the necessary groundwork than by studying Mr. Arnold Lunn's excellent book *Alpine Ski-ing at all Heights and Seasons*. This book, provided the reader is prepared to master it and not merely glance through it, will give him a sound basis to work on, after which he will be able, with comparatively little experience, to make the best of conditions with the minimum of risk.

Briefly, the usual snow conditions to be met with during the winter—say, from December to mid-February—are *powder-snow* up to about 12,000 feet; above that height snow has been usually more or less wind-blown. *Powder-snow*, which will be found in all woods and on sheltered slopes, with the probable exception of those facing south at comparatively low levels where the sun is likely to have formed a

* Mr. Wyatt's remarks apply of course to technical mountaineering and snow-craft. Villagers throughout the Himalaya are killed every year simply through their entire lack of 'avalanche-sense.' Their fatalistic outlook is against them taking the most ordinary precautions. In many parts of the Himalaya one may tell a coolie that if he traverses a certain slope or goes on a certain cornice he will probably be killed, and he will promptly try the experiment!—ED.

crust, gives the best of all running. *Sun-crusted snow*, provided the crust is thin or has been softened by the sun in the midday hours, is fairly good. *Wind-blown snow* varies from being mildly unpleasant to being utterly damnable!

Powder-snow, provided it has had two or three days during which it can settle and consolidate, and provided the general temperature of the air is low, is not likely to avalanche in winter; but wind-blown snow—particularly when it has formed a hard crust—should, on steep slopes, be treated with the greatest caution, for under certain conditions, which need much experience to recognize, it may break away in *wind-slab* avalanches, which are extremely dangerous. The crust of the wind-blown snow cracks under the weight of the ski-runner and the whole snow-slope comes down in a mass of blocks which may be several feet thick. These wind-slab avalanches may occur at any temperature, while powder-snow avalanches usually occur only when the snow has been subjected to general thaw or to a strong sun. There was a very good example of a wind-slab avalanche near the top of the Zoji La last year, that had fallen just before we crossed the pass. We could see the line marking the upper edge of the avalanche and the track it followed; the bed of the nullah, where it had come to rest, was strewn with blocks of frozen snow, many of which must have weighed at least half a ton. The ski-runner should also remember that a slope, safe in itself, may, owing to its position immediately below a steep slope, be liable to be swept by avalanches from above; and that a track, which would be safe in the ordinary course, may be very dangerous if it lies immediately above a cliff or crevasse, for a small snow-slide may sweep the runner over the edge, or a slip on hard snow may not be stopped in time. Ski-ing during the winter months at medium heights, but for the avoidance of avalanche risks, presents fairly simple problems, but as soon as the sun begins to be powerful the question becomes vastly more complicated.

Ordinarily in spring we find on all slopes hard frozen snow at dawn. As the sun reaches it, it gradually softens, at first superficially, but after a varying period it becomes a sodden, slushy mass water-logged throughout its depth. As the evening cools the snow again hardens. At first a slight crust forms and this rapidly thickens until the snow is again frozen hard. Snow which has been melted and then re-frozen, so long as it remains hard, will not avalanche; even when its surface is again softened it is safe enough. But when it is again thoroughly melted it is extremely dangerous. The hard frozen snow of early morning and late evening gives fast good running on

Photo. M. D. N. Wyatt.

AN OLD AVALANCHE TRACK AT 14,500 FEET ON HILLS ABOVE DRAS.
NOTE TELEMARK-CRUST IN FOREGROUND.

gentle slopes, but on really steep slopes a slip once started is difficult to stop. When the snow has been slightly softened by the sun it is almost as good as powder-snow and, as *Telemark-crust*, is safe, fast and easy on any gradient. This superficially softened snow gradually deteriorates as it gets softer, but it improves again in the evening as it hardens ; there is however a short bad period in the evening when the snow is sufficiently crusted to bear the runner for a short distance and then breaks and lets him through to the soft snow below. This is known as *Trap-crust.*

Fairly frequently whole slopes will be found covered with a very thin sheet of ice which reflects the sun like polished metal. When this is slightly softened by the sun it provides delightful running as one's ski cut through the film of ice to the softened snow below and the fragments of ice slip away with a pleasing rustling sound. This snow is known as *Film-crust.* During the middle of the day the film of ice remains, but the snow beneath becomes wet and slow. Thus we find that the morning and evening give excellent running, but that the midday hours are not only dangerous, but also bad for ski-ing. They should therefore be utilized either for sleep or for the climb, provided there is a safe route.

The condition of any slope will vary not only according to the time of day but also according to its orientation. Thus a slope facing north-east will soften sooner and harden earlier than one facing south-west. Again, a steep slope facing east is much more affected by the early morning sun than a gentle one facing the same direction, because the low early rays of the sun strike it almost at right angles and so have a greater effect. A further factor is the variation from month to month as the sun gets more powerful, rises earlier and sets later.

Thus the ski-runner's problem is to time his descent after considering all these various factors so that he may expect snow that will give him good and safe running. Such an appreciation needs experience and some knowledge of local conditions, but it is hoped that the above hints will be of some assistance. Mr. Lunn's book amplifies these points. He was of course writing of European conditions, which to some extent differ from those found in the Himalaya. The sun is so much more powerful in India than in the Alps that spring conditions set in earlier in the year, and the snow softens earlier in the day and more quickly than in Europe. The ski-runner's margin of error in timing a descent in the Himalaya is therefore small. Later in the year the strong sun causes effects, particularly on glaciers, that are not met with in Europe. The extreme heat of the sun, the effects

of radiation and evaporation eat into the surface ice and cause remarkable formations such as pinnacles and waves. Probably the greatest difference is in the size and nature of avalanches. Mr. Smythe in his book, *The Kangchenjunga Adventure*, remarks on the size of the ice-avalanches that fall from Kangchenjunga ; he explains the size to the greater plasticity of Himalayan ice combined with an immense snow-fall. Such ice-avalanches are not likely to be encountered by the ordinary runner, but it must be remembered that the enormous snow-fall that occurs throughout the Pir Panjal, and in general throughout the outer Himalayan ranges, causes avalanches on a scale far larger than in Europe ; and almost level slopes that in Europe would be perfectly safe may, in the outer Himalaya, easily be swept by avalanches falling from steep slopes ending a very considerable distance away. This point must be borne in mind, particularly when choosing high camping sites.

A FRONTIER TOUR.

(Being Extracts from a Diary written during a journey made with H. E. Lord Rawlinson, C.-in-C. in India, through Dir, Chitral, and the Gilgit Agency in 1923.)

LIEUT.-COL. J. R. C. GANNON.

WE left Simla by rail-motor on the afternoon of the 25th July, 1923, while the monsoon was at its height, and arrived at Durgai, the railway terminus, early on the 27th. From here we motored to Malakand Fort, where we were met by Colonel Stewart, the Political Agent, who was coming to Chitral with us. We had an interesting interview with the Miangul of Swat, who came, in spite of his local war with the Nawab of Amb, to pay his respects to the Chief. He was an average-sized man of slight build, clean-cut features with bushy beard and clipped moustache ; small, cruel, but intelligent eyes ; dressed simply and completely in khaki. The opening phases of his war had not been altogether to his advantage, but he had found time to smite the Shalozai. The Chief's efforts to persuade the Miangul to make peace, which might have been arranged, were fruitless ; yet the Miangul was in an awkward predicament, for the Nawab of Dir apparently was only waiting for the end of the Chief's visit to his territory, before joining the Nawab of Amb. This would put the Miangul in the position of being attacked from two sides at once. Thus, at the beginning of the tour a difficult political situation seemed imminent.

Friday, 27th July. Left the Stewart's after tea, having seen some very interesting Buddhist relics, and went off down the Malakand in a car, Stewart with us. ..... Malakand Fort was singularly picturesque as we slipped down the hill. Built on three or four hill-tops of varying height and enclosed by a rambling, twisting wall, it looks like some mediæval stronghold, save for the Union Jack floating out from the highest tower, and a gun beside it proclaiming loudly and in black powder that the Commander-in-Chief in India is now on his way to Chitral. Down into the Swat valley to Chakdara—a wide valley encircled by hills and entirely under rice-cultivation, the river running through, and the road, enclosed on both sides by fine willows, keeping level with the river. Round a bend came a

village, more *maliks*, more gigantic flags, and, horrible sight, quite a flock of sheep! The gentle art of shepherding is surely not in the curriculum of a personal military secretary!

A fine lot of *maliks*, the senior being about eighty and quite blind. By his appearance he might have come straight out of the Bible, and it is doubtful if his forbears of 2000 years ago in this valley were dressed or behaved any differently. Life still consists in the possession of land, women and cattle, and the almost daily battle, murder and sudden death involved in keeping them. The history of their times differs but little from the Old Testament tales of the Hittites, Jebusites and Amalekites.

A short halt at Chakdara Fort on the far side of the important bridge over the Swat river, and we were off again through Dir country to Kuz Sarai. The road, which was unmetalled, ran through a plain with hills on each side: no events save a Henry Ford van full of merchandise stuck in the road at about the only sharp turn where it could completely block our passage. "Henry," needless to say, obstinately refused to start and finally had to be pushed out of the way.

Reached Sarai about 6-30 P.M. and were met by Glen and Hissam-ud-din. The latter has been here for ten days collecting transport and getting ready generally. Sarai is a fortified post under the hills on one side of the valley. The last time the Chitral reliefs passed, the local folk were paid their subsidy; suddenly two factions started fighting over the division of the money, and twenty were killed before the matter was settled. In a land where all go armed, life is of little account and goes daily into the balance over a rupee or two, a woman, land, or even a goat. Shah Jehan, more commonly known as the "Waliarhad," came with an escort to meet and lead the Chief to Dir. A young man who dare not leave his country for fear of intrigue: he only speaks the local language, and is mostly occupied in trying to appear as a great man, in which he is not terribly successful.....

An early bed after dinner. Night rather hot, but the Political won't take the responsibility of our sleeping outside.

Saturday, 28th July. Up at 5 A.M. and off at 5-30 by car for six miles. Then to horse. Kept a "point" half a mile ahead of the Chief and behind us came the Dir Mounted Levies, then Waliarhad and his noble cavalcade of "household troops" clothed and mounted equally oddly; behind them the transport. Turned right-handed at once up a long easy ascent and after a sharp turn at the top, came

in full view of the valley of the Panjkora river, surrounded by bright green rice-fields and range after range of hills away in the distance.

Down to the river at Sado, another post, where breakfast and flies awaited us. Gorgeous morning, not yet too hot. The road runs up the left bank of the Panjkora, often on the edge of or over the river, which flows fast over a series of rapids. Both shores and islands covered with cut tree-trunks, stranded. They belong to a contractor in Nowshera, who buys in Kohistan and hopes to float them down. Understand he lands about fifty per cent. at Nowshera, which has in the past produced him a pretty fortune. Every now and then a log would come spinning down the centre of the river and go lurching through the rapids. After some miles we rounded a bend where a great gang of men worked like beavers pushing logs into the river. The nearer we came the more they shouted and the more feverishly they pushed. Their shouts became yells when we stopped to watch. Suddenly about twenty of them seized single *mussacks* and sprang into the river. Lying on the *mussacks* each man kept his head well out of the water and his balance by paddling with his feet. It was a fine sight seeing them all shot down a rapid, bobbing up and down like corks and cheering like blazes. It transpired that this was a put-up show for the Chief, while the earlier frantic work was displayed for the benefit of the contractor from Nowshera who had, in some mysterious way, tacked himself on to our party.

Towards 11-30 Robat came into sight, the usual fortified post on a spur above the river. The last few miles had been hot, the ponies were tiring, and we were all glad to get in. A marvellous mounted band—two sets of side-drums and three very shrill pipers—played us in. These posts are all small and as everyone has to be inside, hot humanity is at a discount. Baggage in just after two o'clock, a good effort for a first march of 24 miles up and down hills. Glen and I have not brought servants, but we have four orderlies chosen from my regiment by Hissam-ud-din, all Pathans, Khuttacks, nice clean-looking birds. The first one detailed to me was called Mehrab Gul, which being lightly translated means "Bower of Roses." The possibility of being yanked out of bed by a man with a name like that was too much, and I have exchanged him for one with the less odoriferously sounding name of Said Ali Jan.

Sunday, 29th July. Warai. Heavenly sleep on roof of the post leaving hot humanity to sleep in the yard below. Short march; so, thank God, slept till six, breakfast at seven, and on the road at 7-30. Dinner last night given by Stewart, who invited the Waliarhad and

two or three others. Not an amusing guest. Before going to bed they sent dozens of fellows flying down the river on *mussacks*, holding up torches. In bed by 9-30. Short march of 11 miles, again up the Panjkora. A ripping morning and quite cool. We were in soon after 9-30. The same band as before turned up mysteriously and played us in with redoubled energy. The Chief has done a priceless coloured sketch of them. Good breeze. To-morrow 26 miles on to Dir, which is at about 5000 feet.

Tuesday, 31st July. Up yesterday at 4-45 A.M., the difficulty of the operation being eased by swallowing a Quetta peach. How we rough it! On the road by 5-30 and away up the Panjkora. Country much the same at the start, but gradually the river got narrower and deeper and the road rose up from it. The trees are bigger and thicker, and include mountain oak, holly and fig. Reached Darera about 8 A.M. after a 13-mile ride. The usual post, but the roof has fallen in and there are no funds for repair. Breakfasted under a shady tree, then on across an open space for Chutiaten. After crossing a suspension bridge, one horse at a time, the country closed up, the river sank deeper and deeper into a gorge, and the road passed 300 to 400 feet above it, cut out of a hillside thick with shrubs and trees. Magnificent hills rising each side of the gorge. Local interest in the Chief's arrival got more noticeable, little groups of armed men appearing on the hill-tops. Our merry mounted pipe-band appeared from behind a rock and announced our gradual approach with heartrending screams. A sharp turn to the right and we were in full view of Chutiaten Fort, on a spur above the river on the far side—the usual square fort with a square turret at each corner, one of the Nawab's strongholds. The road turned right-handed down a steep incline to a bridge, and on the far side a crowd collected. Our band redoubled its efforts and crossed the bridge with the Chief and us close behind. A crash of drums, followed by a perfect pandemonium of squeals from pipes, burst out as we set foot on the far side, completely annihilating our poor little band, which retired in high dudgeon up the hillside. We suddenly realize that this new noise is "God save the King," no salute. Dismounting, we turn to greet our host surrounded by his ministers and *maliks*. He advances to shake the Chief's hand with his right glove off, and we advance with our right gloves very much on, for the Nawab of Dir, the king of this wild, hilly country, is a leper as white as snow. The end of his nose has gone, the tips of his ears are ashen in colour, otherwise he merely looks unpleasantly unhealthy. A tallish thin man, with a sparse beard, weak watery eyes protected

by sun-glasses, and dressed in a white silk frock coat, loose white pyjamas and patent leather shoes. We are led to a table under a lovely old *chinar* tree on the bank of the river, a most beautiful spot. We sit in a circle and partake of tea, biscuits, fruit. On the Nawab's right sits the Chief, on his left Stewart, while on Stewart's left sits Saftar Khan, prime minister and villain of the piece in the great drama of the malignant yet simple politics of Dir. Round the table sit aged and grave *maliks* and headmen, the Abrahams and Isaacs of the lost tribe, who sip thin tea, and otherwise relapse into dignified mummies apparently looking at nothing. It is time for conversation, and the Chief opens the ball by saying to Stewart : " Tell the Nawab Sahib what a pleasure it is to come and visit him in his country." Stewart tells this in Pushtu to Saftar Khan, who in turn relates it to the Nawab. After a moment the Nawab opens his mouth, a noise like escaping gas comes forth, followed by a rattle of quite unintelligible sounds, and ending in escaping gas again. It appears that the Nawab has no roof to his mouth. Saftar however turns to Stewart and translates in Pushtu, who in turn tells the Chief : " The Nawab is transported with joy that so great a man should deign to bring his glorious presence into his poor country."

Several more rounds of this sort of thing, including a remark from the Chief hoping that the Nawab's health is improving, and the obvious reply that since the Chief's arrival he has already become much better and feels that he will go on getting better every moment of the Chief's stay.....At last we get up to ride the last five miles to Dir. It is a slow and solemn procession. The Chief firmly stops the band from leading the way—it has been rendering ear-splitting aids to conversation all through the meal—and starts off with Stewart at his heels. Then comes the Nawab on a piebald Badakhshani pony clothed in glorious apparel, closely followed by the wicked Wazir Saftar Khan and his eldest son. I and Glen and Hissam-ud-din follow. The bodyguard, a picked lot of fine-looking scallywags in front, and all the other rabble behind.

Saftar—a remarkably nasty specimen : short, with slightly bent shoulders, a bearded face with an expression like a fox or a ferret, small roving eyes that never keep still nor look you in the face—reminds me of Judas Iscariot in the picture of the Last Supper. He is also a miser. The Nawab confines his energies to trying new cures for his terrible disease, or in talk of them, while Saftar holds the power in his hands. The Nawab is nervous of both his sons trying to do

him in and seize the throne. The Waliarhad is the heir, and is nervous of his younger brother and of his father. The second son wants to oust Waliarhad and get the throne in his place, and Saftar plays each off against the other and keeps them all afraid. A pleasant little mediæval romance; and the undercurrent of the various plots and counter-plots of the different households of women must make the life of the House of Dir a pretty lively concern.

We leave the Panjkora and turn left-handed up a valley heavily cultivated with rice and maize. The Nawab is given something to eat or chew every half mile, has a drink of water and prays for a moment at each shrine, for he is a very superstitious monarch. Rounding a bend we come at last within sight of Dir, a collection of mud and wooden huts on a bit of hill in the valley, the Nawab's palace with turrets to the right hand and enclosed on three sides with hills towering one above the other.

A gun booms out from the palace, followed by others at very irregular intervals—a salute for the Chief—black powder, of course. One wonders what the effect of a real gun would be on this gimcrack capital. Four six-inch howitzer shells would about settle the whole box of tricks. We pass the so-called town and palace, the roofs crowded with silent spectators, and on to the post which is round a bend and at the entrance to a gorge up which we must climb to the Lowari pass. We shake off the Nawab and attack lunch. Quite the worst-placed post ever constructed: overlooked in every direction by high hills close round, a most unpleasant spot to take refuge in, and as can be imagined, the site was most carefully selected by the present Nawab's father himself..... At last we are left to a peaceful evening with bonfires glowing on the pickets all round, and the pipe-band wailing away outside as a compliment to the Chief through dinner.

Wednesday, 1st August. Ziarat. A quiet day at Dir yesterday. The Chief went to sketch the Nawab's citadel after breakfast. Did a little work till twelve, then rode out to join him. Had expected to see some local life, but jogged along a deserted road, meeting only one woman who, at sight of me, fled into a field and, covering her face with her hands, cowered in the crops. In the course of conversation the Chief had told the Nawab that he wished to make a picture of his house. Result: Orders issued that no one should stir abroad while the Chief was out. Found him under a tree where he was just finishing a topping sketch of Dir, and jogged home again through empty roads and fields.

In the afternoon we pay a state visit to the Nawab and at 5-30 we leave the post in procession, led by a pipe-band and ministers of state, and turn up a narrow pathway which is apparently an avenue of young fir trees. However the Chief's hungry horse seizes a branch of the first one and away comes the whole tree. The trees have all been cut for the occasion. We proceed under arches of welcome, turn through winding streets so narrow that one horse only can just pass at a time, and arrive at the palace, a large square building of mud and stones.

We are met by the Waliarhad and enter the courtyard with a bodyguard, pipe-band and bugle-band drawn up in line. On the opposite side is a local band of weird instruments assisted by an accordion. A long balcony above and all the available space below packed with the men of Dir. All the bands squeal out " God save the King " together, and we enter the palace by a narrow door and scramble up a steep staircase in a turret, and arrive in the baronial hall of the House of Dir, where the head of the house, still wheezing, meets us. We solemnly arrange ourselves round a table loaded with cakes, sweets, fruit and tea, the Nawab and the Chief at the head. It is a large high room with a balcony on one side under which an archway opens out into another room to another balcony overlooking the Dir valley. The room is decorated all over with faded gold, red, blue and green in oriental fashion. I am told that this is the greatest gathering of notables known for years. It is, in fact, the old feudal chief with his barons, knights and esquires in his hall. Some of these silent, imperturbable old men are indeed barons holding their village and land in the Dir domain, free of all rent or tithe. Only if Dir goes to war are they in honour bound to raise their own *lashkar* and join the army. Others are chiefs of conquered lands and pay rent. One and all sit silent and immovable.....

After rather feeble efforts at tea, and the usual three-cornered stilted conversation, the local minister for foreign affairs gets up and reads out a long and terribly flowery speech in Persian from the Nawab to the Chief extolling his virtues, habits, etc. The Chief then replies extempore in three parts, each part being in turn translated by Stewart. When completed the foxy prime-minister rises and shouts out a very garbled précis into the Nawab's ear, for deafness also afflicts him. In spite of his being such a loathsome sight, I cannot help feeling much pity for this wreck of a man, for in his day, before the fell disease attacked him, he was a determined ruler, though obstinate and superstitious. He had taken part in no less than 84

local wars and engagements, and his personal bravery in the field was beyond dispute.

The Chief then makes presents to the Nawab, a silver-mounted photograph of himself, a pair of binoculars, and some bottles of scent, soaps, powders, etc. These are gracefully accepted and we get up to pass through the archway to look at the view down the valley. The Nawab is inordinately proud of this and we have to admire a very gimcrack water-mill bubbling below us, and the size of the town, which is very small and very dirty. Below, a road runs by the palace wall. Naked little boys are playing in the dust; men are loafing in the sun, their backs to the wall; but never a sign of a woman anywhere. The Old Testament comes vividly to my mind again. Surely in just such a place Jezebel must have met her boisterous end.

Somewhere near is this potentate's prison. It consists of a deep hole in the ground like a well. If the crime is serious, or rather, if the Nawab is really angry, the prisoner is thrown in quickly and left, so he is lucky if he breaks his neck, which is more than probable. If the Nawab is not so angry, the prisoner is lowered into the hole, where he sits among the remains of former occupants and is fed once a day with water and *chupattis*, pending the declining wrath of the monarch; sometimes he comes out alive. Crime is generally a personal matter between the Nawab and his subject. Murder is sometimes taken notice of, but killing as revenge for adultery is permitted. In spite of *purdah*, the local morality is not of a very high standard, and luckily for the birth-rate, the usual process of adjusting the eternal triangle is for the co-respondent to buy the bundle of fun for a little more or less than the price of a cow, according to her age and beauty.

We leave the palace and visit the rifle factory. A small gun is shown with great pride as having been made in the factory. It is a clever piece of work inasmuch as it is rifled and is a breachloader, but a fuze cannot be achieved, so the shell is hurled at the foe in the form of a cylindrical cannon-ball.

We mount and ride back to the post, the Nawab and Saftar accompanying us. At the gate the Nawab bids a final wheezing farewell to the Chief. Later come presents: Swati blankets, a fine sword that started life with the Nawab's grandfather, a yak's tail with silver collar as an ornament for a horse, Gilgit *puttoo*, Chitral whips and boots, and some daggers.

We hear by telegram that the Mehtar of Chitral is ill in bed with appendicitis.

Thursday, 2nd August. On the road by 5-30 A.M. yesterday. The Waliarhad and Saftar escort the Chief with usual accompaniment of bodyguard, levies, etc. A good climb in front as we leave Dir at about 5000 feet, go over the Lowari pass at 10,000 feet and down to Ziarat at 7500 feet.

Up a narrow defile through which the Dir stream rushes and splashes, a steady rise all the way. High hills on each side, and great mountains that surround the Lowari towering up ahead. The ascent soon shows in the flowers—buttercups and forget-me-nots among other Indian flowers. We reach the region of firs; after nine miles come to Gujar post. We rest for a quarter of an hour while the Chief sketches. A cool drink and a cigarette to keep off the swarm of flies; then on again, the road still steeper. Fine forests of fir all round, and high up gigantic spurs and mountain-tops of grey-white granite.

Near the fir-line, after rounding a hill right-handed, we see the summit of the Lowari pass in the distance, just a dip between two mountain-tops. In a grassy valley to the left is the very humble village of Gujar. We are above the tree-line now, and there is snow in deep gullies, scarred up to the mountain-tops. On the ridge of the pass is a large gathering of men and horses at the boundary between Chitral and Dir.

As we reach the summit, the Chitralis push down the narrow road to meet us. They have come into Dir territory, so the Waliarhad and Saftar, followed by their myrmidons, push up as hard as they can into Chitral territory. Glorious confusion results while the Chief tries to shake hands and say "How d'ye do" to five of the Mehtar's sons, two of his brothers, and umpteen ministers, at the same time as he is saying "Goodbye" to the now completely disgruntled Waliarhad and Saftar, who scowl, collect their riding ponies and hop it down the hill to Dir as fast as they can!

The five sons are a little disconcerting—all the same height and apparently the same age. However, we cut out Nasr-ul-Mulk, the eldest, and mark him down. The Chief inspects a guard of honour of the Chitral Scouts and bodyguard, all in khaki, with the local headdress of close-fitting *puttoo* with a rolled edge all round. Then down a steep road to Ziarat three miles away. The fir forest here is thicker than ever, and the mountains seem more massive. There is still snow in parts of the stream-bed—snow brown with mud and pine-needles, under which the stream cuts its way. This is the worst place for avalanches in winter. The bed packs up with thirty or forty feet of snow, and enormous avalanches come hurtling down the steep

slopes. The road is closed, but stout-hearted men get through with the post. Twenty-four men were lost in one avalanche last year.

Ziarat, a simple rest-house of wood and mud. It is cool, a steady breeze sighs through the pines, and the stream bubbles below. Personally I am sincerely thankful to be out of Dir with its surly morose countrymen, who scarcely ever greeted the Chief. The possibility of an odd shot or two, in spite of the Nawab's warm welcome, fired by some faction in order to get another into trouble, was always present. In Chitral all seem happy and cheerful. The Mehtar's boys are jolly lads and delighted at meeting the Chief; everyone bustles round cheerfully. Col. Tancred, commanding Chitral force and Captain Bowers, commanding the Chitral Scouts, Assistant Political Officer, met us.

Friday, 3rd August. Chitral. Left Ziarat after breakfast at 7 A.M. A steady incline down to Mirkani, gradually leaving the firs and getting back to holly and oak. At Mirkhani, a dilapidated-looking post, the road bends sharply to the right. In from the right comes the Chitral or Kunar river, a fine sight as it is large and runs at a great pace. Below Mirkhani it passes through a defile into Afghanistan. Facing the post is a high jagged range of hills which are the border of Kafiristan.

We halt for ten minutes. Some fine old Kafirs roll up to see the Chief. One old grey-beard is pointed out as having killed 130 Pathans in his time; he is now a benevolent-looking old gentleman. Another is dressed in a long brown *choga*, with his head tied up in a handkerchief like a pirate of old; a seared, lined old face, bright beady blue eyes, a hook nose and a fine scarlet beard make him a most picturesque figure.

We ride on down a steep hill to the river, then up the left bank towards Drosh. Gradually we leave the trees behind and massive rocky hills tower above us on each side. The last hour gives us a hot ride. The new ponies are small and not too fit, mostly Badakhshanis. We reach Drosh Fort about 11-30 and have a welcome drink in the 4-12th Punjabis' Mess. In the evening the Chief inspects the regiment. They are the old 24th Punjabis, a fine regiment; also the Chitral Pack Artillery Section. The parade ground is on the far side of the river and we cross this by the best bridge in Chitral—a suspension bridge built by the Military Works at a cost of Rs. 25,000. It swings a bit as we go over. After parade the Chief inspects the lower fort where the S. and T. live.....A hot night. Chief and I slept well, but Glen and Hissam-ud-din attacked by fleas or worse.

On the move by 5 A.M. and it was just light as we rode down the hill and over the suspension bridge and turned up the right bank of the river. Fine hills each side of the river getting bigger and bigger as we go on. It got pretty hot and all of us were glad to get in to Ayun, where breakfast awaited us in a garden under the shade of some *chinar* trees. From here we got a view of Tirich Mir, a snow-covered peak of the Hindu Kush rising 25,700 feet above the sea. It is only 30 miles from Chitral. Not a cloud was on it this morning and it was very lovely. It has never been climbed ; indeed no Chitralis would go near it, as according to them it is infested with fairies.

We passed Gahirat at the 10th mile, a post on the left bank, and joined by a suspension bridge 50 feet off the water, but condemned now ; no one will cross it save a Chitrali or two on a windless day. The road just before Gahirat was a nasty bit, the river running in great strength through a rocky gorge, and the roadway cut three or four feet wide out of the rock. A slip, and you would fall forty feet into the torrent—a clear drop. All the ponies took it quietly enough. They seem to have a most boring habit of walking along the extreme outside edge of the path, due to carrying loads, I suppose.

Left Ayun for the eleven miles into Chitral. It is a hot, dusty, treeless ride till, coming round a bend, we see the road winding down to the river-bed and beyond it, on a plateau above the river, the trees and green fields of Chitral. A canter along the river-bed and we come up to a good road with willows each side, and after a little while to a grassy open space with a low hill behind it. A guard of honour in khaki is drawn up and beside them a pipe-band in scarlet and gold coats with blue trousers. Nasr-ul-Mulk meets the Chief with another host of sons, and on a hill behind hundreds of Chitralis fire off match-locks into the air. A gun fires a salute at the same time ; it is a noisy but warm welcome. The Chief dismounts and we stand in the shade of a tree and watch the local knuts trying to shoot the popinjay. This consists of two small silver balls at the top of a 15-foot pole. The lads of the village then gallop past in turn and take a pot-shot at the popinjay as they go by. There are a good many missfires, but at last some keen-eyed Chitrali rings the bell. Kafir dances follow. Kafir girls in pairs running round and round with the men dancing in pairs as well, the girls being dressed in a brown blanket with cowries sewn on to a head-dress of brown blanket.

More introductions. Kohistanis and Kafirs form up with petitions. At last we break away and march off, headed by the red and

green bands and the guard of honour. We soon reach the bazar, a single street of wooden and mud huts. A sharp turn to the right and we come to the palace, which is gaily decorated. At an outer entrance stand the last batch of sons ranging from ten years of age down to two—quite wee ones who can just stand—all dressed in green with the Chitrali head-dress. In the gateway on a bed lies Shuja-ul-Mulk, Mehtar of Chitral, looking very ill indeed. In spite of the Chief's efforts to prevent it, he is assisted to his feet to welcome the Chief. He is sent back to bed as soon as possible and we go to our camp, a charmingly arranged affair in the palace gardens and on the river bank, with Tirich Mir right above us. The Chief has a regular pavilion, two large rooms and a bed-room running off it. We all have comfortable "Swiss cottage" tents and there is a large mess-tent as well. Lovely grass and trees all round. A welcome drink and a change and we settle down. This enormous row of sons entertain me. They are marvellously alike and the eldest is only a lad. Are there any sisters? It appears there are, 26 of them, while the boys number 13—unlucky, but perhaps the Mehtar has another one up his sleeve. Curiosity gaining the upper hand, I ask one of the sons how his mother is. He replies rather vaguely that he has many mothers!

An easy afternoon. The Chief sketches Tirich Mir. Glen, Hissam-ud-din and I have a look at the bazar which is thronged with good folk who have come in for the show. After dinner, dances by the light of a huge bonfire and a welcome bed.

Sunday, 5th August. Began yesterday splendidly by sleeping till 7-30. Several mails in so worked in the morning and afternoon. At 5 P.M. we paid a visit to the Mehtar, being taken through the palace to the room where he lay. He was looking bad, but better than on the day before. Chief told me to wire to Northern Command this morning for an expert doctor for appendicitis to be sent up at once. The Mehtar is much pleased.

Rode down to the polo-ground where sports were going on. After sports, polo. Mastuj plays Chitral. It is weird and wonderful. The ground is 40 feet wide with a low stone-wall along each side. The spectators are massed on the walls; some sit with their legs inside on the ground. The length is about 200 yards and they play six a side. One back each side and the remainder rush in a mob after the ball. No rules: crossing, hooking sticks on the wrong side going on all the time. A pipe-band plays throughout; the chukker lasts for 20 minutes. When a goal is hit, the scorer picks up the

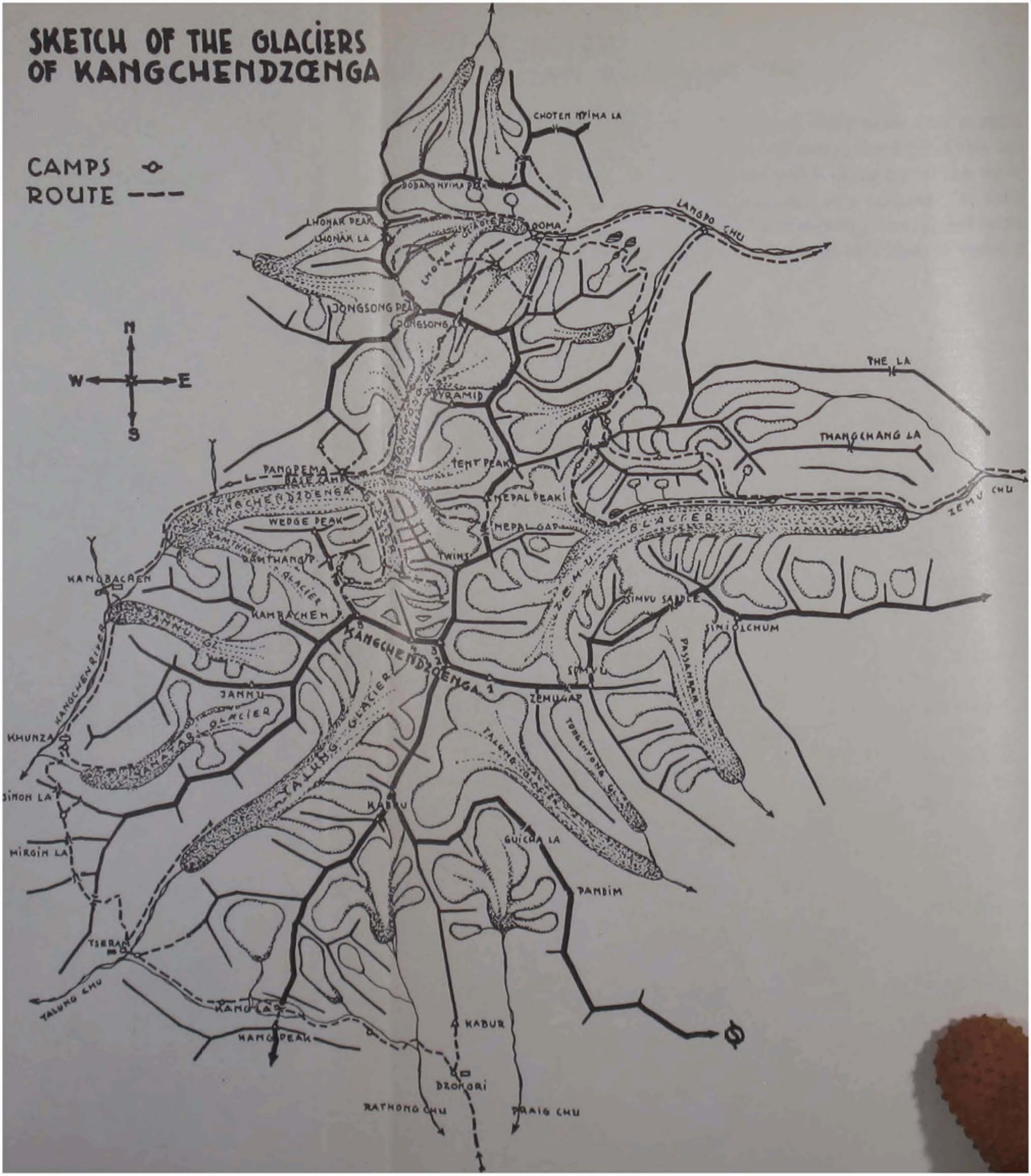
ball in his stick-hand and gallops for the other goal. When in the centre he throws the ball up and has a prodigious welt at it while in the air, and generally hits it. Spectators frequently get hit or trodden on, but that seems to be more amusing than anything else.

Our turn comes next, and our four, including Hissam-ud-din, play four of the Mehtar's sons. Thank goodness that Bowers has some normal polo-sticks, for theirs are of the oddest shape, the sticks being rammed into one end of the head instead of in the centre, and at a sharp angle. Great excitement. The Chief mounted on a fast little Arab, gets going and scores almost at once, amidst shouts of joy. I tittup round after him on an animal that trots with great difficulty. The ponies average 13·2 and our colossal Hissam-ud-din is hurt that his animal won't go faster. Glen rides the opposing back all over the place, which he doesn't understand, and we beat the boys in a 20-minute chukker by 5 goals to love. The losing side is supposed to dance for the benefit of the winners, but the boys won't turn out !

After dinner more dances, both Chitrali and Kafir. The Black Kafirs do their dance in pairs and now get a move on, both men and women doing their curious shuffle. These Kafirs are very interesting. They are very fair and have no ordinary religion except those who have been converted to Muhammadanism. They seem to have been here since before the beginning of time, even before the Buddhists. They live entirely by grazing a few goats and cattle in their valleys. Numbers of them are still armed with bows and arrows. Polygamy is practised, and their dead are placed in a box on a high hill with their best clothes on, a little money and food, and are left there. They hate all Pathans. Wish I could remember Kipling's " Man who would be King." I know the scene was in Kafiristan.

The Red Kafirs do a turn next. This is most perplexing. They stand in a circular crowd and one of them gives the note. They then start singing a definite tune of two lines, something like a Gregorian chant, in a major key. I ask Nasr-ul-Mulk what it all means and he tells me that this dancing is all their religion, and that the words mean " We are dancing in praise of God ; we do not know how else to praise Him." As they get warmed up they move round in a circle marking time with their feet in a sort of double shuffle. There follows another turn by Kafirs, two of them fooling with hobby-horses and wearing huge beards and *lungis*. After a Chitrali dance, a man lies

down on the ground and does a Punch and Judy show with puppets, representing a boy and a girl. It is an old story, the boy making love to the girl and getting rebuffed, and the girl making up to him again. It is cleverly done and ends, needless to say, in a manner that would be considered somewhat indelicate in a Western country, but which is received with roars of natural merriment in this distant corner of the East.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PANGPEMA
BASE CAMP
TENT PEAK
NEPAL PEAK
NEPAL GAP
ZEMU CHU
ZEMU GLACIER
KANGCHENDZŒNGA
WEDGE PEAK
TWINS
KANGBACHEN
KAMBACHEN
JANNU GL.
SIMVU SADDLE
SINIOLCHUM
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ZEMU GAP
KANGCHENDZŒNGA 1
KANGCHEN RIVER
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YALUNG GLACIER
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TSERAM
YALUNG CHU
KANG LA
KANG PEAK
KABUR
DZONGRI
RATHONG CHU
PRAIG CHU

THE INTERNATIONAL HIMALAYAN EXPEDITION, 1930.

PROF. G. O. DYHRENFURTH.

WAS IT successful, this expedition of ours ? Some people say, No ! for the newspapers proclaimed loudly at the beginning that we were out to conquer Kangchenjunga, and this ascent did not succeed. Therefore—a failure !

I am not responsible for what newspapers say ! As a matter of fact, I have always indicated that the ascent of Kangchenjunga was to be one task, the most important task, of our expedition. But we always intended to attack several other high peaks of the Kangchenjunga region, should that great mountain prove to be impossible. Briefly the results of our expedition are as follows :

Four peaks of over 7000 m., or 23,000 feet, have been climbed to their summits. These are Jonsong (24,473 feet), Nepal (23,470 feet), Dodang Nyima (23,623 feet), and Ramthang (23,311 feet). As far as I know, up to now nine or ten mountains over 23,000 feet have been climbed and four of these have been conquered by us.

The International Himalayan Expedition (or I.H.E., for short) also ascended five lower peaks, viz., one of 20,014 feet and one of 20,424 feet, above Pangperma ; the " Mouse " (20,539 feet) between Kangbachen and Ramthang peaks ; a peak (alt. *c.* 21,350 feet) between Kellas' Saddle and Jonsong peak ; and the Kang peak (18,735 feet).

Scientific observations were as important as mountaineering. They included geology, morphology, glaciology, topography, meteorology, climatology and physiology. This is hardly the place to give scientific details, but a few interesting points may be summarized.

The whole Dodang Nyima chain, on the borders of Tibet, together with the summit of Jonsong peak, is composed of chalk. What in the geological past was the bottom of the sea is now a chain of great mountains. The chalk of Jonsong peak has been pushed up upon the gneiss of Kangchenjunga from the north.

Everest and Kangchenjunga are from five to six thousand feet higher than all their surroundings. Viewed from any high point, these two giant massifs stand out like islands in a sea of lesser peaks. The most probable explanation seems to be the right one : They are

actually islands of elevation—elevation that is so recent that it is still going on at the present time, though perhaps only an inch or two a year.

Mountains are levelled by atmospheric forces. In the Kangchenjunga region the forces of elevation have overcome those of decay. This is the explanation, not only of the great height of the mountain, but also of its form. The precipitous wall which everywhere blocks access to the higher parts shows very recent forms.

By means of that theory of elevation we can also explain another remarkable fact. The principal chain of the Himalaya, in spite of its height, is not a watershed ; the latter is formed by the much lower range to the north. The Indus and Brahmaputra break through the Great Himalaya in enormous gorges. In our own field of activity, the Arun and Teesta have their sources north of the great range and break through it in order to reach the Ganges. All these valleys cannot be explained merely by retrograde erosion and river capture. The theory of elevation gives a more satisfactory solution, namely, that these rivers flowed southward before the high chain was raised and they kept their courses open while the mountains were being built.

For a long time we have known that Central Asia is in a state of progressive desiccation. Particularly during the last few years this fact has been stressed by Sir Aurel Stein, Dr. Emil Trinkler and Dr. de Terra. The theory of elevation also throws some light on this problem. When the Himalaya were lower, the monsoon made more incursions into the inner regions of Asia, and the climate was consequently moister. Now the southern chains defend inner Asia from these currents and desiccation increases more and more. It seems probable that neither the growth of the mountains nor the desiccation of the land behind them is yet at an end.

I do not propose to go into the matter any further here, nor can I, in the space at my disposal, refer to the writings of others. I must, however, express my great admiration of the work of Professor E. J. Garwood, the collaborator of Mr. Douglas Freshfield, in 1899. Garwood is the only geologist before me to make a journey "round Kangchenjunga." To-day, after 31 years, we see many things from another point of view, but his work, both geological and topographical, will always appear to me most admirable.

For topography we naturally relied on Garwood's map and the measurements of the Survey of India. Our own topographer, Ing. Marcel Kurz, revised and supplemented these by our own surveys, so that we are now able to publish a new and, we hope, a good map of

the whole Kangchenjunga region from Darjeeling to the frontiers of Tibet, on a scale of 1 : 100,000. This map will be published with the official story of the expedition during 1931.

The I.H.E. devoted some time to photography and to cinematography, with valuable results. Some 6000 photos and 14,000 metres of film were exposed. "*Himatschal*, the Throne of the Gods," our expedition-film, will be ready shortly and we hope that it will be shown in India.

The I.H.E. was composed of five Germans, three Englishmen, two Swiss and one Austrian. They were, besides myself, the leader,

Mrs. Dyhrenfurth, secretary, "quartermaster" and commandant of the various base camps. She had to organize supplies and transport for the higher camps.

Dr. H. Richter, doctor and reporter to the German press.

U. Wieland, meteorologist and oxygen-engineer.

H. Hoerlin, mountaineer and photographer.

F. S. Smythe, reporter to the English press.

George Wood Johnson and J. S. Hannah, of the Himalayan Club, who joined us in India, and who both rendered excellent service as mountaineers and transport-officers.

Marcel Kurz, mountaineer and topographer, and Charles Duvanel, first film-operator, both from Switzerland.

And last, but most certainly not least, Erwin Schneider, the young Austrian, mountaineer and geological assistant.

We left Europe at the end of February and in the beginning of March, in two groups, via Venice for Bombay. Our considerable baggage, weighing about six tons, was allowed into India free of customs duty, and all formalities were quickly settled. At Delhi we had the honour of being invited to lunch with the Viceroy, Lord Irwin, a member of the Himalayan Club. Field-Marshal Sir William Birdwood, the president of the Club, was kind enough to attach a Gurkha to the expedition, while Mr. G. M. Young, the honorary secretary, kindly forwarded our request to pass through Nepal to His Highness the Maharaja. In Calcutta, Messrs. G. B. Gourlay and Shebbeare, and the German vice-consul, Dr. Eberl, gave us advice and every assistance, while in Darjeeling, Lt.-Colonel H. W. Tobin put himself at our disposal in the kindest way for the organization and management of our transport.

By the end of March we were all assembled at Darjeeling and the great packing began. The "Memsahib" worked the hardest, for although supported by the younger men, 350 coolie-loads had to

be packed. This sounds an enormous quantity, but it may be mentioned for comparison that the Vissers, for instance, took on their last expedition 450 porters for half the number of Europeans. For the baggage of the third Everest expedition (which contained the same number of Europeans as ours) 70 porters and 350 animals, carrying about 770 coolie-loads, were required.

I had always intended to attack Kangchenjunga, if possible, from the north-west, for from the accounts of Freshfield, Garwood and Kellas, this side seemed to offer the best chance of success. It was, however, necessary to obtain the permission of H. H. the Maharaja of Nepal, not only to enter his country, which is generally closed to Europeans, but also to be allowed to use it as a base. The permission that was granted was a very delightful beginning to our undertaking, but there is no doubt that, coming as it did on the very eve of our departure, our work was multiplied a hundredfold. We had already accustomed ourselves to the plan of advancing from the east, through Sikkim. We could then have sent on the baggage on animals to Lachen, beyond which place the distance through the valley of the Zemu to the eastern foot of the mountain is relatively short and without special difficulties. A hundred and fifty porters would then have been sufficient, and the relay system of transport between Lachen and a base camp had been worked out in detail. Tempting as the north-west front of Kangchenjunga was from a scientific and mountaineering point of view, we fully realized that the transport difficulties would be enormously increased by attacking it from that side, and more complicated than those of the Munich expedition of 1929. Actually we had to transport about 350 loads for a distance of eighteen very difficult marches over several high passes to the Base Camp, in addition to supplies for the porters themselves who were to carry the loads at least as far as Khunza, 15 marches from Darjeeling. After consulting Colonel Tobin, whom I should here like to thank for his extensive and painstaking work, a plan was drawn up by which the advance from Darjeeling to the Base Camp would be made in three separate groups; Wood Johnson being the leader of the first group, Hannah of the second and Colonel Tobin himself of the third. Both Wood Johnson and I were against this division into three groups and only agreed when Colonel Tobin strongly advised it. I am, however, more than ever convinced now that many complications would have been avoided if we had moved forward with one big caravan. Having decided upon this division into three, it surely would have been best to allow an interval of ten or twelve days between the start of the first two groups

and the third in order that the porters could return from Pangperma to Dzongri. For the benefit of future expeditions it seems necessary for me to point out frankly the mistakes we made.

On 7th April the first group started from Darjeeling, 10 Europeans and 220 porters. Dr. Eberl, taking advantage of his leave of absence, accompanied us to beyond the Kang La, and we were sorry when he had to return. Hannah and Wieland started one day later with 180 porters. The route from Darjeeling to Dzongri has often been described and is well known. Dzongri, at 13,124 feet, was reached in eight days.

The change from the warmth to the cold of regular winter was rather sudden. Dzongri hailed us with a violent snow-storm. This did not affect the Sherpas and Bhutias much; but to bring up our small army of coolies within a few days to the necessary number, we had had to enlist Lepchas from the warm valleys of Sikkim, and at Dzongri they sat, wretched and shivering, and could not be persuaded, even by the good example of the others, to assist in pitching the tents. The next morning we had the first great porters' strike; Wood Johnson took the greatest possible trouble and spent hours in trying to persuade the men to stay, but even he was unable to prevent forty from absconding. Forty important loads had to be left behind and we suffered from this mishap for weeks.

The next days brought the hard work of crossing the Kang La (16,454 feet). The spring of 1930 was unusually snowy, according to the experts; the Kang La was still buried deeply beneath its winter snow. We had brought from Europe enough Alpine equipment for about seventy or eighty men, but certainly not for more than three hundred. Nevertheless the Kang La had to be forced; the success of the whole expedition depended on it. On the Sikkim side our camp was pitched at 13,500 feet. At 14,000 feet the blanket of snow commenced. Although we had distributed 70 pairs of good Bavarian mountaineering shoes, there were still a few coolies left who had to go barefoot. Also we had only 240 pairs of snow-glasses. Nevertheless, we succeeded in traversing the pass in one day with our main body. This was due largely to Wood Johnson, who stayed with the rear-guard, and, carrying a load himself, arrived late at night at the Nepal camp with the last of the porters.

Hoerlin and Schneider on that day climbed the difficult Kang peak from the pass. According to their barometer-observations, its altitude is 18,735 feet, or rather higher than shown on Garwood's map (18,300 feet). Whether the summit climbed by these two is

identical with that ascended by Graham is a matter of doubt to me; at all events no signs of a previous expedition were found at the top.

On the same day Wieland made an attempt on Kabur (15,814 feet) from Dzongri, a mountain already conquered by Freshfield. It is an excellent point of observation. Many porters of the second party, frightened at the prospect of crossing the Kang La, ran away, so Hannah had to stay east of the pass with many loads, while Wieland crossed with fifty men and joined the first party at Tseram (Chairam), the first Nepalese huts (12,500 feet).

According to the plan we had decided upon, we had proposed to send back about 150 porters from Tseram to Dzongri. The baggage of the third party had been advanced as far as Yoksam on mules and from there by local porters to Dzongri. The complications which occurred at the Kang La naturally caused this fine programme to be abandoned, for we now had to send a strong contingent of men under Sirdar Lobsang back over the pass, to bring the loads of our own and Hannah's party, which had been left behind. Unfortunately, Colonel Tobin, with the best intention of helping us, had left Darjeeling too soon, five days after us. So at the time it was quite impossible to send men to help him. In Tseram there were neither local porters nor provisions to be had. The help promised by H. H. the Maharaja was not due till we reached Khunza, and after long conferences with a Nepalese Subadar and the people of Tseram, Wood Johnson and I judged that the only course open to us was to push forward to Khunza as quickly as possible.

We now had to traverse the ridge between the Yalung and the Kangchen valleys in a two-days' forced march. Four mountain passes between 13,600 and 15,000 feet had to be overcome; the route was nothing but a snow-morass, compared with which the most abominable spring snow in the Alps is almost pleasant. We had ski with us, but of course only for the Europeans, and in order not to demoralize the porters, some of us had to go on foot. The snow-shoes proved a mixed blessing, for if one did break through the thin crust, it was most difficult to get one's legs out again. An old guide from the Vorarlberg once uttered the words: "Thigh-deep snow is passable!" Here we very often sank in as far as the chest and the track of our caravan was like a deep trench.

Our one compensation was the splendid view of the group of proud Janu and the Yamatari glacier on the morning of the second day, when we were on the ridge south-east of the Sinon La. But we were glad to leave these passes behind us and to descend to the richly-wooded

Photo. U. Wieland.

THE GREAT ICE-WALL BELOW THE FIRST TERRACE OF KANGCHENJUNGA.

valley of Khunza. We pitched our tents on a fine meadow in front of the village (11,089 feet). Since Freshfield's expedition no European had been here. We were received in a friendly way and all of us were in the best of spirits ; but we grew gloomy as soon as we touched on the supply and transport question. Although the headman had received orders to help us in every way, the stupid peasant at first assumed the rôle of passive resister. We were now fifteen days' march from Darjeeling and had provisions only for one day more. The subadar's energetic persuasion only procured absolute essentials for the porters. To secure a reserve supply for the next few weeks, the Gurkha descended to the next large village, some marches distant, while the subadar stayed on at Khunza. All the porters we could spare or get at Khunza were sent back to Tseram via the Sinon La and Mirgin La.

Freshfield records that his porters felt so happy when they reached Khunza that it was difficult to get them to start again. The same thing happened to us, and a well-earned day of rest at Khunza was marred by anxiety about provisions and by the passive resistance of the porters.

The march up the valley took us through burnt forests and later over a gigantic moraine and the tongue of the Janu glacier, which was buried beneath boulders, to Kangbachen, opposite the fearful 10,000-foot wall of Janu (25,294 feet). A short march to Ramthang had been planned for the next day. The pastures of Ramthang lie from one to one-and-a-half hours' march below the spot marked Ramthang on Garwood's map. In consequence of this mistake, camp was pushed forward too far, and many porters were benighted in bad weather. We were none too happy ourselves, for my wife had mountain-sickness and fell into a stream, while we all reached camp in a violent snow-squall.

On 26th April we reached our preliminary goal and pitched the Base Camp opposite the tremendous north-west face of Kangchenjunga, at a height of 16,569 feet, a little to the west of Pangperma.

That our hope of finding from here an easy or even a possible approach to the highest summit of Kangchenjunga was not realized is well known from Smythe's reports. After having examined the mountain from all sides I do not go as far as he does when he declares that Kangchenjunga will not be climbed in the present generation or by present-day methods. Kangchenjunga is certainly exceptionally difficult and dangerous, but I believe its ascent is possible. The best route seems to me to be through Sikkim and then by the north-east spur and the north ridge. In spite of the immense difficulties described

by the Bavarian expedition one has at least the advantage on their route of moving on a convexity and thereby escaping to some extent the great danger from ice-avalanches.

This danger, the greatest which can threaten the Himalayan mountaineer, cannot be avoided on the Nepalese north route, however good the guiding. The route from the Kangchenjunga glacier is to every eye trained by alpinism the only one that can be pursued. After the first survey of it through trieder and telescope from Pangperma all the seven mountaineers of the I. H. E. agreed at once about it. Smythe himself found this route so obvious that he at first cheerfully exclaimed " How easy ! " I was never so optimistic myself, but I confess that I too, with all the others, was fully convinced that the ascent was possible. At the beginning we all underrated very much the danger of avalanches.

And so our plan was unanimous : Camp 1 was to be pitched at the upper end of the flat part of the Kangchenjunga glacier, and Camp 2 in the firn-basin under the north col, between the Twins and Kangchenjunga. From there the great ice-wall near the north end was to be made passable as close to the rock as stones falling from the north col would permit. We thought that three or four days would suffice for this. Camp 3 was to be laid out on the first terrace as an ice-cavern, whence the route to the north ridge would also be prepared by several days' work cutting steps and fixing ropes.

Alas ! It did not come to that ! On 9th May when we seemed to have conquered the big ice-wall and Camp 3 was about to be prepared, a great mass of the hanging glacier above broke away and the ice-avalanche, so dramatically described by Smythe, who was an eye-witness of it from below, came down.

There our gallant Chettan met his death. No one can regret his death more than I do. He was a fine climber, perhaps the finest of all the " Tigers ", very keen and very reliable. To the members of the Himalayan and of the Alpine Clubs I need say no more. Unfortunately I must protest against the statement which has been made in some quarters that I was directly responsible for Chettan's death. If it is a question of responsibility, we must all share that responsibility ; for the north route was, as I have already mentioned, not merely the whim of the leader of the expedition alone, but had been decided upon by all the mountaineers of the I. H. E. I had been forced, unfortunately, by a bad cough and by difficulty of breathing at night, to go back to the Base Camp. I was therefore unable to influence the march of events at the ice-wall, and indeed it would have

been the height of folly to send orders to such experienced mountaineers as Schneider, Hoerlin, Smythe and Wieland from Pangperma. It is ridiculous to speak of responsibility, as though someone had been guilty of a crime! War with these Himalayan giants entails hard and relentless fighting; the most careful leading can never guarantee that such fighting will cost no lives. Have not the Everest expeditions, which were prepared with the minutest care, also cost a number of lives? Nobody dreams of holding the leaders of Everest expeditions responsible for the price. "C'est la guerre!" Kangchenjunga is only a little lower than Everest and certainly much more difficult and dangerous.

It is an interesting fact that even the porters would not hear of giving up the north route. The Memsahib was bombarded with petitions to persuade the Bara Sahib to continue the attack by the north route. But I could not agree to it; the responsibility for such a course seemed too heavy for me. I therefore decided on a second attempt by the north-west ridge, although I certainly agree with Smythe that this route never appeared very promising. But at least we were safe from avalanches and could be sure of good results, both topographic and photographic. I also felt, now that we were here, obliged to explore the whole north-west and west front of Kangchenjunga and to leave no shadow of doubt about it. For this reason I do not regret for one moment that I decided on this second attempt.

The difficulties of the north-west ridge are amazing, as great as or greater than those of the north-east spur. That alone would not have discouraged us, for technical difficulties are generally a question of time. But time here was our greatest enemy. We had to calculate that it would take between two and three weeks before the ridge trimmed with rock and ice towers could be made passable. When the monsoon set in, we should be standing only at the Kangbachen terrace, that is, at about 23,000 feet, and we should have this fearful ridge in our rear. There seemed to be no hope of pursuing the long ridge across Kangbachen peak and the western summit of Kangchenjunga to the principal summit. The whole ascent would have to be made on that side of Kangchenjunga which would be most exposed to storm by day and night. As a result I now believe that the north and east sides promise the best chances of success on the principal Himalayan mountains. The flank exposed to the south-west wind is generally the least to be recommended.

It was with a heavy heart that I resolved to abandon the north-west route and therefore to give up the assault on Kangchenjunga

altogether. But I am glad that this resolution was taken in good time, in the last period of fine weather before the monsoon broke, so that the energies of our expedition were set free for other tasks that promised more success. So the Ramthang peak (23,311 feet) became our first summit above 7000 metres, an excellent performance by Schneider and Smythe.

On the 20th May all the members were re-united in the Base Camp, including Hannah and Wood Johnson, who had had to leave the assaulting division in order to reorganize the lines of communication along the route Kang La–Tseram–Khunza. If we had experienced great difficulty here, it was much worse for the third party, for Colonel Tobin had too few porters and these were not good. Sirdar Naspati had returned sick to Darjeeling; the other sirdar of the third party, Gyalgen, was not very satisfactory. Colonel Tobin was overworked and worn out by fatigue and the strain of the Kang La problem. He was alone at Tseram. As soon as we arrived at Pangperma we had sent back all the porters we could spare, and when Wood Johnson took over the important station of Khunza and Hannah had gone back to Tseram to help Tobin, the whole machinery was soon set going again. But it was none too soon, for the situation at Pangperma and in the higher camps on Kangchenjunga had become extremely precarious. I do not know what would have happened if the promised help of H. H. the Maharaja of Nepal had not materialized at the right moment.

Once more it gives me special pleasure to express our heartiest thanks to Tobin, Hannah and Wood Johnson for their self-sacrificing efforts.

When this crisis was settled, a new plan of campaign was worked out. Already at the beginning of the expedition I had planned to go back through Sikkim and not through Nepal. Jonsong peak now became our chief objective. This is the "Three Countries' Peak" of the Eastern Himalaya, for it lies at the meeting-point of the frontiers of Sikkim, Nepal and Tibet. As we knew from Dr. Kellas' reports that the north side of Jonsong offered more possibilities than the Nepalese face opposite us, we had first of all to cross the heavily glaciated Jonsong La (20,079 feet) and establish a new Base Camp on the Sikkim side. This was a difficult problem, as Freshfield found; but it was the more difficult for us for we had to move 200 loads over the pass with only 75 porters at our disposal. Over and above this, the monsoon was at our door.

Photo. E. Schneider.

KANGBACHEN PEAK AND N.W. RIDGE FROM RAMTHANG ROUTE.

Smythe was of opinion that an attempt to traverse the Jonsong La with the whole caravan would lead to a catastrophe. He was most emphatic in his proposal that I should send back the main caravan through Nepal and move only a small contingent, consisting of himself and Wood Johnson, across the Jonsong La to the Jonsong peak. The mountaineers of the main caravan might meanwhile try on the way back to ascend Kabru. I confess that here I had to take upon myself a heavy responsibility when I decided to take the whole caravan across the Jonsong La. But while at Kangchenjunga bad luck had followed us, at the Jongsong peak we were lucky and my decision finally brought about the success of the expedition.

While the loads were sent in relays towards the Jongsong La, there was time for some smaller expeditions. Wieland and Hannah succeeded in climbing a firn-summit of 20,424 feet to the north of Pangperma which Smythe had attempted in vain some time before. Hannah's leave of absence had come to an end and to our great regret he had to return via Khunza.

Schneider and Wieland explored the Nepal Gap, which had been much spoken of but never conquered since Freshfield's time. If this Gap were found to be practicable, it would lie on the shortest route between the Kangchenjunga and Zemu glaciers. For this reason Dr. Kellas repeatedly tried to reach the summit of the Zemu pass, but he was defeated by bad weather. Schneider and Wieland, well supported by a picked body of porters, soon perceived that the Nepal Gap was to be reached from the west only with the greatest difficulty. But they found a comparatively easy route, also passable for porters, to an insignificant rise on the ridge north of the actual Gap. The third day after their start from Pangperma these two reached the crest and saw to their joy that a practicable route by way of firn-slopes led down to the northern side glacier of the Zemu. " False Nepal Gap," as they baptized it, is therefore a serviceable passage from Sikkim to Nepal through the Kangchenjunga group. Its height is 20,014 feet.

To the north, between Nepal Gap and Tent peak, there lies a fine summit, unknown till now. Wieland, who during the past weeks had never spared himself, was no longer fit. So Schneider, who was in great form, ascended the Nepal Peak (23,470 feet) by himself, an unsurpassed performance. On the 25th May this little expedition rejoined the main caravan at " Rolling-Stone Camp ", on the way to the Jonsong La.

As every day was now precious and the approach of thirty more Khunza men had been announced, I decided to traverse the pass with an assault party and forty loads as quickly as possible in order not to be surprised by the monsoon. My wife, who at Kangchenjunga had been in charge of the base supplies, now stayed behind with the difficult task of sending on the bulk of our baggage in relays. In spite of great difficulties, her organization was perfect. The first group traversed the pass on the 28th May and established the Jonsong Base Camp, or Lake Camp, at a height of 17,800 feet.

The most evident success of our expedition was the ascent of Jonsong peak, for it is the highest summit conquered up to now. I am far from lessening in any way the heroic deeds of the Everest Expeditions; but though on the second and third expeditions they climbed to altitudes a great deal higher than Jonsong peak, there was probably no summit reached. Actually six mountaineers of the I. H. E. reached the summit of Jongsong: three Germans, one Austrian, one Englishman and one Swiss.

If an expedition is to be successful the members must act as a team. There must be no personal ambition. After the passage of the Jonsong La, Kurz was busy with his survey; Wieland was in need of a rest; and I was much occupied with organizing transport and communication with Lachen as well as with geological studies. The first party chosen for the ascent of Jonsong peak therefore comprised Hoerlin, Schneider, Smythe and Wood Johnson. With twenty porters they moved off to the southern Lhonak glacier to search for the best route to the summit.

As the route across the north-east face was possible but dangerous owing to ice-falls, the north ridge was selected. Here too I may refer to Smythe's account. The third and last high camp of this party was established at 21,300 feet, and from this point the final assault was carried out—*six hundred feet of descent across a difficult* ice-ridge, and then a climb of 3700 feet, the greater part of which was across difficult rocks which may be compared to the Matterhorn ridge.

Wood Johnson, who had been so perfectly fit at both Kangchenjunga and at the Jonsong La that he had made his first attempts to ski at the latter place, was unfortunately taken seriously ill during the ascent, and Smythe was forced to return to look after him. Victory therefore was won by Schneider and Hoerlin only. Five days later, however, on 8th June, we succeeded in making a second ascent of Jonsong peak. The second party originally comprised Kurz, Wieland

and myself. At Jonsong Camp 1 (18,700 feet), where we met the first party, Smythe accepted my invitation to accompany us.

It was not merely for sport that this second ascent was made. It was necessary for scientific reasons that both a geologist and topographer should climb Jonsong peak. As a man of forty-four, I feel that I have a certain right to be proud of this success, the more so as on 6th June the situation was rather precarious. The weather on this day was very unfavourable and the porters, after a very cold and stormy night, were disinclined to go further. Smythe, who on this occasion did not wear the expedition boots—which he loves to laugh at—was afraid of frostbite and wanted to descend. Kurz also was inclined to give up the Jonsong peak and would have preferred to try Lhonak peak. Wieland remained neutral. It was I who declared that I would stay with the porters and continue the attack, and it was my optimism which fortunately turned the scales. Everybody stayed and we established Camp 3 (21,300 feet). After cutting a route down the ice-slope to the last glacier valley and making this passable for the porters, we established our fourth and last camp on the north col at 21,500 feet. The following day we undertook the final attack. Delayed by my geological investigations I reached the main summit (24,473 feet) at half-past four, much later than my friends, but I was tempted nevertheless to go over alone to the eastern summit. My descent with my orderly, Lewa, therefore took place by night during a bad storm. I am an old Alpinist and have been through many struggles. This experience on Jonsong peak was my hardest mountaineering feat. There were moments when I almost wondered whether I should get back.

While we were busy at Jonsong peak, Hoerlin and Schneider, after two well-earned days of rest, had gone on another tour of exploration. It concerned the Tibetan frontier chain which culminates in Dodang Nyima peak (23,623 feet).

These two great friends scored a fresh triumph by conquering this proud summit by an ascent which is probably as difficult as any yet made in the Himalaya. The summit was reached after great perseverance across three ice-walls and along a wildly jagged ridge. In addition to this splendid feat these two bold climbers brought me back specimens of rocks from the summit, which will, I hope, clear up the problem of the age of the Tibetan frontier chalk.

Although the monsoon was now being felt more and more every day, Kurz, Wieland and I made one more journey at the back of the

Lhonak valley in order to examine the contact between the Kangchenjunga gneiss and the chalks of the northern chain and to climb, if possible, Lhonak peak (21,490 feet). This last however was impossible, for on 15th June heavy snow-storms commenced and the period for climbing summits passed. We had to content ourselves with making the most essential geological observations, while Wieland reached the Lhonak La and fixed its height at 19,932 feet with the hypsometer. It is a special joy to me that Lhonak peak was conquered later in the year, after the monsoon, by Mr. G. B. Gourlay.

My wife, Duvanel, Richter, Smythe and Wood Johnson had already marched on 12th June with the bulk of our baggage through the valley of Lhonak to Lachen and thence to civilization. Hoerlin and Schneider with fifteen porters had crossed a high pass of about 19,000 feet and reached the Zemu glacier at the Bavarian camp opposite Siniolchu. The final breaking up of the Base Camp followed on 18th June. To make our map as complete as possible Kurz and Wieland with a party of porters crossed to the Zemu glacier by another more western pass (19,095 feet), which may possibly have been crossed previously by Dr. Kellas. I had the less inspiring work of bringing the rest of our equipment and baggage (45 porters' loads) to Lachen.

For the first two days while we moved along the broad platform of the upper Lhonak valley, which is strewn with glacier boulders, we could use yak transport. At the entrance to the ravine of the lower Lhonak we had to reload the baggage on coolies. Here I had to halt for a day and a half for the porters who were due to arrive from Lachen. Through flowering masses of rhododendrons, through ravines of indescribable grandeur and wildness, we descended into the dripping primeval forest. On our last night under canvas when the monsoon drummed on the sailcloth, I felt that it was just the right weather for me to take leave of it all. Yet I could have cried when I remembered that I was going back to Europe and its culture again.

In Lachen the whole second party assembled once more and we marched back to Gangtok together. The roads were broken by numberless landslips, and bridges had been carried away; yet we succeeded in reaching the capital of Sikkim in three long marches. At Gangtok we received the hospitality of His Highness the Maharaja of Sikkim, and we spent some very pleasant hours with Mr. and Mrs. Dudley. At Darjeeling the Governor of Bengal invited us to lunch; at Calcutta the Rotary Club and the Himalayan Club

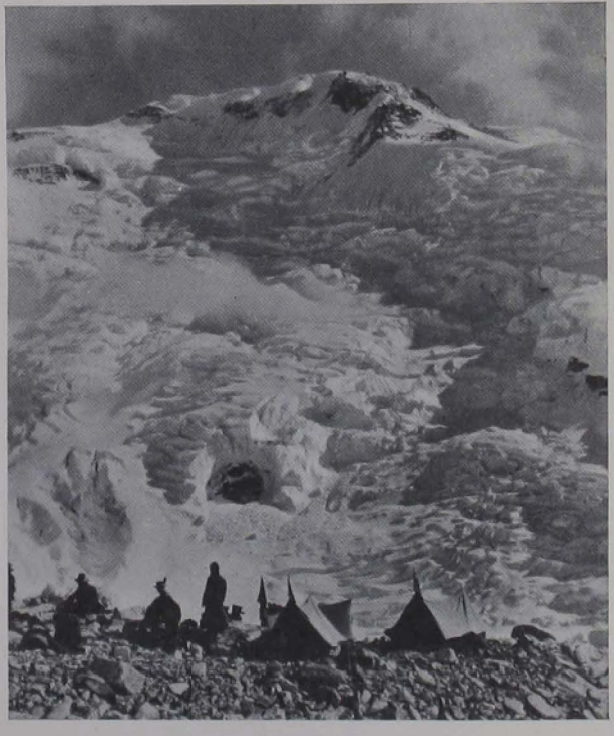

Photo. H. Hoerlin.

N. E. Face of Jonsong Peak from Camp I.

gave dinners in our honour; and as honoured guests of Count Bassewitz and the German Clubs of Calcutta and Bombay we took leave of our country-men who live in India.

Now the bright crown of all the Himalayan summits lies in the land of our memories. For he who has once looked on these incomparable mountains and has wrestled with them must dream of them till the end of his days!

THE THUI AND SHANDUR PASSES.

LIEUT. G. C. CLARK.

IN AUGUST and September 1930, Captain Trevelyan, the Military Assistant to the Political Agent in Gilgit, and I went on a short tour from Gilgit to Chitral territory and back. The normal line of communication between these places is by the Shandur pass. There are however two or three other routes available and we therefore decided to enter the Yarkhun valley from Yasin by the Thui pass and, marching south to Mastuj, leave Chitral territory by Sor Laspur and the Shandur pass. The whole route has, of course, been explored, but the Thui pass is not often used by Europeans.

We left Gilgit on the 17th August and, marching by the usual stages, arrived at Yasin, a distance of 83 miles, on the 20th. Yasin is one of the politically administered *ilaqas* of the Gilgit Agency. On our arrival there we were met by the Governor, Khan Bahadur Shah Abdul Rahman, a member of the old ruling family of Khushwakhts. Formerly the district of Yasin covered a much larger area, but some years ago it was split up into the existing two divisions of Yasin and Kuh-Ghizar, each of which has now a separate governor.

The history of Yasin is steeped in intrigue, murder and sudden death. It was at Darkot, a small village at the head of the main valley of Yasin, that the explorer Hayward was treacherously murdered in 1870. Close to the rest-house at the village of Yasin there is a large boulder on which Hayward carved his initials, which can still be seen together with an undecipherable mark which may be a date. The boulder is near the site of his camp and, looking at the steep rocky hill-side close behind and at the open plain in front, one wonders whether he had thoughts even then of possible treachery, and for this reason had purposely selected a good position on which to pitch his tent.

That evening we invited the Governor and an old crony of his, Pir Jalali Shah by name, to dinner, being afterwards entertained for an hour or so by the usual country dancing. The Pir, who resembles nothing more closely than an old Highland shepherd, is an amusing old character, and I could not help wondering how much of his time is spent in administering to the spiritual needs of his flock, for I never

saw him without a hawk on his wrist and a couple of dogs following at his heels.

Our next day's march was one of only twelve miles to a village called Harf, in the Thui nullah. For the first six miles of this the road runs across a large plain, the Dasht-i-Taus, or Plain of the Peacock. At one time this used to be a barren stretch, but it has been brought under cultivation through the efforts of the Governor, who is constructing water-channels to irrigate it from the Thui stream.

In the middle of this plain we passed what are supposed to be the ruins of an old Chinese fort, whose outline can be seen from the stone walls which are still standing to an average height of about four feet. Presumably before getting as far as this the Chinese army had had its fill of fighting, for the story goes that both the Chinese and the Yasinis determined that the final decision should be made, not by a pitched battle, but by a test of strength between champions selected from each of the two armies. On the appointed day the Yasin army collected on the far side of the valley about eight hundred yards from the fort. The ball was opened by the strong man from China, who, seizing a yak, flung it across the valley into the middle of the Yasin host. It might have been thought that such a feat would have easily won the day for China, but the champion of Yasin was undaunted and, tearing up a walnut tree by its roots, he hurled it back into the fort. To this the Chinese could return no answer and, confessing themselves beaten, they retired without further bloodshed.

A little further on we could see on the far side of the valley the village of Sundi, above which juts a small rocky eminence called Maduri. This was the scene in days gone by of the massacre by Kashmiri troops of a vast number of Yasinis, on the only occasion when the former have invaded the country. Gauhar Aman, an old thorn in the flesh of Kashmir, who had sacked Gilgit and watched its garrison perish in the flames of its burning fort, was dead. His successor, Mulk Aman, was away in Chitral with the majority of his fighting men, when the Kashmir commander at Gilgit, seizing his opportunity for revenge, marched his army into Yasin. Unable to defend their country, the local people fled to Maduri and took refuge on its rock, but their water ran out and they were finally forced to surrender. Those of the prisoners who were not killed outright were taken away, men, women and children, and sold into slavery. There is still, I believe, a small colony in Kashmir of the descendents of these people, for the Governor of Yasin relates how he was on one

occasion greeted at Astor by an old woman who was herself one of the unfortunate survivors of that black day. Such was war in this corner of the world; and it is small wonder that incidents such as the above have left memories that still rankle in the minds of the descendants of the sufferers.

The village of Harf, where we camped in a small orchard of apricot and mulberry trees, is on the right bank of the Thui stream. The scenery is hardly impressive, for the low conglomerate hill-sides which enclose the valley, shut off the views of the high mountains which are actually close at hand. Only by looking up the nullah can one get any idea of the country which is to be traversed in that direction, where one can see the precipitous rock-faces of the hills closing in on either side some six miles away.

The track from Harf continues up the right bank of the stream for about four miles and passes through pleasant cultivated country. On the left bank, about two miles above Harf, a nullah comes in, and at the head of this there is a practicable pass leading into Darkot. At a point where another nullah, leading into the Nasbar nullah, enters on the right bank, the road crosses the Thui stream by a rough cantilever bridge. For the rest of the march to Ramach, eleven miles from Harf, where we camped for the night, the path followed the left bank. In this last stretch there is very little cultivation and we pitched our tents on the edge of a small birch wood whence we could look up the nullah towards the pass and see the white snout of the glacier which descends from that direction. The nullah has now narrowed, and while the hills on the left bank are certainly steep, those on the right are precipitous, and would be a perfect paradise for rock climbers.

In August the Thui pass, which we were about to cross, is comparatively free from snow, being only 14,700 feet above sea-level. There was therefore no need for a very early start next morning. When we awoke, however, we found that the weather had changed and there were low clouds and mist over the pass. In the vain hope that it would clear we waited till half-past seven before marching; but the clouds came lower and we had the misfortune of losing the magnificent views of rock and ice which, I believe, can be had on the way up.

The route up lies almost entirely on the left bank of the nullah—a point which is not brought out clearly in the Survey of India maps of the area. On these the route is shown as winding about up the glacier. For about two miles above Ramach the track is very easy

until, a short distance above the goatherds' encampment of Shakhtoli, we had to climb on to the snout of the glacier, and traverse its surface for some three hundred yards or so, before getting off the ice to the left lateral moraine. This diversion is essential in order to avoid the stream which comes in on the left bank and disappears under the glacier. For the next two or three miles we followed the moraine to a point where the glacier makes a wide bay into the left bank. Here we again had to traverse ice for about three-quarters of a mile before reaching the moraine once more. Into this bay, on the left bank, flows a nullah called Kalandar Ghum, which derives its name from the fact that an adventurous shikari, one Kalandar, never returned from an expedition into its interior.

After passing this bay the track climbs steeply for about two hundred feet up the grassy slopes on the left bank, and for a mile and a half the going is very easy to a point where the valley forks. For about three-quarters of a mile below this fork the glacier no longer fills the whole valley. Here it is formed entirely by small glaciers descending steep nullahs on the right bank. The glaciers which exist high up in the small tributaries on the left bank fail to reach the bottom of the main valley. It is for this reason that the route up this side is so easy.

The route to the pass leads up the right branch of this fork. Here for about a thousand feet we zig-zagged up a steep shale slope until the gradient became flatter, and at a point about eight miles from Ramach the summit of the pass was reached.

It was unfortunate that the day was so cloudy, for the views must be magnificent on a fine day, though I doubt whether any are very extensive. Almost the whole length of the right bank is a series of precipitous rocky cliffs, in whose steep side nullahs we could catch glimpses of ice-falls which appeared as though they might come crashing down any moment. The left bank is more open, and had the weather been fine, we should have obtained views of Daspar, the 21,000-foot peak which overshadows Darkot, and perhaps of the mountains, running up to over 22,000 feet, which were about ten miles to our north.

The pass is well defined and we did not take long to run down the 800-foot shale slope which begins the descent on the far side. At the bottom of this slope a glacier enters from the right and the track, bending to the left, follows the left lateral moraine for about six hundred yards until the snout is reached. After following the left bank of the stream issuing from this glacier for about a mile we came

on another glacier, this time entering from the left. By following the right moraine of this we crossed to the grassy right bank of the valley which we followed to the Galach nullah. Here we camped for the night in a birch-forest. From Ramach to Galach we estimated the distance to be about 15 miles ; it took our coolies about 12 hours to cover the ground. The pass can, I think, be classed as easy, though, until the snows melt, it would certainly be trying for laden coolies. Earlier in the year one would probably have to shorten the march over the pass by camping at Shakhtoli (on the Yasin side) and as far above Galach as possible on the Chitral side. In both cases arrangements would have to be made for fuel.

We were now of course in Chitral territory. About four miles below our camp, the Gazin nullah by which we had descended from the Thui pass, joined the Yarkhun river. Next day our camp marched a very short distance to Warsam village, while Trevelyan and I made a detour in order to have a look at an old defensive position, or *Darband*, which used to be occupied by the local people in the event of an invading force coming up the Yarkhun valley.

This valley is wide and our marches as far as Mastuj, which we reached on the 26th August, were devoid of interest. The country is similar to that in the Gilgit Agency, though there appears to be more water available in the side nullahs for cultivation purposes. From Warsam our first stage was to Brep, 19 miles ; the second to Mastuj, 14 miles. There we were most hospitably entertained by the Shahzada Sahib, Muhammad Nasir-ul-Mulk, who made us exceedingly comfortable in his guest-house, in addition to mounting us for a game of polo in the afternoon and entertaining us with dancing in the evening.

To the north of Mastuj, on the left bank of the river, there is a wide open plain which is frequented by duck in the autumn during their southerly migration. Apparently they do not, however, return by this route northwards, but prefer the way up the Turikho valley on their way back in the spring. This struck me as interesting, for it is a repetition of what happens in the Gilgit Agency. There the duck move southwards in the autumn by the Hunza valley, and return in the spring by Yasin. A possible explanation of this may be that when going south they choose the Hunza and Yarkhun valleys because the passes at their heads, the Kilik (or Mintaka) and Baroghil, are the broad obvious routes to take, while those leading into the Yasin and Turikho valleys are less open. On their return, however, the duck arrive at the junctions of the Gilgit and Hunza valleys in

one case, and of the Turikho and Yarkhun rivers in the other. At these points the Hunza and Yarkhun valleys are narrower and less conspicuous than the others, and the duck therefore select what appear to them at the time to be the more open routes and so migrate northwards by Yasin and the Turikho.

At Mastuj the Laspur river joins the Yarkhun and our road turned up the valley of the former. As we left Mastuj we had a marvellous view down the Yarkhun valley to Tirich Mir, whose snowy peak seemed to be suspended in the air, her lower slopes in the early morning haze, having assumed a blue tint which merged into the sky.

For about six miles the road runs along the right bank of the Laspur river, traversing the position at Chakalwat where, in 1895, Colonel Kelly's force, marching to the relief of Chitral, was opposed by some of the enemy who were investing our small garrison at Mastuj. Below Gasht village we crossed to the left bank by a good suspension bridge and for the next few miles passed through barren country, until we reached the open plain at Rahman. Into this area flow several considerable side streams, the most important of which is the Phargam, at whose head lies a pass leading to Chitral itself.

The horse-coping instinct always being strong in anyone with Irish blood in his veins, the march was enlivened by Trevelyan's attempts to buy a pony, and when we finally arrived at our camp at Sor Laspur we had no fewer than three quadrupeds tethered in the neighbourhood, all of whose owners were out to rob the stranger within their gates.

From Sor Laspur our next stage, over the Shandur pass, was one of 21 miles to Tehru, a village in the Political *ilaqa* of Ghizar of the Gilgit Agency. The son of the Hakim of Laspur, who was accompanying us, put everyone in a good temper at the start by attempting to ride over a very rickety bridge. The whole thing collapsed and in the colossal splash which followed nothing could be made out except legs waving frantically in the air. Luckily no damage was done.

From Sor Laspur to the crest of the Shandur pass the Survey of India map gives the difference in height as 3500 feet. I do not think it can be as much as this, for we reached the top in an hour and ten minutes. The crest is difficult to fix by eye for the road runs for some miles in a series of wide basins divided from each other by low ridges. On the open area at the top of the pass there are two lakes, one of fair size ; on its edge we saw a wolf, paying no attention to a small herd of half-breed yak which were grazing on the grassy

plain. There was also a flight of about twenty duck, which may have belonged to the pochard family, but it was impossible to distinguish them clearly.

On the far side of the pass there is a sudden descent to the Langar plain, an area covered with stunted bushes and excellent grass on which many herds of goats, sheep, half-breed yaks and ponies were grazing. At the foot of the descent is Langar, a normal camping-ground for travellers using the pass ; but as this is only about eleven miles from Sor Laspur, we pushed on another ten miles to Tehru, passing on the way the village and nullah of Chamarkand. At the head of this nullah lies a pass, slightly higher than the Shandur, leading to the northern end of the Mastuj plain in the Yarkhun valley.

The main part of our tour was now over and for the next few days we took things easily, moving camp to the village of Ghizar 4 miles and again to Chashi lake, 7 miles, while we spent our time fishing. Though we caught nothing large, there were plenty of small fish to be had, and our best basket for an evening rise to one rod was 15 fish killed, weighing 12¾ lbs., with an equal number of smaller ones returned.

From Chashi we marched to Pingal, 10 miles, where we were once more back on the old familiar road to Gupis and Gilgit, the remaining 93 miles to the latter being done in four days. On the whole tour we were away from Gilgit for twenty days, during which we covered a distance of just on 320 miles.

Owing to an unfortunate mistake the programme of our tour sent out before our departure from Gilgit, had been misread, and we descended from the Thui pass quite unheralded into the Yarkhun valley. In consequence the local inhabitants might well have been excused had any delay occurred in providing transport. Nevertheless we had not the slightest trouble and everything was found as quickly and as readily as if our coming had been known weeks before. In a country where wood and supplies are by no means easily come by it was very pleasant to see such a state of affairs, and it was most refreshing to find that the traditional hospitality of the mountain tribesmen is not yet a thing of the past and that they are still only too pleased to welcome an officer touring in their country. Throughout the whole journey we had not the slightest trouble anywhere, and both Trevelyan and I are exceedingly grateful for the kindness shown us during the short part of our tour in Chitral.

THE DHARMSALA DHAULADHAR IN 1930.

LIEUT. P. R. OLIVER.

THE Dhauladhar range branches from the Great Himalayan Range near Badrinath and runs south of the Baspa tributary of the Sutlej. It is cut in two by the Sutlej at Rampur and by the Beas at Larji; and it is crossed by the Ravi south-west of Chamba. The northern flank of the Dhauladhar range impinges against the southern flank of the Pir Panjal range at the mountain knot of Bara Bangahal.*

Owing to the political situation in India in 1930, my leave had to be spent in some district within 24-hours' recall of my regiment. After a frantic search for accessible mountains which would yield interesting climbing, I was inspired by Rundall's *Rambles and Scrambles in the Kangra Himalaya* and made straight for Dharmsala. This proved a very happy choice. Suitable camping-sites are found up the range at Triund and at Lakha, three and four hours' march respectively from Dharmsala. Of these two, Lakha, at some 10,000 feet above sea-level, is the better. It is situated where the big green ridge, stretching down to Dharmsala, abuts on the upper 5000-foot granite wall of the Dhauladhar range. Long couloirs of frozen snow seam this wall with shallow rocky ribs between them.

Interesting climbs, with magnificent views of the Kangra valley 12,000 feet below, can be had on this face. Most of the peaks can, however, be more easily reached by crossing the Indrahar pass, a depression on the axis, and turning them from the north by the undulating névé slopes which fall towards the Ravi. The views across the valley of the Ravi from these slopes are very fine.

The following brief notes on my climbs may be of interest to those whose leave may be as limited as was mine. These climbs were carried out in June, during the latter half of which month the weather was most uncertain. Probably a more suitable season would be the period from the 15th May to the 20th June.

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* S. Burrard: *A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet*, p. 88.

8th June. Went up to the Indrahar pass from Triund. Ascent from Lakha, 3 hrs. 10 mins. Descent 2 hrs. Aneroid height of pass 14,500 feet.

13th June. From Lakha with orderly to the Indrahar pass in 2¾ hrs. Halt of ½ hr. From here to Two-Gun Peak in 1¼ hrs.; rope not used. Two-Gun Peak to Indrahar pass, climbing Riffelhorn Gendarme and Slab Peak *en route* in 1 hr. 25 mins. Descent to Lakha in 1½ hrs.

15th June. Lakha to Indrahar pass in 3 hrs. Then roped along the arête towards the Mon. Had to descend on to the névé on the Chamba side to dump the orderly who was mountain-sick. Climbed Cairn Peak and descended to orderly. Pace back very slow owing to sickness of orderly.

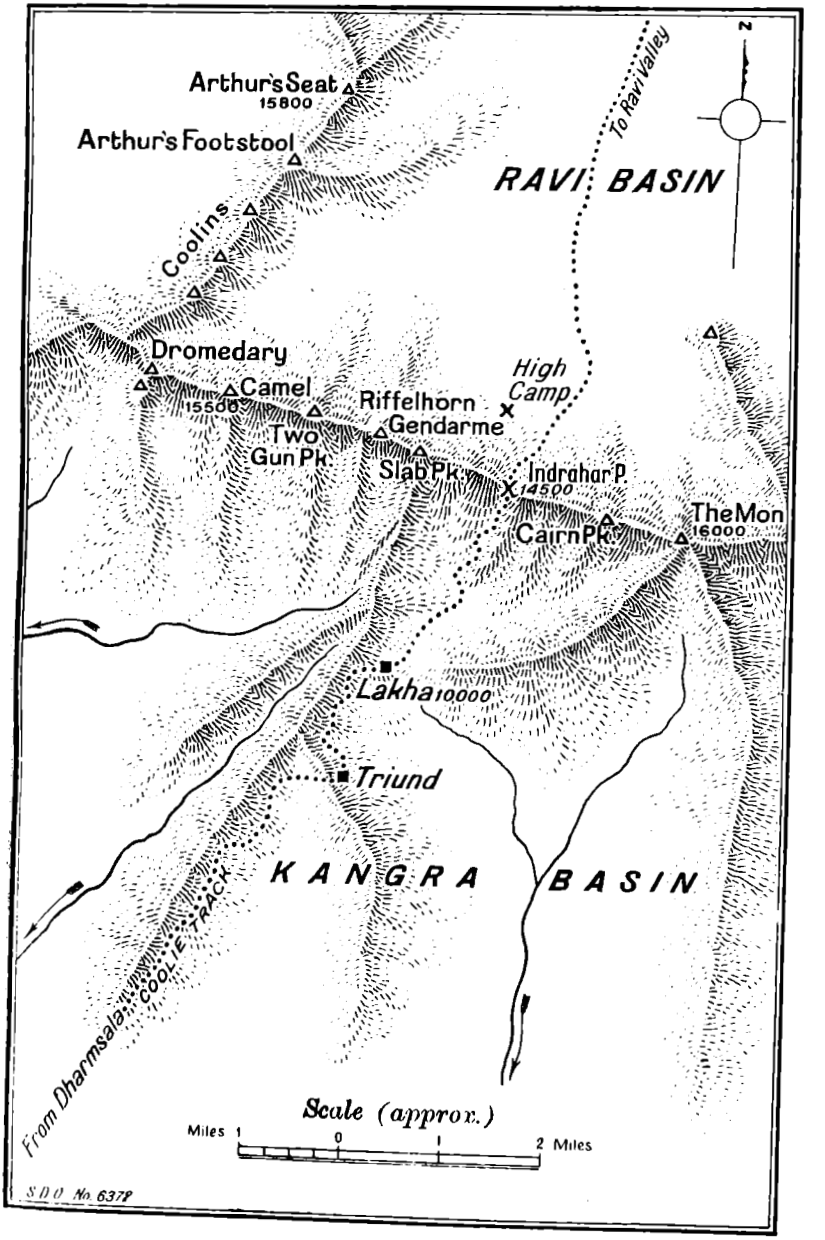
18th June. From Lakha ascended long couloir on crampons to depression on east of Slab Peak. Removed crampons and scrambled up a few slabs and chimneys to summit of Slab Peak; time 4 hrs. 35 mins. Return via Riffelhorn Gendarme; then wearing crampons down a funnel of steep frozen snow-slopes through a waterfall bottle-neck. Finally descended a broad couloir to the west of Ghuna hill in thick mist. It had hailed during my halt on the summit. Crampons were most useful, though on the descent the hail had made it necessary to be very careful that the spikes bit well through into the snow beneath. Time of descent, 3 hrs. 15 mins. Did this climb alone.

20th June. Ascended the Mon with orderly by the "back door." From Lakha to the Indrahar pass (3 hrs.); then to summit by the névé on Chamba side and north-west arête, up which we roped. Time from pass, 1¾ hrs. Hail-storm and lightning on summit. Aneroid jumped from 16,000 to 23,000 feet! From the Mon back to pass in 2 hrs.; thence to Lakha in 2 hrs. Orderly very sick.

23rd June. From Lakha to the Riffelhorn Gendarme, via the arête overlooking Two-Gun Gully and precipices. From Riffelhorn Gendarme by a high-level route over névé fields to the foot of the Dromedary. Ascended the north arête of the Dromedary. Snow was very soft; started a small avalanche with which I went down for about a hundred feet and stopped in a small 'schrund above the Dromedary snowfield. Time of ascent, 1 hr.

From the Dromedary back to the Indrahar pass by the high-level route (2 hrs. 20 mins.). Snow here was still hard as in the morning and in places steps had to be kicked. Indrahar pass to Lakha glissading down a couloir (1 hr.). Did this climb alone.

THE DHARMSALA DHAULADHAR.



27th June. Established a camp on a grassy ledge on a rock-rib in the névé about 500 feet below Indrahar pass on north side. Two porters sufficed to bring up the camp and then left for the *ghaddi* huts lower down. Slept comfortably in canvas-covered eider-down sleeping-bag and 8-lb. tent. Little streams of rather dirty melted snow running over the bare rocks provided me with almost sufficient water.

28th June. Climbed Arthur's Seat and the nearest Coolin to it (Arthur's Footstool). The route taken was probably the easiest and quite straightforward. Times : Camp to Col between Arthur's Seat and Footstool, 2¼ hrs. Col to Arthur's Seat, ¾ hrs., height about 16,000 feet. Ascended the Footstool later from the Col. Found a cairn at summit.

The western faces of the Coolins are very steep and nearly perpendicular in places, with a fall of about 1000 feet sheer to the névé. The same applies to Arthur's Seat and the Footstool. The view to the west was disappointing, as clouds blotted out everything but the lower névé slopes. Small camp-sites such as mine are possible almost anywhere along these northern slopes.

That night there was a bad storm with much rain from 2 a.m. to 7 a.m. Lightning was nearly continuous. My little tent leaked badly where the ground sheet joined the walls.

29th June. The porters arrived and carried my kit over the Indrahar pass to Lakha. I paid them Rs. 2 each for the days they took my camp up and down and Re. 1 each for the day they waited in the high *ghaddi* huts. They supplied their own food and were quite contented with their pay.

EXPEDITIONS.

Mr. F. Ludlow in the Tien Shan.

MR. F. LUDLOW spent the winter of 1929-30 in Kashgar. He left that place on 4th March, and travelling by the Maralbashi-Aksu route, crossed the Muz-art pass into the Tekkes valley on the 19th April. During the next two months he followed the Tekkes river eastwards as far as the Kök-su junction, halting for long periods and collecting butterflies, birds and plants on the way. He then made for the upper Kök-su, via the Karagai-tash Dawan and spent the months of July and August in the neighbourhood of the Kök-su-Yulduz divide, hunting and collecting. He returned to the Tekkes valley by the Kurdai Dawan, and re-crossed the Muz-art pass on the 10th September, eventually reaching Srinagar on the 14th November by way of the Pamirs and Gilgit.

A full account of this interesting journey is not yet available, nor is it possible to give more than a brief summary of the natural history collections made, until they have been worked out at the British Museum. These comprise 850 bird skins, 550 eggs belonging to 50 different species, between 1500 and 2000 butterflies and 250 different species of plants in duplicate. Animals shot include a 55½-inch *Ovis Karelini*, a 53-inch ibex, and a 15-inch roe-deer. Not a single wapiti was seen and only a few tracks of them. In the upper Kök-su certainly these are very scarce, as they are continually harried by Kalmuk hunters for their horns whilst in velvet. These are sold to the Chinese, a pair of horns in velvet fetching anything from Rs. 100 to Rs. 200.

Ludlow reports that the weather conditions during 1930 were good on the whole. There was no dust-haze north of the main range. The Chinese officials treated him with the greatest kindness and hospitality, and he found the Kazaks, Kirghiz and Kalmuks of the Tekkes very friendly and easy to get on with.

The Italian Expedition to the Karakoram, 1929.

Various brief accounts of the Duke of Spoleto's expedition to the Karakoram in 1929 have appeared in print, among them the lectures by His Royal Highness and by Professor Ardito Desio given to the Royal Geographical Society on the 24th and 25th February

1930, which were published, with some very fine illustrations, in the *Geographical Journal*, vol. lxxv, pp. 385 *sqq*. The following is a slightly more detailed account of that part of the expedition which entered the Shaksgam.

Early in May Dr. Umberto Balestreri was charged with the task of finding a way over the Muztagh pass. His party consisted of Giuseppe Chiardola and a guide, but owing to the latter falling ill, the reconnaissance was carried out by Balestreri and Chiardola. The pass was found to be fairly difficult and a way, suitable for porters, was only found after three attempts. Balestreri then spent a fortnight making preparations for the exploration of the Shaksgam and improving the track up the pass. During this time he climbed, on the 7th June, the peak immediately west of the pass for topographical purposes. The ascent was entirely on snow and ice and was not difficult, the summit, about 19,700 feet, being attained in five hours from the pass. Balestreri named the peak in Balti, *Karpho Gang* (= the White Glacier), on account of its glittering whiteness.

At sunrise on the 9th June the party, with Balestreri in command, and amounting to six Europeans and 47 native porters, crossed the pass and descended—some of the Italians being on ski—the Sarpo Laggo glacier. This was, as far as we know, the first time Europeans had been on this glacier since Sir Francis Younghusband ascended it from the north in 1887*. At both Chang-tok and Moni Brangsa, where the party camped, remains of old camps were found; these remains consisted of small walls, cairns, and tent emplacements. At Moni Brangsa a depot of stores was made and two Europeans, Caporiacco and Chiardola, with fourteen porters, who had been acting as a supporting group, returned over the Muztagh pass. The remainder, consisting of Balestreri (in command), Desio (geologist), Ponti (topographer), and Bron (guide), with 33 porters and a *chota shikari*, on the 12th June reached the snout of the Sarpo Laggo glacier (16,300 feet), and on the evening of the 14th entered the Shaksgam valley near Suget Jangal, where further traces of old camps were found. As was to be expected, the maps of this region were incorrect, and it is to be hoped that Ponti will give us a good survey of the ground. The Duke writes that the junction of the Sarpo Laggo stream and the Shaksgam is marked by an isolated rock, nearly 500 feet high, surmounted by a cairn, possibly erected to indicate the old

* Sir Francis Younghusband considers that the ice has extended on the south side of the pass, rendering it more practicable than it was in 1887.

route. The Shaksgam valley above the junction is narrow and deeply cut between high limestone cliffs; below, it suddenly opens out and looks almost like a continuation of the Sarpo Laggo.

In a letter Balestreri writes: "The following days we went up the wonderful Shaksgam valley, so full of magnificent scenery and of glorious views on the north side of K2. We reached the Gasherbrum glacier on the 18th and crossed it about two miles from the snout, because it was impossible to follow Younghusband's route between the foot of the glacier and the opposite wall of the valley. The crossing of this glacier was complicated and difficult and took us several hours." The actual passage was made by ascending the left moraine till a practicable route was found through the maze of ice-pinnacles which covered the surface of the glacier.

The section of the Shaksgam valley between the Sarpo Laggo confluence and the Gasherbrum glacier contained occasional oases, the surrounding mountains having dolomitic shapes, with towers, needles and pinnacles, with big accumulations of detritus at the foot of the terraced sides. A few miles below the Gasherbrum glacier Balestreri reports that a considerable tributary entered the right side of the Shaksgam valley; it seems that this must be the Zug-Shaksgam which was explored by us in 1926.

After passing the Gasherbrum glacier, the party crossed a pass on the ridge between it and the Urdok glacier, which Balestreri named the "Gasherbrum-Urdok Saddle," and from which a view up the Urdok to Younghusband's Saddle (Indira Col) could be obtained. His instructions were to make an attempt to find a pass, if possible, near Gasherbrum I (Conway's "Hidden Peak") into the upper Baltoro, and to go up the Shaksgam valley only if he had sufficient provisions. As these were getting low, he decided to ascend the Urdok glacier and try to cross "Younghusband's Saddle" at its head. Bad weather intervened, however, and he was compelled to return.

Balestreri now decided to make a dash up the Shaksgam. He first reduced his party by sending back Ponti and Bron with most of the porters, via the Muztagh pass to the Baltoro, and with Desio and eight porters started up the main valley. On the night of the 23rd they pitched camp on the right moraine of the Urdok glacier, near the wide flat bottom of the main valley, after a long march. The next glacier, reached the following evening, is the one shown on my map (*Records of the Survey of India*, vol. xxii) as descending from the Workman's "Turkistan La." Balestreri named it the *Staghar*

(= Many-coloured), owing to the alternating strips of ice and moraine. It was possible to skirt this without any difficulty by following a small corridor, 450 to 500 feet wide, between its snout and the opposite wall of the valley. The fourth glacier, shown on my map as descending from the northern slopes of Teram Kangri, was named by the porters the *Singye*, which in Balti means "difficult." Balestreri found the crossing of this extremely difficult and the party spent a whole day among its ice-towers, which he records were some 250 to 300 feet high. Very hard work with ice-axe and rope was necessary to overcome it. On the 27th June after a long and tiring march along the foot of the big reddish buttress, the "Island Ridge," they reached, late in the evening, the Kyagar glacier, which was discovered by my expedition in 1926. "The day had been splendidly fine, with a wonderfully blue sky," writes Balestreri. "All around us the scenery was glorious. We could easily identify your 'Island Ridge' and the 'Red Wall,' and the next day, from a small dome above our camp, we could see the cairn built on the right moraine of the Kyagar by your expedition. I cannot explain to you what I felt at that moment. Certainly it was one of the best moments of my life." At this point, 16,300 feet, a cairn was erected and a magnificent view was obtained up the whole of the Kyagar glacier to the Apsarasas group at the head.

During the journey up the valley a rough topographical and geological survey of the valley had been kept up; flowers, insects, and, it is interesting to note, fossils were collected *; meteorological observations were made. It was no part of the plan to attempt the crossing of the Kyagar glacier, and owing to shortage of supplies this

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* Professor Desio writes: "The high valley of Sarpo Laggo is mostly composed of gneisses and granites.... In association with them we find shales which reach their greatest development towards the lower and middle section of the glacier. In the former section gneisses and granites alternate with green schists, similar to the Shigar shales, and all the features recall those of the region between Baltoro and Biaho. Towards the end of the Sarpo Laggo glacier, the limestone series is met again, composed of grey limestone, clay limestone with a bluish tinge and fossil-bearing, and red shales and polychromous conglomerates. This series corresponds to that of the Golden Throne, slightly metamorphosed.

"The limestone sequence extends in the lower Sarpo Laggo valley, consisting here of grey limestone and black calcareous shales, separated from the preceding sequence by an outcrop of gneiss and granite which descends from the great valley of K². In the region where the valleys of Sarpo Laggo and Shaksgam come together, we find formations answering to the normal facies. They are mostly grey and black limestones, often bearing silex and more or less abundant in

would have been impossible. The return journey was therefore made by the outward route. The same difficulty was experienced in crossing the Singye glacier as before. The weather was, however, better than on the outward journey, and Balestreri was able to confirm our surmise that the Singye takes its rise from the glaciers covering the northern slopes of Teram Kangri. He also examined the snouts of both the Urdok (" which does not block the valley ") and Gasherbrum glaciers, which are very close to one another (" about half a mile apart in some parts"), and are divided by a small lake. After crossing the Gasherbrum glacier, the remaining marches were very strenuous, owing to shortage of supplies. Nevertheless a journey was made up a large affluent of the Sarpo Laggo, where an important glacier, descending from the northern slopes of K^2, was discovered.

After picking up the supplies at Moni Brangsa, Balestreri explored to the head of the Sarpo Laggo glacier in order to complete the survey of it. They climbed a saddle (the " Sarpo Laggo Saddle "), about 18,700 feet high, which forms an easier pass into the Baltoro basin than the Muztagh, by way of the Tramgo tributary glacier of the Baltoro. They also sketched the "Western Muztagh pass," leading to the Punmah glacier, and report that it can be very easily reached from the Chinese side. The party then re-crossed the Eastern Muztagh pass, by which it had left the Baltoro region five weeks before, and reached Rdokass on the 14th July.

Balestreri concludes a letter on this exploration with the remark: " All through our journey the health of Professor Desio and mine

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fossils, including corals, black, red, and violet calcareous shales, brown sandstones, and polychromous conglomerates. In other places whitish quartzites are met and greenstone dykes.

" This formation, which can be followed all along the Shaksgam valley, is frequently rich in fossils. A great many collected by me allowed me to ascertain their age as Permo-Carboniferous, revealed by the presence of *Fusulina*, *Polipora*, numerous *Productus*, including *P. punctatus*, and *P. pustulosus*, *Dielasma*, *Reticularia*, including *R. lineata*. The specimens collected were quite numerous, but unfortunately one of the cases containing them went astray during our return trip across Baltistan. The greatest number of specimens were taken in the Sarpo Laggo basin, in the middle Shaksgam valley, and in the Urdok basin. Nevertheless on my return trip I was able to collect a few from this region, which were packed in another case which reached home safely. Above this series lay a dolomitic limestone of light grey colour, in which I noticed the presence of sections of large shells which most probably, on account of their facies and of their stratigraphical position, belong to the Trias."—*Geographical Journal*, vol. lxxv, p. 404.

had been perfect, thanks to our good and long training as officers of Alpine troops and climbers in the Alps, and in spite of the fact that our journey had been very hard and difficult from an Alpine point of view in some parts, especially up the last glaciers of the Shaksgam valley." He considers the Kyagar is a very difficult glacier, probably very like the Singye in structure, height and intricacy of the ice-pinnacles. He believes that it is possible to cross it, though only a well-trained and well-equipped party made up of a few alpinists and first-class porters could hope to do so.

A photograph showing the surface of the Kyagar glacier, taken by me from one of the cairns mentioned by Balestreri appears opposite page 104 of *Himalayan Journal*, vol. i. The Singye glacier appears across the valley in the distance, and the slopes of the "Island Ridge" traversed by Balestreri are seen in the right middle distance. I agree with him that the Kyagar glacier is passable with great difficulty, but I am convinced from his account that it would have been wrong to expect our Ladakhi porters to cross and re-cross this glacier without expert European guidance, which would not have been available. We shall look forward to seeing the map of this expedition with very great interest.

The Netherlands Karakoram Expedition, 1930.

Mrs. Visser has already given an account of the explorations of the Netherlands expedition during 1929 in this Journal. The following is a brief summary of its explorations during 1930.

The expedition left Yarkand early in May. A good deal of trouble was experienced on the journey to the Karakoram pass, owing to the non-arrival of the caravan which was due to meet them at Malik Shah, two marches north of the pass, on the 4th June. Supplies ran short and the party had to return to Kök-yar, and ten days of valuable time were lost.

From Ali-nasar Kurghan, Mr. Visser and Franz Lochmatter made an attempt to descend the Kara-kash river, but found it impassable after about twenty miles, probably owing to the gorge. The weather was very bad and the snow late and deep on the passes, causing the caravan season to open nearly a month later than usual. Then it suddenly became very warm and the rivers became swollen and difficult.

After crossing the Karakoram pass, Franz Lochmatter reconnoitred down the Shyok valley to ascertain whether the route past the

Kumdan glaciers was passable. He found, as we expected*, that the Chong Kumdan had again formed a barrier across the valley and that a lake three miles long had formed behind it. In a report written at Leh, Visser calculates the depth of the water at the dam, on 20th June 1930 as 133 feet. There was no sign of the channel cut by the waters in 1929. He also examined the southern side of the dam from Saser Brangsa, on 9th July. No water issued from beneath the ice, but traces of last year's break were still to be seen.

The exploration of the right bank tributaries of the upper Shyok, south of the area surveyed in 1929, was then carried out. About half a march above Kataklik a large glacier was found jutting into the main valley. It issues from the third big western side-valley of the Shyok, south of Saser Brangsa. As far as we are aware, this glacier has been mentioned by no previous traveller, nor is it shown on the old Survey of India maps, which are decidedly sketchy hereabouts. "The distance between the snout and the west bank is approximately 600 feet" runs Mr. Visser's report. "The snout shows signs of further advance. As the question of this remarkable advance was for us of great interest, we examined the glacier very carefully up to the upper end. As the result of our observations we can state that at present there is no danger of the valley being blocked, although during a future period of growth a watch must be kept on this glacier" †.

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* "In my opinion the normal seasonal advance and regeneration in the coming winter will almost certainly close the narrow transverse channel which has been cut, and by next spring this should have completely healed. I believe that another lake will almost certainly form next spring, but since the seasonal retreat next summer will now be assisted by periodic retreat, the dam will definitely degenerate in height and strength."—*Himalayan Journal*, vol. ii, p. 46. I give the above quotation as evidence that it *is* possible to foresee something of what such glaciers will do, by an examination of all the facts known to us.

† *West* is probably an error for *east* in the above quotation. I personally do not think there can ever be any danger of this glacier blocking the Shyok valley, unless its period of advance synchronizes with the advance of the Chong Kumdan. Sufficient water should otherwise always be available from the ablation of the Rimo, the Chong Kumdan, the Kichik Kumdan, and the Aktash glaciers to keep a channel clear either round or under the snout.

In another part of the same report Visser says: "Many of the glaciers of the Nubra and Shyok showed signs of considerable growth, so that the Kumdan glacier shares in the general and rather considerable advancing movement." After a very careful study of the known history of a number of Karakoram glaciers, I do not believe it is possible to generalize either with advance or retreat. There are too many factors that affect each glacier individually. I may quote

We understand that a large area of country east of the Nubra-Shyok watershed has been explored and surveyed during the expedition. The Survey of India attached a surveyor, Muhammad Akram, for the purpose.

The Expedition returned to Leh towards the end of July.

Professor Dainelli's Karakoram Expedition, 1930.

Professor Giotto Dainelli, who accompanied Sir Filippo De Filippi on his expedition to the Karakoram in 1913-14, carried out a most interesting journey of exploration during 1930, connecting up the work of the Workman's on the Siachen and the previous surveys of De Filippi on the Rimo glacier. Unfortunately only a bare outline of the route has so far reached us, and this outline is destitute of dates.

It appears that Professor Dainelli ascended the Nubra from Panamik and traversed the whole length of the Siachen glacier from its snout to the junction of the Teram Shehr glacier. Fortunately he took sufficient supplies from the Nubra to be independent of this line of communication, for fifteen days after getting on to the Siachen glacier, he was completely cut off from Panamik by the Nubra river becoming unfordable. He could neither receive further supplies, nor send back the coolies who had brought up his six tons of food for work on the glacier.

He spent about two months on the Siachen glacier, presumably the months of July and August, and crossed with some difficulty the pass at the head of the Teram Shehr to the Rimo glacier, taking fifteen days over this journey. He appears to have quitted the Rimo glacier by the tongue of ice thrown over the Central Asian watershed, which forms the source of the Yarkand river, discovered by Wood in 1914. Difficulties were increased by bad weather during this portion of the journey, which coincided with a week of continual storms. It is understood that Dainelli found that the snout of the Yarkand-Rimo

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the example of two neighbouring glaciers, the Chong Kumdan and the Kichik Kumdan. One is at approximately its maximum advance, while the other is at its maximum retreat. In Hunza Nagar, we have the example of the Minapin and the Hasanabad glaciers, on opposite side of the Hunza valley. The first has advanced considerably, reached its maximum advance, and gone back to nearly its position of maximum retreat, while the Hasanabad has remained almost stationary throughout this period. Both are transverse glaciers. My own conclusions are that some glaciers are advancing and some retreating as far as periodic movement is concerned, while the few indications that we have concerning secular movement tend to show that this movement is one of retreat.

glacier had grown, or at any rate the ice at the snout had increased since 1914, making the descent more difficult. If this is so, it seems that the increase must have occurred during the last four years, for a photograph taken by us on 1st July 1926 showed a snout very similar to that shown in 1914, and in 1926 there were distinct signs of a terminal moraine forming. * The detailed results of this exploration will be awaited with interest.

Tours in the Gilgit Agency.

Mr. H. Todd, the Political Agent, and other officers stationed at Gilgit have been most active during the last three years in examining the snouts of glaciers in the Agency. The following notes have been compiled from letters and notes sent to the Hon. Editor by Mr. Todd.

The Karumbar Glacier. (Ishkoman District, Gilgit Agency, Survey of India Map No. 42 L.)

About 2nd March 1930 the local chief in the Karumbar valley went to see if the route in this valley was clear for a tour that Mr. Todd proposed to undertake. He found that the glacier above Bort had advanced a very long way in the past year, but that it was still about a hundred paces from the far bank. On the 22nd March, however, one of his men reported that the glacier had closed up and blocked the entire valley. The chief, doubtful of the accuracy of this report, again went up the valley to investigate and found that the glacier had actually advanced a hundred paces in three weeks.

Mr. Todd visited the glacier on 20th October and found it stretching right across the main valley with its snout hard pressed against the high steep cliff of the far bank. He estimated the height of the snout to be between 120 and 150 feet, and its breadth from 250 to 300 yards. The width of the valley at the block is about 400 yards wide. Some local Wakhis had succeeded in crossing the glacier to visit their fields upstream, but it must have been a perilous passage owing to the formidable barrier of ugly pinnacles and crevasses. The main river was flowing underneath the ice close to the snout and was quite clear. The muddy waters of the glacier itself were issuing from it some 200 feet above the snout.

In recent years floods have been caused by the bursting of the Karumbar ice-dam on two occasions, in July 1893 and in June 1905. Mr. Todd gives the following information concerning the latter,

* *Records, Geological Survey of India*, vol. lxiii, Pt. 2, 1930, p. 275.

thereby supplementing the notes he gave in his letter published in the *Himalayan Journal*, vol. ii, p. 174.

In the autumn of 1904 the Karumbar glacier made an advance similar to that of last spring, and eventually closed against the cliff on the far side in November and December 1904. It was inspected in April 1905 and reported to be about 120 feet high at the snout. A lake formed behind the barrier in the winter and spring of 1904-5, which was reported by locals to be stretching for a full day's march upstream, a statement which was probably exaggerated, unless the march is considered a laborious and difficult one. On the night of 17-18th June the imprisoned waters forced a channel underneath the glacier, and the ice-bridge above the tunnel gradually caved in. The resulting flood reached Gilgit about 8 A.M. where it carried away the one-pier bridge.

It will be interesting to note whether a similar flood occurs next year. If we take the block dates as the winters of 1891-2, 1904-5 and 1929-30, the intervals between the times of maximum advance are approximately 13 and 25 years. It would be interesting to know whether there was a minor block about 1917, which would give us a fairly regular periodicity of about 13 years. We are still groping for the laws that govern glacier-movement and we hope that the future movements of this glacier will be recorded annually by the authorities at Gilgit.

The Minapin Glacier. (Nagar State, Map 42 L.)

Mr. Todd visited this glacier on 17th April 1929 and on 18th April 1930. He found on his first visit that the attenuated end or "tongue," observed by the Vissers in 1925, had melted away and that the actual snout was about 100 yards further back. The villagers reported little change in the previous four years.

On his second visit, in 1930, he found that the tongue had melted again considerably and ended from 300 to 350 yards further back from the position observed by the Vissers. The "forehead" above the tongue had sunk very considerably since his visit in 1929.

This glacier was one of those measured by the late Sir Henry Hayden in 1906; and we know something of its position from old maps in 1889, 1892 and 1893. It was observed by me in 1913, using Hayden's marks as references, and in 1925 by the Vissers. These observations indicate a slow but steady periodic advance between 1889 and 1892, when a rapid advance of 1200 yards occurred. By 1906 the snout had advanced a further distance of 300 yards, i.e., the average annual advance between 1893 and 1906 was 23 yards as

against about 33 yards between 1889 and 1892. The glacier was still advancing in 1906 when seen by Hayden, at an average annual rate of 33 yards and was nearly at its maximum position of advance when I observed it in 1913. Retreat set in soon afterwards, slowly at first, but by 1925 it had retreated some 600 to 700 yards and had formed a degenerate tongue. Mr. Todd's observations show that this degeneracy is still very marked.

Observations have not yet been carried on over a sufficient length of time to determine the periodicity accurately, but on plotting the position of the snout in various years and taking into consideration the topography of the valley, I believe that the glacier will be at its maximum retreat about 1937, giving a total periodicity of about 48 years, 24 of advance and 24 of retreat.

It is to be hoped that every traveller who passes up the road through Nagar will halt at the Minapin rest-house and record the position of this glacier's snout. A record of the observations made up to date may be seen at the Political Agent's Residency at Gilgit.

The Hopar Glacier. (Nagar State, Map 42 L.)

Observations of this glacier have not been carefully recorded in the past. Nor would it be easy, owing to the compound basin of the glacier, to draw any deduction regarding its periodicity. When Visser saw it in 1925 the snout crossed the Hispar valley and he considered that there was a danger of it blocking the valley. Sir Martin Conway's map showed the snout about a quarter of a mile clear of the valley.

In the spring of 1929 Todd found the snout some 750 yards back from the position recorded by the Vissers, while on 20th April 1930 it had again advanced some 600 yards. Captain Berkeley, Commandant of the Gilgit Scouts, visited this glacier later in the year and found the snout pressed against the other side of the valley, while the Hispar river had forced a way under the ice.

The Pasu and the Batura Glaciers. (Hunza State, Map 42 L.)

Mr. Todd, the Political Agent, visited these two glaciers in the springs of 1928 and 1930. Both are apparently stationary and have altered little in the last forty years.

The Hispar Glacier. (Nagar State, Map 42 L.)

The Hispar Glacier fulfils most of the conditions for a glacier in which secular movement at the snout should preponderate over periodic and other movements.

Captain Berkeley visited the snout of the Hispar on 10th November 1930 and found that it was about 120 yards further back

from the position observed by the Vissers in 1925. His guide informed him that it had been about 20 yards further back than its present position, in 1928. There is little doubt that over a long period the secular movement of the Hispar is one of retreat.

Three glacier tributaries of the Hispar are of considerable interest, though accurate observations as yet do not extend over a sufficient length of time to draw any conclusions. These three are the Kunyang (Kuinang or Lak), the Garumbar and the Yengutz Har (Yengutsa).

The Yengutz Har Glacier. To take the last first. *Yeng* means "a mill," *utz* being the plural suffix. *Har* denotes "a valley." In 1892 Sir Martin Conway recorded that the path from Darapu to Hispar descended into a precipitous gorge. "In its bowels some half-a-dozen mills find a footing. The path goes round by these and mounts to the fair fields of Hispar."* Conway's map showed the snout of the Yengutz Har glacier, which he called the *Rungpa*, a little over 1½ miles from the mill-path. In 1906 Sir Henry Hayden marked the position of the snout and recorded that in about 1901 the glacier had advanced two miles. "Now the path," he wrote, "instead of descending, climbs arduously over a steep mass of black and slippery ice, the mills are gone, and their ruins hidden under the snout of the advancing glacier."†

In 1908 the Workmans examined the Yengutz Har, and found that it manifested only a small decrease in thickness and length. They recorded a recession of 989 feet from the line joining Hayden's pyramids.

I first noted a further change when I examined Khan Sahib Afraz Gul's map which he executed on the Visser expedition of 1925. On this the snout of the glacier was shown to have retreated about 1000 yards since 1906 and the path was drawn as crossing the gorge some distance north of the snout. I then concluded that the sudden advance in 1901 was undoubtedly accidental and was probably caused by an earthquake or sudden relief from some obstruction (*Rec., Geol. Survey of India*, vol. lxiii, p. 229).

Captain Berkeley examined the glacier in November 1930, and I cannot do better than quote his note *in extenso*.

"This glacier has retreated still further and I found the snout—after an arduous climb of at least two miles—at about 13,000 feet,‡

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* *Climbing in the Himalayas*, p. 325.

† *Records, Geol. Surv. of Ind.*, vol. xxxv, p. 134.

‡ This is about 2000 feet higher than its altitude in 1906.

just at the present snow-level on the northern slopes. It showed great deterioration and was difficult to identify, for it is not visible from below. While cairns were being erected on each bank I climbed another mile up the glacier but could see little more. Judging from the enormous amount of ice clinging to the almost perpendicular mountains which hem this glacier in, I should think that it is subject to frequent ice-avalanches.

" I was told that the Mir of Nagar had sent a party up this glacier after the catastrophe of about 1901, but it was unable to get more than five miles from the position of the present snout. It reported that, although the slope became less steep at this point, the ice was forced into such high pinnacles and was so intersected by crevasses, that further progress was impossible, especially as the walls on either side and a dividing hill in the middle were quite perpendicular. I was told, however, with some assurance, that the glacier has its origin at approximately the same place as the Barpu. I also obtained from the old guide a report of the sudden advance of this glacier, which according to Sir Henry Hayden occurred in 1901, and I give it, as far as possible, in his words:

" ' The glacier was above where the present snout is. One day, when the crops were about a hand's breadth high [end of May ?] we noticed that the water in the irrigation channels was very muddy and was coming in greater quantity than usual. We went up the nullah to see what had happened and saw the glacier advancing. It came low down, like a snake, quite steadily ; we could see it moving. There was no noise. At the same time water and mud gushed out from the ice while it was still advancing and flooded our polo-ground and some fields. When an obstruction got in the way the ice went round it at first and then gradually overwhelmed it. The ice was not clear but contained earth and stones. All our mills and water-channels were destroyed. The ice continued to move for eight days and eight nights and came to a stop about forty yards from the Hispar river. As soon as the ice stopped, the mud and water, which had been coming out higher up, stopped too. The ice remained down for fifteen years, during which time one man to each house remained in the village. As all our cultivation was spoilt and we could not bring another water-channel to our fields while the end of the glacier was below them, the Mir fed us. Twelve years ago the ice began to go back. Each day a length of about fifteen yards would break off from the main ice and was washed away by the water. And once again water commenced to flow out of the glacier

above the village and we were able to make another water-channel. The ice continued to go back until about three years ago when it stopped where it is now.' "

The Garumbar glacier, the first glacier tributary to join the main Hispar glacier on the south bank, is now, according to Berkeley, definitely retreating. On Sir Martin Conway's map of 1892 it was shown (as the *Charum* glacier) nearly 1½ miles from the main trunk of the Hispar. In 1925 it had joined the latter. Now, according to Berkeley, the ice again no longer reaches the main trunk and in the two thousand yards which are visible from the north of the Hispar, there are no fewer than four ice caves, all with streams pouring from them. This glacier, according to local legend, made a sudden advance before the Yengutz Har and so swift was its progress that it is said to have overwhelmed two women who were fleeing before it.

The third tributary is the *Kunyang glacier*. This has a fall similar to that of the Hispar and appears to have advanced in the last fifteen or twenty years. There is a cairn which is said to mark the position of the snout about that time and this is fifty yards from the Hispar. The Vissers in 1925 recorded that the Kunyang had recently shrunk considerably in volume. Berkeley records that in 1930 the Kunyang joins the Hispar glacier and the red stones which it carries run along the Hispar for about a mile after the junction.

IN MEMORIAM.

CHETTAN.

WHEN mountaineers began the exploration of the Alps they found no native guides with any craft beyond that gained in chamois hunting: it was through association with amateurs that the Alpine guide came into being. So in the Himalaya, though Younghusband, Mummery, Bruce and others have found good local talent amongst the hill tribes, the native guide has not as yet been evolved. The lamentable death of the Sherpa, Chettan, on Kangchenjunga has cut short the life of one who might well have developed into a real guide. A number of Gurkhas have been trained by British officers, and Kellas did all his climbing with men he recruited in Sikkim and trained himself; yet the Sherpas and Bhotias selected by Bruce for the Everest expeditions are generally considered the best material for our purpose. Chettan was one of the best of these, and his companion Lewa is another.

Familiarly known as "Satan," he began his mountaineering career as personal attendant to Finch during the second Everest expedition. Finch liked him and taught him something of the use of axe and rope. He went twice to Camp 5 with Finch and Geoffrey Bruce. In 1924 he was one of the "Tigers," who survived the earlier buffets of that year's terrible weather. He was one of the two men selected by Hingston to accompany him when bringing down Norton snowblind from the North Col, a most memorable feat for all concerned. In 1926 Somervell selected him to join Hugh Ruttledge's party in Kumaun, and he stayed on with the party after Somervell's departure. Ruttledge notes that on Qalgunga Chettan carried twice as heavy a load as anyone else. On the descent of the Ralam pass he was given charge of a rope, and when his party of local porters slipped, though he could not hold them all, he kept his head and his balance and steered them to safety, afterwards restoring their moral by continuous ragging. On Kailas General Wilson was impressed not only with his climbing powers, but by his mountain judgment and keenness. Again on the descent of Traill's pass he was entrusted with a rope, got his party safely down a rotten cliff and showed great steadiness lower down among bad crevasses. Ruttledge is confident that the local porters would not have faced this descent but for Chettan, so that he was really doing a guide's work.

Ruttledge again got Chettan in 1927 for an excursion into Garhwal. He brought Lewa and four other Sherpas with him, and with these six men we found ourselves quite independent of local assistance. Though Chettan did all our cooking he carried a heavy load up the glaciers. During the reconnaissance of the Nandagini pass in bad weather he was quite unconcerned, discussing all the time how Trisul could be climbed from that side.*

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* Chettan was a Sherpa from Solakhumba, a Tibetan Settlement near the southern slopes of Mount Everest, in Nepal territory. To make Dr. Longstaff's admirable record of Chettan's exploits complete, we may perhaps mention that he was Bauer's personal servant on the 1929 Bavarian expedition to Kangchenjunga, and he was on that occasion one of the porters selected for the final assault on the mountain. During the 1930 International expedition he was Schneider's personal servant. Smythe writes of him after the avalanche disaster in which Chettan was killed: "We had lost not a porter, but a valued friend. We left him buried amid one of the grandest mountain cirques in the world. So died a genuine lover of the mountains, a real adventurer at heart, and one whom members of several Himalayan expeditions will mourn." (*The Kangchenjunga Adventure*, p. 256.) —ED.

Photo. H. Ruttledge.

CHETTAN.

Chettan was intelligent and quick to learn. Also he was particularly easy to get on with. He was always keen and always cheerful —sometimes *too* cheerful; but only after work was over and finished, and he bore no malice under correction. When I parted from him in 1927 I offered him a present of money, but he asked me to give him my clasp-knife, saying that thus he would be reminded of me daily; while the money he would surely spend and forget all about. He understood what mountaineering means to us and shared our interests to the full. He was on the road to be a guide, with all that word implies among mountaineers, which is that the servant becomes a companion and a friend.

T. G. LONGSTAFF.

CAPTAIN FRANK ASHCROFT.

(1900–1930.)

CAPTAIN FRANK ASHCROFT, 6th Royal Battalion 13th Frontier Force Rifles (Scinde), was killed with eight of his men in action against the Hathi Khel Wazirs on the 24th August 1930, after inflicting considerably higher casualties on the enemy. The untimely death of this gallant officer is a great loss to his Battalion and to the Indian Army, while for those who knew him well there remains a gap which cannot be filled. He was a keen member of the Himalayan Club, his last venture among our mountains being through Chitral to the Badakshan border. He was of exceptional ability and efficiency and in addition possessed those qualities so necessary for Himalayan travel, which combine cheerfulness, inventiveness and a peculiarly imaginative sense of humour.

W. FITZ-MAURICE.

GILBERT EDWARD ROUTLIFF COOPER.

(1885–1930.)

GILBERT COOPER, who died at the early age of 45 from jaundice and heart-failure in the Rangoon Hospital on the 11th March, spent most of his service in the Survey of India on topographical work in Berar, the North-West Frontier and in Burma. He served with the East Persia Survey Party during the Great War and in the Afghan War of 1919.

A prominent member of the Bombay Natural History Society, his private collection of butterflies being one of the finest in the East,

he was regarded as one of the first authorities in India on Oriental Butterflies. He was also a keen *shikari* and had made several Himalayan journeys, both on duty and for sport. He was elected to the Himalayan Club in 1929 and had promised to contribute a paper on Oriental Butterflies for publication in this Journal. Unfortunately this was not sufficiently advanced when he was taken ill.

KENNETH MASON.

LIEUTENANT IAN MACFARLANE CADELL.

(1902–1930.)

IAN MACFARLANE CADELL, son of Lt.-Col. Cadell, I.M.S., was born on 30th July 1902 and commissioned in the Royal Engineers on 31st August 1922. He arrived in India on 13th March 1925 and was appointed to the Survey of India a year later. He died of pneumonia at Loi Hkio in the Southern Shan States on 27th December 1930.

The first ten months of his service in the Survey of India was on an instructional course at Dehra Dun. Towards the end of this he was an indefatigable observer for the International Longitude determination of October–December 1926. Immediately after this he joined " A " Company on the Frontier and carried out very strenuous triangulation in Chitral, his energy being the admiration of all who witnessed it.

He returned to Dehra Dun in January 1929 and after holding charge for short spells of the Levelling Party and Drawing Office executed some work in the outer Himalaya to settle the Deori Kharam boundary dispute between Sirmoor and Jubbal. He was given charge of 15 Party (triangulation) in August 1929.

The main feature of the programme was the accurate connection of the triangulation of India and Burma with that of Siam. In 1881 a series of triangulation had been observed just south of latitude 14° connecting Bangkok with the Burma Coast Series. This was not of the necessary precision for to-day in view of the amount and quality of triangulation subsequently observed by the Siamese Survey Department; and the International Union of Geodesy and Geophysics had passed a resolution in 1927 urging that the triangulation of Burma and Siam should be adequately connected. It was decided that two connections should be made, one at latitude 20°, which entailed re-observing the old Mong Hsat secondary series and also extending the Great Salween Series to join the north terminus of the Siamese

triangulation; and the second at latitude 10° 45′ in the Mergui neighbourhood.

Work on the first of these was commenced in 1928-29; but failed owing to instrumental defects. In 1929-30 Cadell began the southerly extension of the Great Salween Series. The climate of the Southern Shan States is not favourable to triangulation and work was very much impeded by bad visibility. Though he took the field at the earliest possible time he was only able to complete 6 stations, when work had to be stopped in mid-February. He had meantime reconnoitred for a base-line on the Kengtung plain.

On taking the field again in September 1930 he had the task of completing the junction of the Great Salween and Mong Hsat Series with the Siamese work, for which 8 stations remained to be observed and further the connection and measurement of the base and certain essential astronomical observations at the base and contiguous stations. He had also to supervise the work of an assistant whose task was to effect the short connection near Mergui. He set to work with his usual zeal and in spite of spells of unsatisfactory weather he completed 7 of the stations early in December 1930. One station, Loi Hkio, only remained to be observed to complete the triangulation proper. It appears that he reached this station about mid-December. His last letter of 22nd December made the first reference to ill-health when he wrote that he had a temperature of 102° and was out of action for the present, but that he hoped to be fit again within four or five days.

A fortnight before this was received in Dehra Dun, came the telegram despatched from Mong Ping by his computer saying that he had died of double pneumonia on the night of 27th December 1930.

It appears that he had not troubled to take any medicine with him, although he had made adequate provision for medicine chests for his scattered detachment, and no doubt he relied on his strong constitution to carry him through. A few days before his death he wrote to Kengtung for help and advice; but this was too late. His letter only reached the Mission Doctor on the 27th who kindly arranged for Rev. Dr. Buker to select a site for a grave and to conduct the burial service. Cadell's body had meantime been carried down to Mong Ping and there he was buried near the bungalow.

Any one who knew Cadell on his professional side will realise that it must have been a very bitter trial to him to become sick at a time when he was within sight of completing his main task. He had given his very best to carry out all that was entrusted to him;

but alas! he must have over-taxed himself and paid scant heed to his own well-being. All who knew him were his friends and certainly the writer, under whom he was serving, reposed complete confidence in him. His death is a grief to all his colleagues.

The unfinished part of his work has now been completed by another officer. What a pity that poor Cadell could not know of this!

J. DE GRAAFF HUNTER.

NOTES.

ROYAL GEOGRAPHICAL SOCIETY AWARDS, 1930.—His Majesty the King-Emperor approved the award of the Founder's Gold Medal of the Society to Mr. F. Kingdon Ward for his explorations in the Eastern Himalaya and North-Eastern Frontier of India. This award has been exceptionally well earned as the result of a number of valuable journeys, the first of which, in 1909-10, was across China, Szechuan, Shensi, Kansu and through the gorges of the Yangtze.

In 1909 Kingdon Ward crossed Yunnan from Burma and entered Szechuan and south-eastern Tibet. Two years later he was in the same regions as far as the Wi Chu, and in 1914 he made a journey on the north-east frontier of Burma, up the 'Nmai Hka, across to Fort Hertz, and down the Mali Hka.

After the war, throughout which he served in a military capacity, Kingdon Ward was again on the Burmese frontier in 1919. Two years later he crossed Yunnan to the little kingdom of Muli in Szechuan, afterwards following the Mekong to Yakalo, and, crossing the headwaters of the Irrawaddy to Fort Hertz, came down to Myitkyina. In 1924 he took the Sikkim-Lhasa road to the Yamdrok lake, thence to Tsetang on the Tsangpo, which he followed to the Gyamda confluence. He carried out explorations round Namcha Barwa—the great mountain of the eastern Himalaya discovered by Morshead and Bailey—traversed the Gyamda valley, northwards towards the Peking-Lhasa road, and explored the Tsangpo gorge to the Po-Tsangpo confluence, afterwards returning through Eastern Bhutan.

In 1926 from Fort Hertz, Kingdon Ward reached the Nam Tamai and the Seinghku valley, crossed the Diphuk La to the Lohit, and came down through the Mishmi hills to Sadiya and Assam. In 1928, he was again in the Mishmi hills and followed the Delei river almost

to its source*. His recent journey in 1929 across to Annam was briefly referred to in the last volume of the *Himalayan Journal* †. He is once again somewhere on the borders of Burma.

Most of Kingdon Ward's journeys have been undertaken with a view to collecting rare plants and introducing them into England; but much interesting geographical knowledge has also been accumulated by him. Prior to this award the Royal Geographical Society had on two occasions, in 1916 and 1924, awarded him the Cuthbert Peek Grant. Popular accounts of his plant-hunting and geographical work are contained in the following books written by him:

1911.	*The Land of the Blue Poppy*	.. (1913).
1913.	*The Mystery Rivers of Tibet*	.. (1921).
1914–1919.	*In Farthest Burma* ..	.. (1920).
1921–22.	*From China to Hkamti Long*	.. (1924).
	The Romance of Plant-Hunting	.. (1924).
1924.	*The Riddle of the Tsangpo Gorges*	.. (1926).
1926–1928.	*Plant-Hunting on the Edge of the World.*	.. (1930) ‡.

THE COUNCIL OF THE SOCIETY also awarded grants to two other Founder Members of the Himalayan Club, namely COLONEL H. WOOD, late a Director of the Survey of India, and LIEUT.-COLONEL REGINALD C. F. SCHOMBERG.

COLONEL WOOD who received the Murchison Grant, retired from the Survey of India on the 28th October, 1927. Much of his service was spent in elucidating Himalayan and Trans-Himalayan problems. It was in 1903 that Lord Curzon, then Viceroy of India, decided to settle the controversy concerning the nomenclature of Mount Everest and obtained the consent of the Nepal Durbar to the despatch of a party under Captain Wood in November of that year in order to ascertain whether Everest and Gaurisankar were identical. Wood established the separate identity of the two peaks.§

At the conclusion of the Tibet Expedition in 1904, Captain Wood accompanied Captain Ryder's expedition which, north of the Himalayan watershed, explored the Tsangpo to its source. In 1914 he was in charge of the party attached by the Survey of India to Sir

* *Himalayan Journal*, vol. i, p. 51.

† *Himalayan Journal*, vol. ii, p. 114.

‡ *See* Review on page 138 of this volume.

§ *Report on the Identification and Nomenclature of the Himalayan Peaks as seen from Katmandu, Nepal*, Dehra Dun, 1904.

Filippo De Filippi's expedition to the Karakoram, during which he explored the headwaters of the Yarkand river. After the war, in which he served with distinction both in France and Macedonia, he was most anxious to secure permission to complete the exploration of the Yarkand river basin and the unknown course of the Shaksgam river, but to his disappointment sanction was cancelled after his preparations were well advanced.

For his services with the De Filippi Expedition of 1914, Wood received the thanks of the Italian Government and the Order of the Crown of Italy.

COLONEL REGINALD SCHOMBERG, who received the Gill Memorial, has spent most of his leave travelling in the Himalaya or other parts of the world. In 1903, 1905, and 1906 he visited the greater part of Bashahr, Spiti, Lahul and Kangra. In 1907 he was in Central Baluchistan (Kelat, Khozdar, etc.), and two years later he visited the Wardwan valley and Kishtwar. During 1912 and 1913 he made three journeys on foot across the Malay Peninsula: (1) Through upper Perak across the watershed of the peninsula to the source of the Kelantan river, which he followed to its mouth. (2) From Kuala Lipis, Pahang, to Kuantan, Pahang; thence on foot to Kemaman, by boat to Trenganu and up the river of that name. (3) From Sengora, Siam, across to the Kedah frontier, and thence to Alorstar.

In 1923 Schomberg visited Ladakh as far as the Changchenmo region, and in 1926 travelled through Gilgit and Hunza to the Pamirs and Kashgar. The following year he again went to Kashgar with the main object of exploring those regions of the Tien Shan and Great Altai, which are still shown so inadequately on existing maps. A brief account of his journeys in these parts was given in *Himalayan Journal*, vol. ii, pp. 104–107.

Owing to an accident Colonel Schomberg had to return to England to undergo an operation early last year. He went back however to Central Asia during the year and is again "somewhere in the Tien Shan."

KAMET.—In view of Mr. F. S. Smythe's proposed expedition to Kamet this year, a brief recital of previous attempts has been compiled with the assistance of Dr. Longstaff.

Kamet, 25,447 feet, the *Central Ibi Gamin* of the Schlagintweits, the *Kangmen* of Ryder, and the *Kangmed* (= Lower Snows) of the

Tibetans, stands to the north of the Great Himalayan axis. It is situated in the extreme north of Garhwal, on the watershed between the upper Alaknanda (Saraswati) and the Dhaoli rivers, one mile south of that section of the Tibetan border between the Mana and Niti passes. Climatically however, it lies almost in southern Tibet; it is subject to incursions of the Indian monsoon, but fine spells are not uncommon during that period, when the hot Tibetan sun blazes down fiercely on the higher altitudes. From the Indian side Kamet is inconspicuous from Almora, but it forms a towering landmark from all the elevated parts of northern Guge and Chumurti.

Kamet is the highest of a group of four peaks, the Western (24,200), the Central (25,447) and the Eastern Ibi Gamin (24,170) of the Schlagintweits, and the Mana peak (23,860). Richard Strachey in 1848 was the first to determine their positions and heights trigonometrically *. The next European travellers to this region were the brothers Adolf and Robert Schlagintweit, who made a record ascent of 22,259 feet on what they believed at the time to be Kamet itself. Coming as they did from the Tibetan side, it is now almost certain that this attempt was made on the northern outlier, Eastern Ibi Gamin†.

There appear to have been no further expeditions of importance into this group until the survey of it under Mr. E. C. Ryall of the Survey of India in 1874–77. In those years Kamet was accurately fixed, both for position and height, but the trigonometrical observations to E. Ibi Gamin were considered doubtful and were rejected, while no observations for height were made to either E. or W. Ibi Gamin. During the topographical survey Mr. I. S. Pocock of the Survey of India set up his plane-table at a height of 22,040 feet, also probably on the slopes of E. Ibi Gamin.‡

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* Brief accounts of Richard Strachey's journeys and his brother's, appeared in the *Journal, Asiatic Society of Bengal*, xix, 1850. *See* also H. Strachey's *Physical Geography of Western Tibet* (*R. G. S. Journal*, xxiii, p. 25). Strachey's observations appear to have been subsequently lost after his return to England, and after the compilation of his map.

† *Alpine Journal*, xxxiii, p. 72.

‡ *Survey of India Synoptical Volume* xxxv, p. *xxxiv*; *see* also Dr. Longstaff's paper in *Alpine Journal*, xxv, p. 401, and Mr. C. F. Meade's paper in *A. J.*, xxxiii, p. 72. Pocock worked from the Mana or western side of the group; Meade considers that the only approach to that altitude is from the E. Ibi Gamin direction. The illusion from the Mana side that E. Ibi Gamin is merely an excrescence on the ridge of Kamet is extraordinarily strong.

In July 1907, Major the Hon. C. G. Bruce, Mr. A. L. Mumm and Dr. T. G. Longstaff made a preliminary reconnaissance from both the Niti (east) and the Mana (west) sides*. From the Niti side Bruce and Longstaff reached a point 20,180 feet on the south-eastern slopes of Eastern Ibi Gamin, but owing to cloud got no good view of the peak. Longstaff considered that the hanging glaciers above the Kamet glacier made that route dangerous. Morshead in 1920 also drew attention to this danger†; but it is now clear that this is the only route available. The 1907 party crossed the range south of the Mana peak by the Bhyundar Khanta pass‡ to Mana, whence they made a first reconnaissance of the Khaim and lower Ghastoli glaciers, which are shown quite wrongly on the old sheet 19 of the 1874–78 survey. But here again, owing to the onset of the monsoon, they never got satisfactory views of Kamet or its approaches.

Unhappily we have no proper record of the remarkable attempts on this mountain by the late Captain A. Morris Slingsby, 56th F. F. R., who was killed at the head of his regiment in Mesopotamia in 1916. He was a most resolute mountaineer and was accompanied only by his own orderlies and by local men from Mana. He approached the mountain from the Mana side in 1911, ascending a steep pass (about 23,000 feet) on the northern ridge of Eastern Ibi Gamin, which was subsequently named after him by Meade. We have no account of this remarkable climb. During May and early June 1913 Slingsby again attacked Kamet from the western side. He suffered from extremely bad weather, and an unusually severe snowstorm stopped his final assault at over 23,000 feet§.

Mr. C. F. Meade visited the range in 1910, 1912 and 1913, accompanied by the great guide, Pierre Blanc. No serious work was done on Kamet in 1910. In 1912, during May and June, he attacked it from the Mana (west) side, reaching 23,000 feet on Eastern Ibi Gamin, after ascending 'Slingsby's pass' but encountering very bad snow conditions. During July, from the Niti (east) side, he thoroughly explored the Raikane glacier system. In June of the following year, again from the Niti side, despite bad weather, he reached the saddle,

* Longstaff: *Alpine Journal*, xxiv, p. 125; and *Geographical Journal*, xxxi, p. 379.

† *Geographical Journal*, lvii, p. 215.

‡ Longstaff mentions that this pass was crossed in 1862 by Colonel Edmund Smyth, and that he was told later by priests that one of the Strachoys had also crossed it (*G. J.*, xxxi, p. 382).

§ *Alpine Journal*, xxvii, p. 326.

23,500 feet, between Kamet and Eastern Ibi Gamin, and set up a light camp there*.

Until the Everest expeditions this remained the highest altitude at which a party had camped for the night, though Longstaff may have bivouacked higher on Gurla Mandhata in 1905. From this camp it appeared that an easy snow ridge led to the summit, but soft snow and the combined effects of sun and altitude stopped further advance†. It therefore seems clear that the credit for discovering the most promising route belongs to Meade.

The late Dr. A. M. Kellas made a brief reconnaissance from the west in August 1911, apparently under good weather conditions.‡ He returned to Kamet in 1914, but seems to have published no record of this visit. In September 1920, accompanied by Major Morshead and a topographical surveyor, he attacked the mountain from the east. Going up the Raikane and Kamet glaciers they eventually reached Meade's Saddle (23,500 feet). Here, however, their Niti coolies, of whom they speak very highly, broke down. Inadequate cooking arrangements and the excessive cold of the late season partly accounted for this failure. If they could have pitched a tent on Meade's Saddle, they saw nothing to prevent success by this route.§

Thus, leaving aside the Schlagintweit's great climb of 1855 and the early reconnaissances of the Strachey's and the Survey of India, there have been some eight expeditions to Kamet since 1907. In the course of these, four serious attempts have been made on the peak; two from the west by Slingsby and Meade, and two from the east by Meade and Kellas. Meade's eastern route appears the most practicable. In Dr. Longstaff's opinion August is probably the best month for snow conditions, though snow-shoes should be taken as a precaution against powdery snow above 24,000 feet. Judging from what he saw of the mountain from Tibet in 1905, he thinks that fine weather is also more probable in August than in June or July.

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* *Alpine Journal*, xxvi, p. 434; *Geographical Journal*, lvi, p. 503.

† *Alpine Journal*, xxxiii, pp. 70–5, with 10 photos. Also pp. 305–12.

‡ *Alpine Journal*, xxvi, p. 137. It is interesting to note that during the discussion on this paper at the Alpine Club, Kellas emphasized the danger of avalanches from the ice-cliffs on the north-west face of Kangchenjunga, which he had recently examined from the Jonsong La.

§ *Alpine Journal*, xxxiii, p. 312 and map; *Geographical Journal*, lvii, p. 213 and map.

GAURISANKAR-EVEREST.—It is regrettable that confusion is still caused owing to the use of the name *Gaurisankar* for Mount Everest, on some continental maps of the Himalaya. The name was first put forward as a "native" name for the peak by Hermann Schlagintweit after his visit to Nepal in 1852. There is no doubt whatever that Schlagintweit was misled in his identification of Everest from Kaulia in Nepal, or was given a wrong name for it, for in 1903 Captain Wood found that Gaurisankar and Everest were separate mountains 36 miles apart, Gaurisankar being the name of a peak previously known in the records of the Survey of India as XX (23,440 feet). During the recent survey of Nepal this view has been confirmed, and it has been found that no Nepalese name exists for the highest summit on earth.

Hermann's identification of the peaks from Phalut, on the Singalila Ridge, seems also to be faulty. In a recent letter to the Editor, Colonel Max Schlagintweit, the youngest brother of Hermann, says that the latter first observed Mount Everest from Phalut in 1850, that two years afterwards he identified the same mountain from Kaulia in Nepal, and that in 1855 he painted his well-known picture of "Gaurisankar-Everest" from Phalut. He claims that the observations from *both* points gave a height of 29,196 English feet, and that this accordance between the two results and with the observations of the Survey of India prove that Hermann could not have misidentified the mountain.

This view is however unacceptable. Hermann was on Phalut for several days in May 1855, when he was favoured with the finest weather. He was impressed by a towering snow peak in the north-west, about 170 km. distant, "not only because of its angular height, but by the fact that it far out-topped surrounding mountains."

There are two great massifs which, seen from Phalut, appear to culminate in peaks of surpassing altitude: the Kangchenjunga massif and the Everest group. Hermann's beautiful picture has many points of similarity to both, and there are some who know the view from the Singalila ridge who affirm that it was Kangchenjunga and not Everest that Hermann painted. The steep south-western cliffs of Kangchenjunga, these people argue, seem to be visible over a peak which has every resemblance to Kabru, while west of it appears a mountain with the unmistakable outline of Janu. No such peak would appear in a panorama of the Everest group. Gaurisankar, the peak 36 miles distant from Everest, which is normally visible from Phalut, is omitted from the picture.

It seems to us inconceivable that Hermann Schlagintweit could possibly have painted the Kangchenjunga massif instead of the Everest group. This would mean an error of 65 degrees in bearing. It must be remembered however that in those days probably neither peak was shown on the very rough maps that then existed, nor was any of the country surveyed. We prefer to assume that it was the Everest group that was painted, and to put down the appearance of a "Janu" and the omission of a "Gaurisankar" to artist's licence. Yet even if we admit that the picture is of the Everest group, the summit that appears from Phalut to out-top surrounding mountains is Makalu and not Everest, which, though actually behind and to the north-west of Makalu, appears in the picture as an insignificant excrescence *on* a ridge of Makalu*.

This evident mis-identification by Hermann in 1855 is confirmed by an annotated photograph of his picture sent us by Colonel Max Schlagintweit, in which "Gaurisankar-Everest" is shown as the highest apparent point and Makalu as a lower peak which does not break the sky-line. The real Everest has escaped notice. From this it appears almost certain that Hermann observed the point he believed to be Everest, which is undoubtedly Makalu.

Apparently the continental claim to adhere to the name Gaurisankar (or Gaurisankar-Everest)† is based on the supposition that Hermann was the first to observe it trigonometrically and that he first discovered it to be the highest mountain in the world. Actually it was first observed trigonometrically by officers of the Survey of India in 1849 from the stations Jirol, Mirzapur, Janjpati, Ladnia and Harpur, and in 1850 from Minai. Using a coefficient of refraction varying from 0·07 to 0·08, Colonel Waugh deduced the following heights:

28,991·6	28,998·6	Mean 29,002.
29,005·3	29,026·1	
29,001·8	28,990·4	

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* We are indebted to Colonel Phillimore for the following figures for the angles of sight, caloulated from the surveyed positions and heights given on our latest Survey of India maps:—

Natural tangent of angle of elevation,

Phalut to Everest	1/26·4
Phalut to Makalu	1/24·4

† See *Mitt. d. Geogr. Ges. in München.* 22. Bd. 1929.

The distances of the stations of observation from Everest varied from 108 to 118 miles. We know of no publication by Schlagintweit prior to the working out of these results, in which he claimed that he had discovered the highest mountain in the world or observed its height.

If Mount Everest has a name in any of the languages spoken in the countries bordering it, that name certainly is not Gaurisankar and only confusion is caused by giving it this name on maps*.

Secular Movement of Glaciers.—The following communication has been received from Sir Edwin H. Pascoe, late Director, Geological Survey of India.

I should like to call the attention of members of the Himalayan Club to a paper by our esteemed Honorary Editor, Major Kenneth Mason, recently published in the *Records of the Geological Survey of India*, vol. lxiii, p. 214, on the "Glaciers of the Karakoram and Neighbourhood," and also to some earlier papers dealing with the secular movement of Himalayan glaciers, which have appeared in these *Records*. The first paper of the series, by various officers of the Geological Survey of India, was published in volume xxxv, page 123. The enquiries, of which these papers are the result, comply amongst other things with a suggestion made in 1905 by Mr. Douglas Freshfield on behalf of the *Commission Internationale des Glaciers*. This suggestion was that, whenever possible, data should be recorded for determining whether the Himalayan glaciers are retreating or advancing, ignoring of course mere seasonal or catastrophic variations. The question is very lucidly elaborated by Major Mason in the introduction to his paper but, for the benefit of those who are not in a position to consult the latter and for ready reference, I may perhaps be permitted to recapitulate the crucial points in the hope that members may be constrained to make further inquiries.

* There seems to be little doubt now that the great massif of which Mount Everest is the culminating point has a Tibetan name. Sir Charles Bell, in his book, *Tibet : Past and Present*, states that some French Capuchin Friars, who resided at Lhasa from 1708 to 1733, constructed a rough map of the country, and marked on it the mountain "Tchomolungma" in precisely the correct position for the Mount Everest group. This map by d'Anville is still in existence. The same name has been obtained independently by General Bruce, Dr. Kellas and the Everest Expeditions. The correct transliteration of the Tibetan word, according to Colonel Morshead, is Chomo Longma, which was given him by educated Tibetans, and is a corruption of Chomo Lobzangma, "the Liberal-minded Goddess."

The relationship of a glacier to the climate which is responsible for it is shown, with more precision than would on first thoughts appear, by the position of the glacier snout or " point where the melting caused by the increased temperature of lower altitudes balances the supply of ice from above. " If the climate becomes warmer this melting will take place at an earlier stage in the glacier's path ; in other words, the snout with its ice cave will move to a spot higher up the glacier valley. To recognize and record any change of this sort, the position of the snout has to be determined from time to time with reference to some fixed point, such as a mark on some bare rigid rock in the immediate vicinity. Frequently there is no permanently bare rock in contiguity with the snout, in which case the position of the latter has to be determined by compass bearings, plane-table or theodolite readings, from the nearest available and suitable fixed rock, the points of observation being marked in an indelible manner on the rock for future reference. Photographs of the snout from fixed and marked points afford excellent confirmatory evidence. Observations of this kind, taken, say, every ten or twelve years, would ultimately decide the interesting question as to whether the climate of the Himalaya generally is becoming warmer or colder, whether there is any local departure from this change and, to some extent, the degree of this departure.

Observations have already been recorded regarding the following glaciers :

(References are to volumes of the *Records, Geological Survey of India.*)

Kashmir Region.

Barche, Bagrot valley	xxxv, 130.
Hinarche, Bagrot valley	xxxv, 127.
Minapin, Nagar	xxxv, 131 ; xxxvii, 221 ; lxiii, 230.
Hispar, Nagar	xxxv, 133 ; lxiii, 225.
Yengutsa (Yengutz Har), Nagar ..	xxxv, 134 ; lxiii, 228.
Muhammadabad, Hunza	xxxvii, 221.
Hasanabad, Hunza	xxxv, 135 ; xxxvii, 221 ; xl, 339 ; lxiii, 232.
Mechoi (Machai), Baltistan	xl, 340 and 343.
Mamostong (Murgisthang or Mongstong), Upper Nubra.	xl, 342 ; lxiii, 261.
Hopar (Barpu), Nagar	lxiii, 229.
Sasaini (Ghulkin) Hunza	lxiii, 235.
Pasu, Hunza	xxxvii, 221 ; lxiii, 236.
Batura, Hunza	lxiii, 239.
Ghutalji Yaz, Shingshal	lxiii, 243.

Lupghar Yaz, Shingshal	lxiii, 243.
Momhil Yaz, Shingshal	lxiii, 243.
Malangutti Yaz, Shingshal	lxiii, 244.
Yazghil, Shingshal	lxiii, 246.
Khurdopin, Shingshal	lxiii, 248.
Virjerab, Shingshal	lxiii, 251.
Parpik, Bara Kun group	lxiii, 253.
Kuksel, Ghujerab group	lxiii, 254.
North and South Maidur, Shingshal ..	lxiii, 254.
Biafo, Braldoh valley	lxiii, 254.
Punmah, Braldoh valley	lxiii, 257.
Baltoro, Braldoh valley	lxiii, 257.
Siachen, Nubra valley	lxiii, 260.
Gasherbrum, Shaksgam valley ..	lxiii, 263.
Urdok, Shaksgam valley	lxiii, 264.
Kyagar, Shaksgam valley	lxiii, 265.
Rimo, Shyok valley	lxiii, 266.
Chong Kumdan, Shyok valley ..	xl, 343; lxiii, 268.
Kichik Kumdan, Shyok valley ..	lxiii, 271.
Aktash, Shyok valley	lxiii, 274.
Yarkand Rimo, Yarkand valley ..	lxiii, 275.
Lungmo-chhe, A and B, Yarkand valley	lxiii, 276.

Lahul.

Bara Shigri	xxxv, 144.
Sonapani	xxxv, 141.

Kumaun.

Pindari	xxxv, 149.
Milam	xxxv, 152.
Shankalpa	xxxv, 154.
Poting	xxxv, 156; xlii, 102.
Baling	xliv, 284.
Sona	xliv, 284.
Naulphu	xliv, 285.
Nipchungkang	xliv, 286.
Kharsa	xliv, 287.
Chingchingmauri	xliv, 287.

Sikkim (*Kangchenjunga*).

Alukthang	xl, 52.
Guicha	xl, 57.
Zemu	xl, 57.

For convenience no reference has been made to the results of Mr. Ph. C. Visser's extensive work of 1922 and 1925 in the Karakoram published in *Zeitschrift für Gletscherkunde*, xvi, pts. 3-4, 1928. These will be found in Major Mason's valuable paper. Members of the Himalayan Club are cordially invited to co-operate in this particular inquiry by continuing observations on any of the above glaciers, or

by initiating observations on any additional glaciers they may consider to be suitable for the purpose.

Reprints of Major Mason's paper may be obtained on application to the Honorary Editor.

THE INTERNATIONAL GLACIER COMMISSION. The Glacier Commission is now part of the Hydrology Association of the International Union of Geodesy and Geophysics. It met in Stockholm in August 1930, during the Congress of the Union, under the presidency of Professor Axel Hamberg, of Djursholm, near Stockholm. Major Kenneth Mason attended the Congress under the orders of the Government of India, and gave to the Glacier Commission a brief summary of the conclusions arrived at as the result of a study of Karakoram glaciers.

Most countries which contain glaciers are now represented on the Commission. A carefully compiled Report of the movements of glaciers in the Alps and Scandinavia was presented and it is hoped that reports on the glaciers of other parts of the world will be submitted to the Glacier Commission in future. Owing to the inaccessibility of the glaciers of the Himalaya and Karakoram it is not possible to maintain regular official observatories, and in this country we must be dependent on the careful records of travellers. The Director, Geological Survey of India, was elected at Stockholm the official reporter on Himalayan Glaciers, and it is to be hoped that travellers will send in their observations to him. The Honorary Editor will also be glad to give any advice as to the nature of the observations required.

The next meeting of the Commission will be at Lisbon in October 1933.

VARIATION OF THE SIACHEN GLACIER SNOUT. Colonel Ruck, extracts from whose diary of a journey to the Siachen glacier in May 1909 appears in this volume, has shown the Editor a most interesting little topographical sketch which he made of the snout in that year. They compared this with the detailed survey of Khan Sahib Afraz Gul, made in 1929, and concluded that the snout had retreated about three-quarters of a mile during the interval. The 1929 map also shows the plan of the snout more rounded than the sketch of 1909, which fact may indicate that retreat is still taking place, for summer ablation is not yet in full operation by mid-June, the month of the Khan Sahib's survey.

It is not easy to compare the topography as shown roughly on the old "Atlas Map" (from sketches by Mr. E. C. Ryall in 1862), but it would appear that the 1909 position was approximately one and a quarter miles in advance of the 1862 position, for the small glacier on the west side of the valley below the snout on Ryall's map joined the main trunk of the Siachen glacier both in 1909 and 1929.

Colonel Ruck considered that the snout was retreating in 1909.

LANDSLIDE ON THE INDUS BELOW CHILAS.—On the 9th April a considerable landslide occurred in unadministered territory on the right bank of the Indus below Chilas. The river here is about two hundred yards wide. A large mass of boulders, stones and shingle, apparently loosened by rain, was precipitated into the river, forming a dam approximately five hundred feet wide in the middle. The Indus was held up for a few days at this point and some excitement and apprehension were caused for many miles below, the fall of the river being noticed at Attock. On reaching the level of the top of the obstruction, however, the Indus cut for itself a channel approximately 125 feet wide and 31 feet deep through the dam, and a good deal of water was released. The sub-overseer of Chilas, who visited the scene of the block under the orders of the authorities at Gilgit, reported that early in May there was still an obstruction which caused rapids, the difference of level between the up-stream and down-stream sides of which was about 70 feet. The obstruction was being gradually worn away and there was no reason for anxiety unless a further slip occurred. A second slip seems to have taken place but appears not to have reached the river. Slack water extended for about eight miles above the obstruction.

CONDITIONS OF TRAVEL IN KASHMIR.—The following extract is taken from a letter written by a traveller who has had many years' experience in Kashmir:

I was ten days in Srinagar struggling to get the Kashmiri tradesmen to produce the stuff I had ordered. The materials they now burden the traveller with are markedly inferior to what they used to be. There is not even a good khud stick to be had and waterbottles, chairs, clothes, etc., which used to be rough but quite serviceable, are now *kacha* indeed. As to roads: Well, I write this in Baltal bungalow. The winter after you were here (3 years ago), an avalanche demolished all the outbuildings, including the *chowkidar's* hut. None have been rebuilt or repaired, though the kitchen could well be made more serviceable. On the road itself, when a bridge falls down, it just remains there and a diversion is made. You remember that the road from Kangan used to cross the Sind river

in places. Now it does not do so, because the bridges were washed away last year. The most absurd diversions have been made. The state of the bungalows is usually deplorable; both basins in this one have holes. And so the rot goes on: and so it will. Practically nothing except patchwork has been done on the Jhelum Valley Road—always a tender and fragile track, but now a truly delicate invalid..... I noticed coming up this year.....that even the little culverts are flimsily patched with a few planks, and any heavy shower closes the road! .....Much is now done to make things disagreeable for the visitor, by petty restrictions, taxation and annoyances. Kashmir is rapidly becoming very dear.....Comparatively few visitors this year.

We have received other letters written in much the same strain. It seems a pity that one of the most advanced of the Indian States should apparently be reverting to the condition it was in a hundred years ago, through sheer neglect.

REVIEWS.

THE KANGCHENJUNGA ADVENTURE.—By F. S. Smythe. *London: Victor Gollancz, Ltd.* 9½ × 6 *inches;* 464 *pages;* 47 *illustrations; sketch-maps;* 16*s.*

IN *The Kangchenjunga Adventure* Mr. Smythe tells the story of the attempt on Kangchenjunga in 1930 by the international expedition led by Professor Dyrenfurth.

Mr. Smythe's name is familiar to mountaineers both as one of the most notable of our younger climbers and as a writer on mountaineering and ski-ing. His name is particularly associated with his two ascents of Mont Blanc by the south face; the second of these was described by Dr. Wilson, the President of the Alpine Club, as probably the greatest pioneer ascent ever made in the Alps by guide or amateur.

Mr. Smythe prefaces the story of the 1930 expedition by a brief historical survey of previous attempts on Kangchenjunga, in which he does full justice to the remarkable achievement of the Bavarian expedition of 1929 in reaching a height of 24,272 feet on the north-east ridge. The rest of the book is devoted to a description of the 1930 expedition: the plans and preparations, the journey through Sikkim and Nepal, the two unsuccessful attempts on Kangchenjunga and the subsidiary results of the expedition, including the ascent of the Jonsong Peak, the highest summit yet attained. He concludes with a chapter

on the lessons of the expedition and two appendices on Himalayan glaciology and the weather of Kangchenjunga.

Those familiar with Mr. Smythe's writing will open this book with high expectations and they will not be disappointed. It is eminently readable, the story is full of incident and excitement and the author's comments and criticisms are throughout sound and well balanced. Mr. Smythe writes modestly and with admirable loyalty to his leader and his party. The reader, however, particularly the reader with Himalayan experience, can hardly fail to read between the lines unspoken or merely hinted criticism of the preparation and conduct of the expedition.

Considering the records that have been left by previous expeditions it is hard to understand the absence of any attempt to send an advanced party to Darjeeling some weeks before the arrival of the main body to collect and equip a suitable caravan of porters; the failure to provide boots, snow goggles and adequate clothing, not to mention food, for the bulk of the porters who were asked to cross the 16,000-foot pass, the Kang La, in early spring might well have led to an even more complete breakdown of the transport arrangements than actually occurred. It was here that the really splendid efforts of the British transport officers, Colonel Tobin and Messrs. Wood Johnson and Hannah, saved the situation, though the tasks that were demanded of them were often unfair. The fact is that, despite the accessibility of the fullest possible information and advice on the subject, the whole question of supply and transport seems to have been neglected until the eve of departure from Darjeeling; the effect of this was to over-strain the powers of endurance of all the porters with the exception of a proportion of tried and tested veterans of previous expeditions. Pre-eminent even in this chosen band was that sterling character Lobsang, whose splendid qualities brought him so much to the fore on Mount Everest in 1922 and 1924. Nor is it easy to understand the predilection of the organizers of the expedition for supplying single layers of heavy warm clothing and boots weighing—as Mr. Smythe feelingly assures us—as much as six and a half pounds the pair, in the face of all experience—Antarctic and Himalayan—in favour of a diametrically opposite policy.

The story of the attempts on the mountain itself is a grim one. To put it in a nutshell: the great north face of Kangchenjunga, lying between the converging north-west and north ridges of the mountain, the face on which the efforts of 1930 were concentrated, is frankly an

impossible proposition and the expedition spent itself in attempting the impossible most gallantly. The ice-work entailed was of a technical difficulty which is never attempted in the Alps : to try at heights of 21,000 feet and over to hew through such defences a path which can be traversed by laden porters is to court failure. The difficulties of the actual climbing were only a secondary obstacle ; the prime one was the danger of avalanches. It appears that in the whole of the vast basin which lies below the north face of the mountain, not to mention on the face itself, there is no camp-site and certainly no route between camp-sites, which can be made safe against the cataclysmic ice-avalanches which perpetually sweep the whole area ; sleeping and waking the climbers and their devoted porters were never free from the imminent fear of destruction by these avalanches. It is clear that nothing but amazing good fortune limited the casualty list to one valuable life—that of the gallant Chettan, hero and ' bad hat ' (in his wild youth), of the 1922 and 1924 attempts on Mount Everest, proved and tested veteran of four subsequent major expeditions.

Of the climbers, Herren Hoerlin, Schneider, Wieland and Mr. Smythe himself, bore the brunt of the work—an exceptionally strong team. Schneider is obviously a Himalayan mountaineer of outstanding mettle, displaying those same indomitable qualities that distinguished Mallory, Somervell and Odell, and it is impossible to read of his endurance and technical proficiency on rock and ice or of his ski-running on snow-slopes of daunting steepness without a longing to see this master-mountaineer at work.

In his description of the effort entailed by high climbing in the Himalaya Mr. Smythe confirms what, I suspect, his predecessors have all felt, though all are not so frank in describing their feelings. It is pain and grief, a painful taste of the treadmill, divorced from all the exhilaration that makes Alpine climbing so different from these campaigns against the giants.

The successful ascent of the Jonsong peak was in the nature of a consolation prize and a prize well earned by sound organization ; but as a mountaineering feat it scarcely merits the prominence accorded to it in the press last autumn, for the Jonsong peak, 24,344 feet high, and presenting no serious technical difficulties should be, and is, comfortably within the powers of an expedition equipped for the conquest of Kangchenjunga. By comparison, Dr. Longstaff's feat in conquering Trisul, 23,360 feet, in 1907, by a climb of 6000 feet up and down in one day, constitutes a *tour de force* worthy of more remark

than it has received in all the quarter of a century during which he held the world's record for the highest summit conquered.

Mr. Smythe's book is admirably illustrated with 48 beautiful photographs, but it lacks any adequate map; this is a serious and somewhat incomprehensible omission, considering the existence of Mr. Garwood's excellent map which illustrates Mr. Freshfield's *Round Kangchenjunga.*

E. F. NORTON.

IM KAMPF UM DEN HIMALAJA.—By PAUL BAUER. *Munich: Knorr and Hirth,* 1931. 7×9¼ *inches; 174 pages; maps and numerous illustrations.*

THIS book, containing an account of the Munich Expedition to Kangchenjunga in 1929, is in many ways a model of what such a book should be. In the first place, it is printed in the clearest of type, and got up in an attractive way. In the second place, it is just the right length; not too long, as are some climbing books, yet long enough to give an account of the whole expedition in fair detail and often with great vividness. Most important of all, especially to those of us for whom the reading of German is a slow or even an impossible task, it is illustrated so well and so profusely that we can follow the journey with the aid of the pictures alone, from the start at Darjeeling and up the Zemu glacier; we can share with the explorers something of their life in the high camps; we can climb with them up that terrible North-east Spur, the conquest of which is the greatest feat of sheer hard work and determination in the history of mountaineering. We can stop now and then and look around at the magnificent views from the ridge, and finally share in their intense disappointment when, after overcoming the chief of their difficulties, they had to fight their way back through several feet of fresh snow to the camps below, and to return defeated—but with an honourable defeat if ever there was one.

I advise that those who cannot read German, should get the book for the pictures alone, and read the long article by Paul Bauer in the *Alpine Journal,* following the text with the illustrations of this book; in such a way a very vivid idea of the expedition could be obtained.

This German account is written in a straightforward and business-like way. Though perhaps the travelling through Sikkim is described rather too fully, yet one must remember that to the non-climbing

reader this part has a very definite appeal, though personally I felt that too much was said about the feeding arrangements and the exact divisions of the parties, etc.—an unnecessary thing to do in view of the fact that there is an excellent and detailed " Journey-day-book " printed as an appendix, which contains all the details of the personnel of the various parties from day to day, and tells one, in fact, exactly " who was where " at any particular time.

When the expedition reaches the mountain, the writing becomes more vivid and the following sixty pages are really excellent. Those abortive attempts to find the best way, which take up so much time and thought and energy on an expedition of this kind, are dealt with graphically, but not at too great length ; and when at last the summit of the North-east Spur is attained—by a route that involved much step-cutting, or shall we say, path-cutting, and a few places of real danger—our minds are fresh and eager to climb the spur in detail. And in this, the really unique part of the expedition, we are helped, not only by the graphic and impressive, yet never emotional, style of the narrative, but also by the splendid series of photographs. The amazing ice-work which was found to be necessary between Camps 8 and 10 is described in detail and with that combination of vividness with reserve which is characteristic of mountaineering classics ; and we can follow almost every step on the pictures, which are as good as anything we have ever seen of their kind. We get an intimate acquaintance with the formation of that variety of Himalayan ridge-ice and snow, which so many of us have seen from below and ruled out as impossible, but which, though difficult and exposed, is nevertheless climbable by men like Allwein, Beigel, Kraus and Thoenes.

As a mountaineer may I make one observation regarding the route of this expedition ? Kangchenjunga is a very dangerous mountain for avalanches, yet the expedition made a route up one of the very few places where avalanche-danger is practically absent. They preferred hard, gruelling work to danger ; and how hard the work was only those who have tried similar cutting at a similar height can know. But the route was a safe one, as far as any route up Kangchenjunga can be safe, and the choice of it, and the way they overcame it, reflects the greatest credit on the mountaineers of the expedition.

From October 4th to the 7th, an extraordinary snow-fall stopped their attempt. It must have been heart-breaking, having overcome all the chief difficulties, to find that all was in vain, and to be compelled to retreat. This part of the book is written with reserve,

but we can imagine something of the disappointment, though it was borne with great cheerfulness. The fact that two metres of fresh snow did not cause any fatality on the way down the ridge is a sufficient commentary on the wisdom of the choice of route.

The return journey is rightly dealt with very briefly; and the book closes with an excellent and helpful series of appendices; the "Day-book" already mentioned, a statement of the cost of the expedition and of the commissariat arrangements; a full account of the equipment, some practical observations on the medical side, and short meteorological and photographic supplements. Altogether it is a very complete book, in spite of being kept within reasonable limits of length. Every Himalayan climber, whether he can read German or not, should have a copy.

T. H. Somervell.

PLANT-HUNTING ON THE EDGE OF THE WORLD.—By F. Kingdon Ward. *London: Victor Gollancz Ltd.*, 1930. 8½×5½ *inches;* 383 *pages;* 16 *full-page illustrations;* 21*s.*

In this book Mr. Kingdon Ward has written a most fascinating account of his expeditions in search of plants at the north-east end of the Himalaya, where the northern frontiers of Assam and Burma meet and abut on the edge of the high tableland of Tibet. The actual routes followed by him and the sites of his hunting-grounds are shown on a map included in the book.

The main object of his expeditions has been to obtain new species of hardy beautiful plants suitable for cultivation in English gardens, an object which is necessarily more specialized than that of a field botanist and one which requires a different scientific and mental equipment. There is no doubt that Kingdon Ward successfully achieved his aim in a manner far exceeding expectations, for he discovered and brought back to England a very large number of plants of exquisite beauty. A list of some of these in cultivation in England at the time of writing is given in an Appendix at the end of the book, and contains no less than sixty new species—some of which are not yet named—of which twelve are Primulas and thirty Rhododendrons. Besides those mentioned in the list many other species of Rhododendron were found, and it is a remarkable fact that so many different species of the same genus should be found growing in so comparatively small an area, a fact which inspires new thoughts with regard to the distribution and origin of species.

It must not be regarded as certain that all plants mentioned as being now in cultivation in England will continue to flourish in the English climate, for although many Himalayan Alpine plants have become definitely established in gardens there, others have flourished for a short period and then disappeared. Is it not possible that the failure of these to establish themselves permanently is due to unsuitable conditions of soil rather than to climate alone ? For if some flourish in the English climate, why should not others from the same locality also succeed ?

In the chapter on " Flowers of the Alps," at page 295, the absence of trees at high altitudes is attributed to the rarified atmosphere ; but may it not be due simply to the severity of the climate, low temperatures with icy winds and heavy snow-fall, conditions which would induce the vegetation to adopt a dwarf habit enabling it to lie warm and snug under a protective coat of snow throughout the winter ?

The book is full of thrilling incidents of adventure, glowing accounts of wonderful scenery and magnificent vegetation, graphic descriptions of the physical features of the country and interesting anecdotes of the habits of local tribes. It may perhaps be sufficient to quote one passage, which reveals the pleasures of plant-hunting and the ecstasy which may be experienced when suddenly the hunter comes upon some new *gloriosa superba.*

" But I had scarcely reached the bank when I stopped suddenly in amazement. Was I dreaming ? I rubbed my eyes and looked again. No ! Just above the edge of the snow a vivid blush-pink flower stood out of the cold earth....Yet so fascinating was it to stand there and gaze on this marvel in an aching pain of wonder that I felt no desire to step forward and break the spell. Indeed, for a minute I was paralysed with an emotion which perhaps only those who have come across some beloved Alpine prize in Switzerland can faintly appreciate.... In the face of such unsurpassed loveliness one is afraid to move, as with bated breath one mutters the single word ' God ' !—a prayer rather than an exclamation ! And when at last with fluttering heart one does venture forward, it is on tiptoe, and hat in hand, to wonder and to worship."

Such was the feeling and emotion inspired by the Tea-Rose Primula (*Primula Algeniana*, var. *thearosa*), but very many difficulties and hardships had to be overcome. There is an account of the final effort made in October to obtain the seed of the treasures found in flower earlier in the season, which explains very graphically

how difficult it may be to collect those seeds which ripen late in the year when the traveller may at any time be overtaken by snow-storms, with his retreat threatened or his communications cut, and a perilous return journey ahead.

Mr. Kingdon Ward was awarded the Founder's Gold Medal of the Royal Geographical Society for 1930, a very well-deserved honour. His book is one which every lover of plants—and who is not ?—should read. And all who read will feel the debt they owe to Mr. Kingdon Ward and his predecessors among the great explorers of the past, who, like him, at the risk of their lives, have filled our English gardens with plants of such exquisite beauty.

B. O. Coventry.

L'OEUVRE DE SVEN HEDIN ET L'OROGRAPHIE DU TIBET: Extrait du Bulletin de la Section de Geographie du Comite des Travaux historiques et scientifiques.—By Emm. de Margerie, Président de la Section. *Paris : Imprimerie Nationale*, 1929. 10 × 6 *inches ;* 139 *pages*, 28 *diagrams and illustrations.*

This pamphlet, reprinted from an article by the well-known French geographer M. de Margerie, presents a detailed and critical *résumé* of Dr. Sven Hedin's *magnum opus* which was published at Stockholm during the years 1917–22 under the title of "*Southern Tibet ; Discoveries in former times compared with my own researches in* 1906—08." Some idea of the scope of Sven Hedin's vast undertaking may be inferred from the fact that it occupies nine quarto volumes comprising the stupendous total of 3771 pages and 599 plates, together with two portfolios of maps and a folio album of 657 plates and panoramas. With the exception of certain scientific appendices, the English language is used throughout.

The high cost of the publication (700 Swedish crowns) must in any case impose a strict limit on the possible number of subscribers to a work of this nature ; while the notorious attitude adopted by Sven Hedin during the Great War probably accounts for the fact that his magnificent volumes have so far been suffered to pass almost unnoticed at least amongst the allied nations.

M. de Margerie remarks : " Laissons à nos amis britanniques le soin de protester au nom de leurs compatriotes : qu'auraient dit, en effet, un Kitchener, un Minto, un Curzon, après tant de marques de l'hospitalité la plus généreuse et la plus cordiale, prodiguées au voyageur suédois, en apprenant sa soudaine volte-face à l'égard de

l'Angleterre ? Mais comment un Français—fût-il géographe—pourrait-il oublier la conduite de ce ' neutre,' venant, dès le début des hostilités, mettre sa plume au service de l'Allemagne, et, tandis qu'il parcourait, à la suite des armées impériales, la Belgique et nos départements envahis, ne trouvant pas une parole de blâme, pas un cri d'indignation à propos de l'incendie de Louvain ou des massacres de Dinant ? "

Having thus relieved his feelings, he dismisses the unpleasant topic, and in the course of his long and singularly unbiased review proceeds to render unstinted praise to the world-renowned and tireless explorer, paying particular homage to his remarkable artistic talents sustained throughout his many difficult campaigns by a will of iron.

Separate chapters of the review are devoted successively to (*i*) the illustrations, (*ii*) the maps, and (*iii*) the text of this monumental work. Several specimen illustrations are reproduced in the review, and M. de Margerie, in summing up his impressions, remarks that one and all are executed with that scrupulous exactitude and sense of character which form the distinctive essentials of Sven Hedin's talent.

As regards the maps, portfolio No. 1 contains *inter alia* 26 sheets of a hachured map on the scale of 1/300,000 in six colours drawn by the Swedish General Staff in 1917. No. 2 portfolio consists of 52 sheets of a contoured map of Southern Tibet on the 1/200,000 scale in four colours, drawn in 1922, and covering the same area as the map in portfolio No. 1. In the compilation of the latter series, Colonel Byström of the Swedish General Staff has made use of Sven Hedin's numerous panoramas, and has thus been able to extend the topography to a greater distance on either flank of the author's routes ; otherwise the information given on the two series of maps is practically identical. M. de Margerie pertinently suggests that it would have been easy with a little forethought to avoid the necessity of issuing the second series of maps with the consequent squandering of labour, paper and money thereby entailed.

Portfolio No. 1 also contains 15 sheets of a general map of Eastern Turkistan and Tibet on the 1/1,000,000 scale embracing Sven Hedin's routes of 1894–1908 as well as all other available data. These sheets, each measuring $11\frac{1}{2} \times 21$ inches and published in six colours, are reviewed in detail by M. de Margerie, who compares them very favourably with the corresponding layered maps published on the same scale and at approximately the same date by the Survey of India.

Turning now to the text, it is to be noted that less than one-fifth of the total letterpress (viz., parts of Volumes II, III, IV and IX) is allotted to Sven Hedin's personal explorations. Of the remainder, Volume V (published in German) is devoted to a study of Tibetan geology by the late Professor Hennig; Volume VI comprises appendices on meteorology, astronomy and botany; in Volume VIII Sven Hedin, in collaboration with Dr. Herrmann, presents a study of the Chinese sources of geographical knowledge regarding Tibet.

The greater portion of Volumes I, II, III and VII deals with the geography of Tibet from the historical point of view. Of this portion, Sven Hedin writes: "I have done my best not to forget or overlook a single traveller or scholar from the remotest times to our own days," —a claim which his reviewer finds completely justified. Volume I opens with a generously worded dedication to the Survey of India, an institution to which and to several of whose individual officers Sven Hedin pays frequent tribute. He is, however, less flattering in his comments on certain other British authorities of a past generation—notably Brian Hodgson, of whom he writes "On Hodgson's map *everything* is wrong, even those parts which were correct 124 years earlier (d'Anville).... Hodgson was the first Englishman, although by no means the last, to bring confusion into .... the geography of those parts and to bring our knowledge a great step in the wrong direction."

Sven Hedin is no doubt justified in considering his greatest achievement in Southern Tibet to be the elucidation of the Trans-Himalayan Range—a name which, it is interesting to note, was first propounded by Godwin Austen as long ago as 1884. It is, as he himself remarks, a curious fact that his predecessors in this region, from the *Pandits* to Ryder and Rawling, have had so little to say regarding this complicated series of ranges which extend for hundreds of miles across Tibet, between the Tsangpo on the south and the chain of great lakes on the north.

In closing his review, M. de Margerie opines that this great publication of the Swedish explorer will almost certainly be the last of its kind to cover such vast territories. We are to-day witnessing the end of an epoch in Asia; with the spread of communications and the increasing specialization of the scientists who devote themselves to these researches, the area covered by new expeditions tends continually to diminish, while on the other hand the rigour and precision of the results demanded in the various fields of investigation are for ever increasing. Sven Hedin himself furnishes an example of this

change which is taking place in the methods of exploration, in the campaign which he is now conducting in Kansu and the neighbouring provinces in company with several European and Chinese assistants. But apart from whatever additions may thus yet accrue to the total mileage of his journeys, this eminent geographer will surely retain in the verdict of History his justly acquired reputation of being one of the greatest explorers of all time.

H. T. MORSHEAD.

GEOMORPHOLOGISCHE STUDIEN ZWISCHEN OBEREM INDUSTAL UND SUDLICHEM TARIMBECKEN.—By HELLMUT DE TERRA. *Zeitschrift für Geomorphologie*, Bd. XV, 1930, *pages* 79–131. *Illustrations, sketch-map, and section-plans.*

IT IS to be hoped that some specialist will come forward and translate into English this important paper by Dr. de Terra, so that those interested in the mountains of Asia may follow all the arguments put forward.

Dr. de Terra accompanied Dr. Emil Trinkler on his last Central Asian expedition and has now attempted a morphological analysis of the mountain-belt which lies between the upper Indus valley and the Tarim basins. He bases his study on the fact that the relief of existing features gives a comparatively complete expression of crustal movement in recent geological times. According to Penck, the majority of geologically *young* ranges, such as the Alps, the Cordilleras, etc., show a distinct arrangement of different reliefs which indicate the process of their structure. Such evidence points to a succession of warping effects on a grand scale, resulting in the appearance of arched sectors of the crust (" ge-anticlines ").

The first part of the pamphlet deals briefly with the orography of the region and with some of the main climatic agencies involved in the relief-making processes of recent age, and it is easy to see that almost at once the writer has considerable difficulty in fitting in the results of modern exploration with the material shown on the maps of the last century. A brief sketch of the geological history as derived from recent exploration points to these two facts ; the different structural development of single ranges from Palæozoic times to Cretaceous, and a more uniform history of the area during the younger crustal movements. The marine Eocene deposits which are only to be found south of the Ladakh range and north of the western end of the Kun-lun, seem to point to the former existence of an upper Cretaceous upland

(covering the Karakoram–Kun-lun region) at a time when the Himlaya were submerged.* The post-Eocene Himalayan folding however adds a third chain of ranges to the two (Muztagh and Kun-lun) already in existence. The folded sector which then grew from north to south is bordered by the two great depressions that exist to-day : the Tarim Basin and the Indo-Gangetic trough. Remnants of Tertiary and Pleistocene continental deposits help to reveal ancient processes of denudation on various surfaces of this upland and bear witness of a former extensive erosion under more humid conditions than now exist.

The morphological chapters deal with the evidence of this erosion and the processes by which it was brought about. Various surfaces of erosion are found from the northern slope of the western end of the Kun-lun as far south as the Indus valley. Uniformly-featured plateaux exist between the Kun-lun and Muztagh ranges, e.g., the Aghil Depsang, the Depsang, the Lingzi-tang, and the Aksai-chin, which can be proved to represent typical old surfaces of erosion of peneplain-like appearance. They cover the region of the oldest, late-Cretaceous uplift. In spite of the later transformation through glaciation, the Karakoram valleys show clear evidence of their pre-glacial existence (high terraces and spurs), and indicate a former continuation of those ancient levels towards the south. Dr. de Terra enumerates four different surfaces of erosion, of which three are in the Karakoram region. One is represented by the high ice-covered peaks of the Muztagh ; a second shows a peneplain at about 20,000 feet ; and a third and lowest represents the high plateaux. De Terra gives the altitude of this as 15,500 to 15,000 feet ; I would have thought it was about a thousand feet higher. These surfaces are clearly shown on the mountain-profiles given with the text.

Dr. de Terra suggests a continuation of the lowest level in the Indus valley near Leh, in the pre-glacial relief of the Ladakh range, and he adds that a fourth distinct relief covers the Himalayan ranges in Kashmir and Ladakh, remnants of which are the Deosai plains and the high levelled spurs projecting into the various valleys. This relief he considers restricted to the regions of young Himalayan uplift.

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* We came to practically the same conclusion in 1926. "It seems probable that in early Cretaceous times the Shaksgam-Aghil area emerged from the sea, and has ever since been dry land." *Rec. Survey of India*, vol. xxii, p. 87. *See* also Chap. ix.—Ed.

The final conclusions drawn from these general relief features are both geological and morphological: geological, inasmuch as the different reliefs cover areas with different structural development, and morphological, in that they indicate a distinct arrangement of the relief, which has been eroded at different periods. As it is obvious that such levelling by erosion cannot be effected while the whole region is at an altitude of over 15,000 feet, a succession of great uplifts has to be assumed, and these must have occurred since Middle Tertiary times. The nature of these movements was very possibly epirogenic with local deformation (e.g., in the Chang-chenmo, western Pangong basin, Shyok valley, etc.).

Dr. de Terra concludes that the existence of a uniform peneplain covering the whole of this part of Central Asia, as has been assumed by former writers on this subject, does not seem to be in accordance with existing morphological evidence, which, on the contrary, shows different reliefs in type and age. At the same time the author admits and realizes the difficulties of a complete analysis when the geographical and geological record is still incomplete.

Those who have travelled in the Karakoram region will find in Dr. de Terra's paper a probable solution of many points that must have puzzled them. Not least of these is the apparent lack of parallelism of the Karakoram ranges with those of the Himalaya.

KENNETH MASON.

ALAI! ALAI!—By W. R. RICKMERS. *Leipzig: Brockhaus*, 1930. $6\frac{1}{2} \times 9\frac{1}{2}$ *inches;* 300 *pages.*

THIS book gives a popular account in German of the adventures of the joint Russo-German expedition to the Pamirs from May to October 1928. A brief summary of the expedition has already appeared in the *Himalayan Journal*, vol. ii, p. 116. Mr. Rickmers, the well-known German explorer, who had made eight journeys in Turkistan between 1894 and 1913, was the organizer of the expedition, which left Moscow on 22nd May 1928. The Germans would no doubt have preferred a purely German personnel, but the Soviet Government made joint participation a condition of their sanction.

Relations between Germans and Russians are said to have been good, possibly because most of the actual work was done by the Germans! Soviet methods are well illustrated by the difficulty experienced in getting the stores imported from Germany through the Russian

Customs; in spite of the semi-official nature of the expedition and the patronage of the Soviet Government, it took about a month to get these stores through the Bolshevik barriers of officialdom. In one passage the author describes his Russian liaison official, one Perlin, as follows:—"He acted principally as our liaison officer with the local Soviet officials, with the postal and railway authorities. Dripping with perspiration, but without a word of complaint, he piloted us through the rocks of bureaucratic and police regulation."

The organization of the expedition was evidently carried out with German thoroughness, and nothing was left to chance. On leaving railhead, the expedition consisted of 65 men, 160 horses and 60 camels, and was therefore on a large scale. On the other hand, there seems to have been no undue luxury and personal baggage was apparently cut down to a minimum, e.g., no camp-beds were allowed, and only very small tents were carried.

Decentralized methods were adopted, i.e., work was carried out by small parties (mountaineers, topographers, geologists, etc.) sent out from a central camp, from which they drew their supplies and to which they reported progress and requirements from time to time.

The area explored included a large part of the Russian Pamirs, mainly south and west of Lake Karakul. The results of the expedition have been considerable, especially from the topographical, geological and mountaineering points of view. A large area of difficult and practically unknown country was surveyed; the largest glacier in the world, the Fedchenko glacier, 48 miles long, is claimed to have been discovered and surveyed. Mount Kaufmann, 23,382 feet, on the Trans-Alai range, which was then believed to be the highest mountain in Russian territory, was climbed on 25th September, while Peak Garmo, on Peter the Great range, was discovered to be higher, 24,590 feet, and fixed for position and height by stereo-photographic methods. It is obvious that though scientists of both nations took part in the expedition, the most important work and the main discoveries fell to the lot of the Germans.

The party was lucky in having little or no sickness, though there were several unfortunate accidents, such as men being kicked by horses. Two hardy explorers were nearly drowned in a decidedly collapsible boat on Lake Karakul—a lake half the size of Lake Constance, which contains no fish of any kind.

Hunting and shooting seems to have been discouraged; or else the members of the expedition do not appear to have been keen or

skilful shots. There is no mention of ibex or *ovis poli* having been shot, although these animals must have been fairly common. On one occasion a caravan of 40 donkeys, laden with *ovis poli* horns, apparently for sale in Turkistan, was met with.

The book is well arranged and has some 90 illustrations from photographs, many of which are very good ; it has also 25 diagrams, 2 panoramas and a map. One grave disadvantage of the latter is the unfamiliar German method of spelling, e.g., Kaschmir for Kashmir, Pendschab for Punjab, Jarkent for Yarkand, etc. It is a pity, too, that the book is printed in German characters, surely somewhat out-of-date in these days.

W. L. O. Twiss.

THE RECORD OF THE ROYAL GEOGRAPHICAL SOCIETY, 1830-1930.—By Dr. Hugh Robert Mill. *London : The Royal Geographical Society*, 1930. 10×6½ *inches ;* xvi+288 *pages ;* 35 *illustrations.* 10*s.*

The Centenary of the Royal Geographical Society was celebrated in October 1930. Among the numerous Societies, Clubs and Institutions honoured with invitations to attend the Centenary was our young Himalayan Club, now situated very much in the same position as was the Royal Geographical Society a hundred years ago. This Record, therefore, apart from its own fascinating interest, is well worthy of careful study by all those who have the welfare of the Himalayan Club at heart.

It is not Dr. Mill's purpose to give a detailed account of the Society's activities in the field of exploration, though it is not altogether impossible to eliminate these altogether. These activities are better studied in the Proceedings and Journals of the Society. Nor would it be possible, in the compass of a single volume, to summarize these active enterprises. Dr. Mill rather concentrates on an analysis of the beginnings, the early struggles, the trials, the prosperities, disappointments and victories, that have brought the Society to its proud position as the leading Geographical Society in the world to-day.

The volume opens with three chapters—*Forerunners*, *Founders* and *The Happy Start*—which give a remarkable and delightful picture of the early days and of the personalities of those who counted for anything in geography and exploration. There must be much that has never hitherto been published, for Dr. Mill has had

access to all the archives of the Society, including the Council Minutes. These happy chapters hardly prepare the reader for the next period, one of gloom, when from 1841–51 the Society's ship all but ran aground. Dr. Mill speculates on the causes which so nearly caused shipwreck, and, after the most diligent research, lays "most of the blame for the lean years on the political troubles and the deplorable depression of trade and agriculture which made discontent and misery the portion of the land." There can be little doubt that this is true, but on a second reading of this chapter IV, one wonders whether sufficient justice has been done to those "amiable, learned and interested" presidents who ruled during "the Hungry Forties." These years of depression followed a similar period of enthusiasm and prosperity; and it must be remembered that it was not the practice in those days to lay up reserves.

In May 1849 Captain Smyth, R.N., took over the ship in a spirit of cheery optimism, convinced that the Society had started on its course with more sail than ballast. The Jonahs were pitched overboard and Smyth set a fresh course, assisted by the fair weather of returning prosperity throughout the country. Smyth was succeeded by the great Murchison, and from his day the record of the Society has been one of steady and increased usefulness. Murchison ruled the Society in 1843–4, 1851–2, 1856–8, 1862–71, that is, for 16 years out of the hundred. During the last half of this period he was associated with Markham and Major as Honorary Secretaries and with Bates as Secretary, and it was during this period that the reserves were built up. Since then the Society has steadily grown in membership and in popularity.

It is said by some that the Society has concentrated too much of its energies on the "seven problems of discovery": The attainment of the North-West Passage, the North-East Passage, the North Pole, the South Pole, the Sources of the Nile, the Forbidden City of Lhasa, and the Summit of Everest. It is only in the *last* decade of this century that the last of these problems has come into the picture at all, since the attainment of the other six. But is it not a wise policy to aim at an object of supreme difficulty, the training for which entails an apprenticeship in less strenuous fields of endeavour? It is not fair to say—as some have said—that the exploration of Asia has been *neglected* in favour of the barren useless Poles! Grants have been made from the funds of the Society to explorers of Asia as to those of other parts of the

world, but very naturally, when funds are limited, it has been deemed expedient to leave much of the exploration of the Indian borderland to officials of the Indian Government. It has been the policy to *reward* successful exploration rather than to *finance* it in such regions; and on more than one occasion in the past the Society has been discouraged from "butting in" by the secretiveness of the Indian Government. These days are happily long since past, and wherever possible, the Indian Government now encourages and assists the private explorer. It may be not out of place here to call attention to the fact that no less than fifteen members of the Himalayan Club have been awarded Gold Medals by the Royal Geographical Society for explorations in the Himalaya and Central Asia, while many recipients of the award would have been members had they been alive when the Club was founded. Many others of us can testify to the help and encouragement, both moral and material, that we have received from the Society; while the Club itself owes a debt of gratitude both to individual Fellows and to the present Secretary, for much wise advice.

The Himalayan Club stands to-day much in the same position as did the Royal Geographical Society a hundred years ago. We include amongst our objects many of the aims of a Geographical Society. Our ship sails seas as tempestuous politically as any that ever were sailed by Captain Smyth! May we, with wise guidance, weather our first hundred years and emerge ninety-seven years hence with as proud a record as that of the Royal Geographical Society.

KENNETH MASON.

WILD FLOWERS OF KASHMIR.—BY B. O. COVENTRY. *London: Raithby, Lawrence & Co. Calcutta: Thacker, Spink & Co.*, 1929. 7½×5 *inches.* Series III. *Coloured illustrations. Rs.* 12.

THE publication of a third volume of *Wild Flowers of Kashmir* by Mr. Coventry, the Technical Correspondent of the Himalayan Club for Botany, will be very much appreciated by members. The beautiful reproductions of flowering plants fully maintain the high standard set in the first two volumes. We do not ever remember seeing a more perfect reproduction of natural colour photography than the frontispiece to this volume, where *Cremanthodium decaisnei* and *Corydalis thyrsiflora* give a lovely foreground to a glacial cirque near Sonasar in the Liddar valley.

Once more Mr. Coventry has selected fifty species of Kashmir flowers, illustrated each with coloured photographs, and described them faithfully and simply, so that anyone finding them in nature may identify them easily and with certainty. The volume is arranged on similar lines to those of the previous two, but a useful Introduction on the pronunciation of the scientific names has been added, and in the descriptions of the plants the pronunciation of such names has been systematically indicated by dividing them into syllables. Once more we repeat that we sincerely hope that Mr. Coventry will continue this series of publications in conjunction with Messrs. Raithby, Lawrence & Co., who also deserve the greatest credit both for the excellence of their work and for the modest price of the volume.*

KENNETH MASON.

MAP OF MOUNT EVEREST AND ENVIRONS.—1 *inch to* 2 *miles. Survey of India*, 1930. *Rs.* 2.

THE Map of Mount Everest and Environs, on the scale of 1 inch to 2 miles, published by the Surveyor-General of India in 1930, deserves the gratitude of mountaineers in general and of everyone interested in the Everest problem in particular. For the first time we now have, shown on one sheet, the country from Kyetrak to Makalu with the upper glens of the Dudh Kosi including all the southern, or Nepalese, side of Mount Everest. The latter details are of course the result of the survey of 1924-1927 under the orders of the Nepalese Government; but the new form of representation of the glaciers and other ice-features, which is a great advance on anything hitherto attempted, reflects great credit on the draughtsman and on those responsible for the new experiment. Snow, glaciers, moraines, névés, and ice-slopes are for the first time distinguished, and the map is very much more 'readable' than any of the older Survey of India productions. For example, the contrast in the scenery between the precipitous glens of the upper Dudh Kosi and the rounded mamelons of the Chodzong Dzakar Chu is immediately apparent. A comparison between the courses and alignments of the streams on the Tibetan and Nepalese sides respectively, combined with the contrast in

* Previous volumes of this series were published by Messrs. Raithby, Lawrence & Co. in 1927. *Prices:* Series I, Rs. 16; Series II, Rs. 12. A brief review of these two volumes appeared in the *Himalayan Journal*, vol. i, 1929, p. 124.

sculpture, shows us at a glance which is the dry and which the rainy side of the range.

It would be a grand thing if the Survey of India would bring out a similar map of Kangchenjunga and K^2. There is perhaps already enough information to justify a sheet for Nanda Devi, while Kamet and Nanga Parbat may soon be candidates for consideration. Ever since the days of Rennell the Survey of India has had no need to fear comparison of its standard of field work with that of any other service in the world, but it has lagged behind in its representation of mountain regions on its map sheets; thus it has undoubtedly lacked its due measure of appreciation from the public, whose only measure of value is the printed map.

May I repeat in the *Himalayan Journal* a point I have often emphasized in the *Alpine Journal* and in the *Geographical Journal*. We know quite well that the field parties in charge of the old Himalayan surveys were instructed not to 'waste' time and money over the uninhabited higher regions, but merely to sketch the high mountain topography as quickly as possible. The old maps are admittedly inaccurate in detail. But this is merely a matter of degree. If any explorer be given a map of any imperfectly surveyed region, and cannot in the course of his travels *improve* that map, he proclaims himself thoroughly incompetent! Every explorer who makes the first map of any unknown or imperfectly known region, *always* makes mistakes in his map. If subsequent travellers cannot improve upon the first explorer's map, they too proclaim themselves thoroughly incompetent. *Of course* the first map in a difficult country is always 'wrong' somewhere. But so long as it is better than any previous map, its publication is justified. There is a certain type of traveller whose chief stock-in-trade is the belittlement of his predecessors on the same ground: he has so little positive material to contribute that he is compelled to pad it out, with negative platitudes, which, though good enough for the popular press, cut no ice at all with the real expert. It therefore appears a pity that the Survey of India should hold its hand indefinitely because it is not satisfied with the absolute trustworthiness of its material. It is knowledge that we seek: the Survey of India can stimulate Himalayan exploration by the publication of such composite sheets as that under review and should not be deterred by any fear of comment about inaccuracy of detail.

I should like to make one small criticism of this map because it is a matter of principle. Such names as 'Chang La' which were

given by the Everest Expeditions to natural features but were not used previously by the local inhabitants, are printed in inverted commas, as if they were in suspense, or still under consideration. The logical purism of such a method is beyond dispute. But is it wise ? To my knowledge, some of these names were actually used by Chettan and Lewa in 1927, so that they have already come into colloquial use. If the Survey is satisfied as to the suitability in general of nomenclature, then I think they should definitely support the usage of such names ; because otherwise, these names occurring in the original books and papers of the earliest explorers, confusion is likely to arise in case of any change in the future. In uninhabited countries, where there are no local names except for passes, the nomenclature is merely a matter of identification labels for certain spots on the map. The Survey of India is the one and only competent judge in this matter. But if they are reasonably satisfied with a name, let them place it boldly and irrevocably on the map and so avoid the risk of subsequent change and confusion. After all, many of our best-known Himalayan names were ' coined ' originally.

T. G. LONGSTAFF.

CORRESPONDENCE.

THE SPELLING OF KANGCHENJUNGA.

To

The Editor,
The Himalayan Journal.

DEAR SIR,

On page 131 of Volume II of *The Himalayan Journal* there is a note which puts forward a new spelling for Kanchenjunga, worked out on the supposition of a Tibetan origin for the name. The note closes by saying that the name of this mountain will be shown on the maps of the Survey of India as KINCHINJUNGA (Kangchen Dzö-Nga).

The Surveyor-General has asked me to let you know that he is by no means convinced of the Tibetan origin of this name. As pointed out by Sir Sidney Burrard in a letter to the *Times*, dated 21st March 1930, it is very unlikely that the Tibetans, who are not in the custom

of naming their own mountains, would invent a special name for a mountain beyond their borders.

Sir Sidney Burrard further points out that nearly all of the prominent Himalayan peaks that are visible from the plains of India have Sanscrit names, and that it is unlikely that the people of India would omit to give such a name to Kanchenjunga, the most prominent of all these peaks.

This view is supported by Dr. Hara Prasad Shastri, the greatest Sanscrit scholar now in Bengal, and I attach a copy of his letter, which I hope you will find room to print. He gives the derivation of the name as *Kancan* (golden) and *Jangha* (thigh), and this agrees with a letter from Mr. H. Goshal published in the *Times* of 29th March 1930.

The Surveyor-General has therefore decided not to accept the Tibetan origin of the name, but to retain the spelling Kānchenjungā, which now appears in the *Imperial Gazetteer* as an alternative form. The old name Kinchinjunga will be dropped.

I am, Sir,
Yours faithfully,
R. H. PHILLIMORE.
(*Colonel, Director, Map Publication.*)

CALCUTTA,
14th August 1930.

Extract from letter dated 17th July 1930 *from* Mahamahopadhyaya Dr. Hara Prasad Shastri, M.A., C.I.E., *to* Mr. R. Wolfenden, *Assistant Director of Public Instruction, Bengal.*

.... I have been four times to Nepal during the last 35 years. On the second occasion on 1st January 1899, Professor Bendall of Cambridge, his wife and myself went to see the peaks from Kokoni, the summer residence of the Resident of Nepal, situated about 15 miles west of Katmandu.

I was in a *dandi*, so reached the summer-house one hour before the rest of the party, but I could not enter the Residency bungalow. It was surrounded on all sides by a sheet of snow. So I turned my face towards the north and saw the great Himalaya, a mass of white snow from one end to the other of the horizon. There was not a speck of black in it, all white of a general high level. Five peaks rose high above the level, deep into the sky. The westernmost was Dhavalagiri, the next one Muktinath, the third one Gonseithan, the fourth Kancan-jangha and the fifth Gourishankar.* All these are Sansorit names;

* Dr Shastri puts "Kancan-jangha" between *Gosainthan* and *Gaurisankar*, and so west of Mount Everest. Unless Dr. Shastri's memory has played him false it would appear that he was given incorrect names for the mountains. According to Sir Sidney Burrard, the Nepalese name for Kangchenjunga is *Kumbhkaran Jangur.—Ed.*

Dhavalagiri means "White Mountain," Muktinath means "Lord of Salvation," Gonseithan, "The Place of a Saint," Kancan-jangha, "The Golden Thigh," and Gourishankar means "The Goddess and her Consort."

When all these are Sanscrit names, I do not think that Kancan-jangha alone can be a Tibetan name. The spelling of the word Kancan-jangha according to the Geneva Convention of transliteration, adopted by all Sanscritists throughout the world is "Kancana-jangha." For ordinary purposes one may write *Kancan-jangha*. There is no necessity of putting any "i" or "e" anywhere in the name.

Note by Editor.

Probably nobody is prepared to be burnt at the stake for the sake of the 'g' in Kangchenjunga. But since even the female mosquito is entitled to defend her young, it seems advisable to give the points of several letters that have been received from members on this question.

Sir Sidney Burrard is most certainly misinformed when he states that Tibetans do not name mountains. They do so with a vengeance, and most of their mountains have not only a name, but also a string of poetic and descriptive synonyms. To mention a few of the best known only, we have Chumalhari (Chomo Lhari), Kangchenjau, Chumiomo (Chomo Yummo), Kamet (Kangmed), Kang Rimpoche (the Tibetan name for the sacred Hindu mountain, Kailas). There are scores and scores of others.

Sir Sidney speaks of Kangchenjunga as being beyond the borders of Tibet. Until comparatively recent years the mountain was within Tibetan territory, and even now Tibetan is the mother tongue of all the natives of northern Sikkim and of the Lamas of all the monasteries. The name Kangchen Dzö-nga, the Tibetan name of the mountain, is known throughout the whole of Sikkim, and the word occurs in many printed books of the Tibetans who invoke the god inhabiting the mountain in their rituals.

Dr. Hara Prasad Shastri is probably the greatest Sanscritist now living in Bengal, but there are others, perhaps more abreast of modern philology, among his compatriots, who do not agree with him, and who hold that Kangchen Dzö-nga has been imported into Bengali by English geography, and that very recently. For instance, no one has been able to produce any written evidence that this name existed in Bengal a hundred years ago.

Sir Sidney Burrard points out that nearly all the prominent Himalayan peaks that are visible from the plains of India have Sanscrit names, and therefore he concludes that it would be most unlikely that such a prominent mountain as Kangchenjunga would not have one. Is this a fair deduction? Surely to the west, where pilgrims penetrate, these men, who speak Aryan idioms, may give Sanscritic names to the peaks they hold sacred. No such pilgrims from the plains have sought to attain merit on Kangchenjunga, which is far to the east of their beat.

It is a curious fact that every modern expedition that investigates the question becomes convinced of the Tibetan derivation. Indeed, we do not recall any case where the "g" has been omitted. Kangchenjunga is the spelling used by Freshfield, Kellas, and Smythe. Kangchinjunga is the spelling used by Dr. J. Jacot Guillarmod; Kangchendzonga is the spelling used by the various German expeditions. The press in India followed the *Times* during the recent

International expedition. It is, I believe, a fact that the *Times* actually dropped the "g" because in the headline the use of a certain type would not fit if a "g" was included!

The Bursting of the Shyok Dam, 1929.

To

The Editor,
The Himalayan Journal.

Dear Sir,

I have just received Vol. II of *The Himalayan Journal*, and have read it from cover to cover. It is a delightful issue. Many congratulations. There is just one point which puzzles me about the bursting of the Shyok Dam. Are you certain that it burst on the morning of the 15th August? I ask this because, according to my diary, Gunn and I were still together on the morning of the 15th. We were encamped 4 or 5 miles below Daulat-Beg-öldi, near the junction of the Chip-Chap river with Wood's Stream "N." That morning Gunn accompanied me for 2 or 3 miles up the Chip-Chap. We then parted. He went over the Depsang and I made for the Karakoram pass. On the way up I saw the Vissers' camp, looked them up and stayed for lunch. The dam certainly had not broken then, otherwise it would have been *the* topic of conversation. Did I make a mistake in my diary? If so, Gunn did the same, for he also says in his article that we were down at the dam on the 12th, and I can easily account for the following two days. On the 13th Gunn and I were still on the shores of the lake, Gunn spending the day computing. On the 14th we rowed the boats round to the Chip-Chap confluence and buried them there, marching on the same evening to our camp just below Daulat-Beg-öldi. It therefore amounts to this. If the dam burst on the morning of the 15th, Gunn and I were certainly not inspecting it on the 12th, but probably on the 11th. If, however, our diaries are correct and we were inspecting it on the 12th, then it certainly did not burst on the morning of the 15th.

Upper Kök-su
Tekkes Valley, Tien Shan.
25th August 1930.

Yours faithfully,
F. Ludlow.

Note by Editor.

Khan Sahib Afraz Gul also reported that the dam burst on the 16th August and not on the 15th; and he showed me his diary in support of his contention. He also informed me that he felt certain that the diary of the Vissers would agree with his. It is now evident that according to the diaries of Ludlow and of Gunn the dam *was not heard bursting* on the morning of the 15th but on the 16th. Yet when Gunn reached the Shyok on the 17th he records that this was "more than forty-eight hours after the dam burst" (*Him. Journ.*, Vol. II, 36).

As will be seen from the Chart illustrating the Shyok Flood Waves, the river began to rise at Khalsar 135 miles from the dam, at about 8 A.M. on the 16th, and reached a maximum two hours later. Had the dam burst on that morning at 5 A.M. the first water to arrive would have had to travel at the rate of 45 miles an hour for 3 hours, which is surely impossible. Admittedly the report of the ferry-guard at Saser Brangsa cannot be considered wholly trustworthy, but on his evidence the water reached Saser Brangsa at about 6 A.M. on the 15th, *rose* 85 *feet in* 4 *hours* to about 10 A.M. and remained at this level till about 11 A.M.* If his *times of day* are even approximately correct, the date of the burst cannot have been the 16th, when the flood arrived at Khalsar.

It is, however, impossible that so many as four separate persons should be a day wrong in the dates of their diaries.

The above note was sent to Mr. Ludlow, who comments as follows:

I was misled by your remark on page 40, *Him. Jour.*, Vol. II, that Afraz Gul "heard the first breaking of the ice like the noise of a cannon shot at 5 A.M. *on the morning of the 15th August.*" I felt pretty certain that if Afraz Gul had heard the noise on the 15th August, Gunn and I would have heard it too, for we were nearer to the dam than he was. It now appears that Afraz Gul heard this noise on the 16th and not on the 15th.

My explanation of what happened is this. I think we have all been labouring under the delusion that when Afraz Gul heard the "noise like a cannon shot," it was synchronous with the *first* outburst of the waters through the dam. I suggest that this was not actually the case. The waters began to issue through the dam some hours—how many I cannot say—before Afraz Gul heard his "cannon shot," and that the noise he heard was due to the collapse of an unusually large mass of ice some time after the dam had actually broken, and the waters had been released. It is inconceivable that the waters of the lake travelled down to Khalsar at a speed of 45 miles an hour. I think therefore—this is pure surmise on my part—that the lake began to empty itself on the morning or afternoon of the 15th; that at first the escaping waters caused no great fall of ice and made no such noise that could be heard at Daulat-Beg-öldi, a day's march distant; and that the "cannon shots"

* See Appendix C, *Flood Rises*, in Mr. J. P. Gunn's *Report on the Chong Kumdan Dam and the Shyok Flood of* 1929, where he says definitely: "The dam broke in the early hours of the 15th August."

and booms heard by Afraz Gul were due to the collapse of large masses of ice some hours after the main break.

Further note by Editor :

Mr. Ludlow's view appears to be undoubtedly correct. It seems probable now that the dam did not burst with an instantaneous crash, but that the waters found a weak spot, on the morning of the 15th, probably a hundred feet from the top of the dam. Finding this outlet they rapidly tunnelled through the glacier, wearing away and tearing out blocks of ice, and transporting them away on the flood. It seems probable that it was the unsupported surface of the glacier, perhaps a hundred feet thick, which may have collapsed subsequently to the main release of the lake, that caused the "noise like a cannon shot" heard by Afraz Gul.

Gerard's "Booran" Trees.

To

The Editor,
The Himalayan Journal.

Dear Sir,

A small point has occurred to me in reading Mr. Buchanan's interesting article "In the Footsteps of the Gerards" in *The Himalayan Journal*, Vol. II. On page 73 he quotes a paragraph referring to "oak and booran" trees, and says that he has been unable to identify the "booran."

"Booran" is, of course, the very common *pahāri* word "Burāns" (=rhododendron), *c.f.* Burāns Khānda (=Rhododendron Spur), a spur on the Mussoorie-Tehri road just beyond Landour.

Maymyo, Burma.
17th August 1930.

Yours faithfully,
H. T. Morshead.

CLUB PROCEEDINGS.

The Annual General Meeting of the Himalayan Club was held at New Delhi on Saturday, 14th March 1931. Lieutenant-General Sir Kenneth Wigram took the chair.

The Report of the Honorary Secretary, which is printed below, was presented. The Club accounts for 1930 were presented and confirmed. The Officers, Members of the Committee and Additional Members of the Ballotting Committee for 1931 were elected, and Messrs. A. G. Ferguson & Co. were appointed Auditors.

Report on the Work of the Club in the Year 1930.

By the Honorary Secretary.

Membership.—During the year 1930, 48 new members were elected to the Club. There were 11 resignations, mostly among officers retiring from India. The total membership of the Club at the time of writing is now 339.

I regret to have to record the premature deaths of three of our members, Captain F. Ashcroft, 6th Bn. 13th Frontier Force Rifles, and Mr. G. E. R. Cooper and Lieut. I. M. Cadell. Captain Ashcroft was killed in action against the Hathi Khel Wazirs near Bannu on the 24th August, and Mr. Cooper died from jaundice and heart failure in the Rangoon hospital on the 11th March 1930. Mr. Cooper was an expert authority on butterflies, and was to have contributed a paper on this subject to the *Himalayan Journal* of 1931. Lieut. Cadell died in Burma on 27th December of pneumonia.

It is appropriate to mention here also the passing of a well-known figure in Himalayan climbing—Chettan, the Sherpa porter, who was killed by an avalanche on Kangchenjunga while with the Dyhrenfurth expedition. Chettan was on the last two Everest expeditions and twice carried loads at over 25,000 feet. He was with Ruttledge in Kumaon in 1926-27 and rendered exceptional service to the Bavarian expedition to Kangchenjunga in 1929. He was perhaps the finest of the fine body of Sherpa porters which has come into being since the war.

President.—Field-Marshal Sir William Birdwood, our first President, retired from the office of Commander-in-Chief and went home to England at the end of November. The Club owed him a deep debt of gratitude for the interest that he has always taken in our welfare and proceedings, and for many kindly acts of help. Shortly before he left, Sir William Birdwood presented the Club Library with a number of valuable and interesting books from his own library.

You will be asked to elect as President in his place His Excellency Sir Malcolm Hailey, Governor of the United Provinces, who has kindly consented to undertake the office.

Awards.—In the Himalayan Club we have no awards that we can grant to any of our members for the work they do in the mountains. It is therefore all the more gratifying when other Societies bestow their favours on our members. In 1930, no less than

three of our members received awards from the Royal Geographical Society. Kingdon Ward received the Founder's Gold Medal, the highest award an explorer can hope to get. Colonel Schomberg was awarded the Gill Memorial and Colonel Wood received the Murchison Grant.

I may mention here that the Royal Geographical Society kindly invited the Himalayan Club to depute a representative to the Centenary celebrations of the Society in London. The invitation was accepted and the Club most appropriately represented by Sir Geoffrey Corbett.

"The Himalayan Journal."—The second volume of our Journal was published in April and was very well received. It is perhaps impossible to expect the first few volumes to pay for themselves, considering the fact that we distribute free, to members and kindred societies and clubs, nearly five hundred copies. Our library benefits by receiving in exchange the best mountain literature in the world, but the accounts of our own Journal suffer. We hope to better the situation by getting more firms to advertise, but in the present state of trade depression we find that firms are cutting down their expenses, and one of the first items in India to be retrenched is advertising. New members can do something to assist by purchasing back numbers and making the Journal known, among their friends who are not members, and among the messes and clubs to which they belong.

Our Honorary Editor asks me again to thank those who helped to make the Journal a success, particularly many kind reviewers in India and abroad. It may interest you to know that we have had demands for the Journal from such widely separated places on the earth's surface as San Francisco, Peking and Melbourne, while a further compliment was paid to the Journal in 1930 by the election of the Honorary Editor to Honorary Membership of the French Alpine Club.

Library.—Besides 28 books presented by our late President and referred to in an earlier paragraph, 15 books were presented to the Library by other members. A catalogue of the Library has been compiled and copies have been sent to all members of the Club. We have to thank Colonel Phillimore and his successor Captain Armitage for the compilation of this catalogue. Captain Armitage resigned the post of Librarian on leaving Simla at the end of November and has been succeeded by Captain F. R. Gifford, General Staff Branch, Army Headquarters. A few purchases of books were made in England.

The Library appears to be popular and a number of books were borrowed in the course of the year by members not resident in Simla. With the issue of the new catalogue, it is possible that the demand for books will increase.

Photographic Exhibition.—A very successful Photographic exhibition was held at Simla in September in connection with the annual exhibition of the Simla Fine Arts Society. It was organized by Major H. R. C. Meade, to whose efforts the success was largely due. Major-General R. C. Wilson and Mr. H. Ruttledge exhibited a few photographs of Kashmir and several of their recent expeditions in the Kumaun Himalaya, by the Pindari glacier route over the main range to Mt. Kailas in west Tibet, round which are the sources of the Indus, Sutlej, Brahmaputra and Ganges rivers. Some of these photographs were produced in slate-grey, a very effective colour for snow scenes with a low sun. Photographs sent in by Major G. W. P. Money also dealt with the Kumaun Himalaya, but his route into Tibet lay up the Dhauli river further east. Mr. E. B. Wakefield's photographs were taken on a recent journey from Simla and ended, like that of Wilson and Ruttledge referred to above, near the Manasarowar Lake in west Tibet. Wakefield's route lay partly along the one originally surveyed by Ryder's party on its return from Lhasa to Simla after the Tibet Mission of 1904-05. Mr. C. P. Skrine's photographs consisted of a wonderfully clear panorama of the Hunza valley in Baltistan, some fine photographs of the mountains just south of Kashgar in Chinese Turkistan, a group explored by himself in 1926, and a few in south-east Persia. Mr. T. H. Somervell's contribution consisted of an excellent oil painting of Nanda Devi in Kumaun, some water colours of the Kangchenjunga group in Sikkim made on the occasion of an unsuccessful climb in 1922, and some curious photographs taken between 27,000 and 28,200 feet on Everest, which must be the highest altitude photographs ever taken by a man on foot. These last show various 25,000 feet peaks seen from above, and a bird's-eye view of the routes of the successive Everest expeditions.

Except for a few photographs from Sikkim and Bhutan, Somervell's were the only pictures of the Eastern Himalaya shown.

Mr. B. J. Gould's photographs were of Kabul and the Kurram, chiefly around the Peiwar Kotal.

Ski-ing was represented by photographs of trips above Gulmarg and on the Pir Panjal range by Squadron-Leader C. C. Durston and Mr. M. D. N. Wyatt. Mr. D. M. Burn's survey duties in Chitral entailed his reaching altitudes above 21,000 feet, and

Photo. Capt. G. Sherriff.

KUNGUR II, 25,200, EASTERN PAMIRS, FROM SARIGH YON.

resulted in some fine photographs. Major E. J. Cripps's photographs dealt with the lower end of the same (Chitral) valley, above Kila Drosh.

Photographs by Major Keith Dawson, Dr. E. F. Neve and Mr. C. H. Donald dealt with Kashmir and the Baspa and Sutlej valleys, and Mr. G. Carter sent in a very fine series covering Chamba State and Ladakh. Lahul and Zanskar were dealt with by Captain D. G. Lowndes and Mr. C. A. Mead.

A series of Himalayan forest photographs by Mr. H. M. Glover showed the causes and progress of deforestation and erosion, and apart from technical interest contain some excellent views in the Kagan valley, Hazara.

The Club has to thank Captain Sherriff for four magnificent photographs of Kungur and Shiwakte, which arrived too late for the exhibition.

Expeditions.—Perhaps the most important of last year's expeditions was the International Expedition to Kangchenjunga, led by Professor Dyhrenfurth. It comprised some of the most experienced climbers from Germany, Austria, Switzerland and Great Britain, while three members of the Himalayan Club were invited to join in India. As you know, this expedition failed in its main object, the conquest of Kangchenjunga, but some very valuable reconnaissance was carried out by its various members in the north-west quadrant of Kangchenjunga. The Nepal Gap was ascended by a party of climbers, and some very strenuous work was put in on the North-West Ridge. It seems that Kangchenjunga is invulnerable from this side. Two ascents of the Jonsong Peak, 24,344 feet, at the head of the Lhonak valley, were made. This is the highest *summit* yet climbed, though not, of course, the highest altitude reached.

The Vissers, who wintered at the end of 1929 in Yarkand, returned to India in 1930. On the way back Mr. Visser attempted to explore the Karakash Gorge, but found it impossible to penetrate. He then examined the Chong Kumdan glacier in the upper Shyok valley, and found, as we had expected, that the channel, cut through the ice by the liberated waters of the 1929 lake, had healed during the winter and that another lake, three miles long in July, had formed behind the barrier. Mr. Visser then explored the right bank tributaries of the upper Shyok, below the area of his 1929 explorations, and found the snout of another large and previously unknown glacier,

some 20 miles long, projecting into the river-bed, a few miles below Kataklik.

Another member who has returned from Central Asia, after wintering in Kashgar, is Mr. F. Ludlow. His were mainly Natural History interests, and he spent the greater part of the months of May, June, July and August in the Tekkes valley and in the neighbourhood of the Kok-su–Yulduz divide, hunting and collecting butterflies, birds and flowers. He returned to Kashmir in November with some 850 bird-skins, 550 eggs, 1500–2000 butterflies and a large variety of plants.

I believe I am right in saying that all the British officers stationed at Gilgit and Kashgar are members of the Club. They have been very active during the year. We have, however, had few details of their tours. Captain Berkeley, Commandant of the Scouts, made a trip along the Darel border. Mr. Todd, the Political Agent, toured the lesser-known parts of Hunza territory, and has promised us some very interesting information concerning the glaciers of the Karumbar valley. He reports that the glacier above Bort has suddenly slipped into the valley and blocked it. The movement was very rapid, the final blocking being completed at the rate of 100 yards in 20 days.* Captain Trevelyan and Lieut. Clark, who are also stationed at Gilgit, have also collected some observations of the glaciers in the Gilgit Agency, and we hope that this work will now become regular. This question of Glacier Movement is one which all our travelling members can help to solve, and our Honorary Editor, who attended the International Glacier Commission at Stockholm this year, asks me to try and enlist as many of you as possible for this work all over the Himalaya.

Before leaving Central Asia and the Karakoram, I must mention the journey made by Professor Dainelli, one of our Italian members. He traversed the length of the Siachen glacier, ascended to the head of its main feeder, the Teram Shehr glacier, and made a pass over the main Muztagh watershed to the Rimo glacier, which he traversed to the Yarkand river source. This is the first recorded passage of the range at this point.

We have very little to record of expeditions to the Central Himalaya this year. But in Sikkim, apart from the International Expedition already mentioned, we have had some activity.

* *See* Summary under "*Expeditions*," p. 110.

Mr. G. B. Gourlay, our enthusiastic Eastern Secretary, visited the Upper Lhonak valley in Northern Sikkim, on a month's leave from Calcutta in October. He was successful in reaching the summit of the Lhonak Peak (*c.* 21,500 feet), which is situated between the Jonsong and Dodang-Nyima Peaks, which were climbed by the International Expedition. In spite of these three successes, there are still quite a number of virgin peaks in Lhonak, and as this district lies beyond the reach of the Monsoon, it forms an ideal ground for the climbing enthusiast from Calcutta.

One member from Calcutta however preferred to spend long leave in Kashmir. Mr. Wyatt seems to have been ski-ing along most of the northern slopes of the Pir Panjal range for the greater part of the first six months of 1930. With Captain Curteis, another member of the Club, he made the first winter ascent of Shin Mahinyo, 15,113 feet, on ski, at the end of March. As late as July he was out on ski with his wife on the Tosha-maidan. While on the subject of ski-ing, I may mention that very good use of ski was made by the members of the International Expedition to Kangchenjunga, and it seems possible that ski will become as important a part of the equipment of an expedition to the high Himalaya, as they are of an expedition to the Antarctic.

Expeditions in being.—Several expeditions are in being or [illegible] the air. That veteran of Central Asian travel, Sir Aurel Stein, [illegible] now engaged on his fourth great journey in Central Asia. With hi[illegible] is his experienced Survey of India companion, Khan Sahib Mia[illegible] Afraz Gul Khan. We last heard of these two members at Kashgar. They do not expect to be back till 1932 at the earliest. Colonel Schomberg, also, is probably wintering there, having been forced to return from the Tian Shan at the end of 1929 owing to an accident which necessitated an operation. At the other end of the mountains, Mr. Kingdon Ward is back again somewhere on the frontiers of Burma.

Mr. F. S. Smythe, who joined the Club after the Kangchenjunga Expedition, hopes this year to attempt the conquest of Kamet, which has baffled the efforts of such experienced mountaineers as Mr. C. F. Meade, Dr. Longstaff, Dr. Kellas, and Colonel Morshead, in the past.

The Club was asked to assist the proposed expedition of Dr. Welzenbach, of Munich, to climb Nanga Parbat, which has seen no attackers since the death of Mummery. A number of our members

volunteered to accompany the expedition and their names and applications were forwarded by the Club Committee to Dr. Welzenbach. The latter has, however, since written, thanking the Club and the individual members who volunteered for their assistance, but regretting that he will not, after all, be able to make the expedition this year.

Botany.—The following has been received from Mr. Coventry at Srinagar: "I have nothing of much interest to report for 1930. I have carried on botanical work much on the same lines as reported last year. There still seems to be a good deal of interest being taken in the cultivation of Kashmir Alpine plants, and most of the enquiries which I received from outside of Kashmir were for seed of these plants. It may be interesting to remark that several of the residents in Kashmir have now taken in hand the cultivation of Alpine plants in rock gardens in Srinagar and Gulmarg, which if successful will facilitate the collection of seed. Last winter I sent home some plants of the large pale mauve Iris, which is so conspicuous in Srinagar in the spring, and I heard that they had flowered successfully. There seems to be little doubt that this plant is indigenous to Kashmir; and the white Iris (*Iris Kashmiriana*, Baker), which is grown so extensively in graveyards, is considered to be an albino form of the same plant.

"The publication of Series 3 of *Wild Flowers of Kashmir* has been delayed longer than I expected, but has now been completed.

Huts.—You will be interested to learn that the Central and Eastern Section committees have under their consideration proposals for building two Club huts, one in Sikkim and one at the head of the Liddar valley in Kashmir. The idea is to locate both huts in places where they will be of equal benefit to climbers and to skiers. We hope to enlist the co-operation and support of the Governments of His Highness the Maharajah of Kashmir and His Highness the Maharajah of Sikkim, who is one of our members. The sites have not been finally selected and plans and estimates have still to be prepared: but there is an ample balance at the Club's disposal to cover the cost of both projects, if finally approved.

Notes on Important Topics discussed at the Annual General Meeting.

Several matters of importance came up for discussion at the Annual General Meeting. It was finally decided that ladies should be eligible for full membership of the Club in future, and that their conditions of membership should be precisely the same as those

of men. This question, as members are aware, had been under discussion for some time, and a consensus of opinion had been taken from all members. The replies received were unanimously in favour of the admission of ladies to the Club on the same footing as men.

It was noted that the numbers of the Club were in excess of the registered membership, and that the time had therefore come for the Committee to register an increase of members under Rule 2. It was decided that the limit should be raised for the present to 500.

The meeting discussed also the rate of subscription payable by ordinary members. The opinions, which had been received in writing on this subject before the meeting, for and against the proposal, were almost equal. In the Eastern Section, which unfortunately could not be represented at the General Meeting, there appeared to be a strong feeling that the subscription should not be reduced, at any rate until the Club has been in existence for some time longer. This view found general support also at the meeting. It was pointed out that although the Club was already successfully fulfilling several of the objects for which it was established under the Memorandum of Association, there were other objects such as the proposals now under consideration for building huts, which it would probably be very desirable to pursue. Such projects would involve utilizing the Club's capital, and until we know more exactly where we stand in these matters, it would be inadvisable to alter the rate of subscription. It was however decided that this question should be reconsidered every year.

The General Meeting also discussed the proposal to erect a memorial at Darjeeling to Chettan, the Sherpa porter, who was killed on Kangchenjunga in the year under report. The proposal was accepted and it was resolved to ask the Eastern Section Committee to prepare a design and estimates for the monument, preferably in the form of a " Chorten ", in some suitable place at Darjeeling.

CLUB NOTICES.

I. Appointments.

The following members have agreed to act as Local Secretaries, Correspondents, Assistant Editors, etc.

Local Secretaries.

Kashmir .. .. Lt.-Colonel G. D. Ogilvie, Resident in Kashmir, Srinagar, Kashmir.

Chamba	Dr. J. Hutchinson, Chamba, via Dalhousie, Punjab.
Simla	G. Mackworth Young, Esq., I.C.S., Army Department, Simla.
Kumaun	Captain C. J. Morris, 3rd Gurkha Rifles, Lansdowne.
Darjeeling	Lt.-Colonel H. W. Tobin, D.S.O., O.B.E., "The Glen," Darjeeling.
Calcutta	G. B. Gourlay, Esq., M.C., 10, Clive Row, Calcutta.

Local Correspondents.

London	Lt.-Colonel E. L. Strutt, C.B.E., D.S.O., 12, Somers Place, Hyde Park, London, W. 2.
Quetta	Lt.-Colonel E. F. Norton, D.S.O., M.C., Staff College, Quetta.
Murree and the Galis ..	Lt.-Colonel C. G. Lewis, O.B.E., R.E., Survey of India, Murree.
Switzerland ..	H. F. Montagnier, Esq., Chalet Beau Reveil, Champery, Valais.

Scientific and Technical Correspondents.

Archæology ..	Sir Aurel Stein, K.C.I.E., Ph.D., D.Litt., D.Sc., C/o Postmaster, Srinagar, Kashmir.
Botany	B. O. Coventry, Esq., Srinagar, Kashmir.
Entomology ..	Brigadier W. H. Evans, C.I.E., D.S.O., Headquarters, Western Command, Quetta.
Fishing and Shooting ..	Lt.-Colonel H. G. Martin, D.S.O., O.B.E., Staff College, Quetta.
Folklore	H. W. Emerson, Esq., C.I.E., C.B.E., I.C.S., Secretary to the Government of India, Home Department, Simla.
Geodesy and Geophysics	Dr. J. de Graaff Hunter, Sc.D., M.A., Director, Geodetic Branch, Survey of India, Dehra Dun.
Geology and Glaciology	Dr. L. L. Fermor, O.B.E., A.R.S.M., D.Sc., Director of Geological Survey of India, Calcutta.

Meteorology	..	Dr. C. W. B. Normand, D.Sc., Director-General of Observatories, Poona.
Ornithology	..	H. Whistler, Esq., Caldbec House, Battle Sussex, England.
Photography	..	Captain C. J. Morris, 3rd Q.A.O. Gurkha Rifles, Lansdowne, U.P.
Survey and Maps	..	Colonel R. H. Phillimore, D.S.O., Director, Map Publication, 13 Wood Street, Calcutta.
Zoology ..	..	Lt.-Colonel C. H. Stockley, D.S.O., O.B.E., M.C., 11-9th Jat Regiment, Meerut.

Honorary Assistant Editors.

Himalayan Journal	..	Lieut. J. B. P. Angwin, R.E., Survey of India, Shillong.
The Pamirs and Kun Lun		C. P. Skrine, Esq., I.C.S., H. B. M.'s Consul-General for Sistan and Kain, Nasratabad (via Duzdap); and Lieut. G. Sherriff, R.A., Vice-Consul, Kashgar (via Gilgit).
Gilgit Agency	..	H. J. Todd, Esq., Political Agent, Gilgit.
Baltistan, Nubra, Ladakh and Zaskar		Lt.-Colonel M. L. A. Gompertz, 3-10th Baluch Regiment, Secunderabad.
Kashmir including the Kishanganga, the Lolab, the Sind and the Lidar		J. Kelly, Esq., M.A., Aitchison College, Lahore; and Lieut.-Col. G. D. Ogilvie, C.I.E., Resident, Srinagar, Kashmir.
Murree and the Galis	..	Lt.-Colonel C. G. Lewis, O.B.E., R.E., Survey of India, Murree.
Punch, Jammu, and Udhampur (Kishtwar)		H. L. Wright, Esq., Chief Conservator of Forests, Jammu and Kashmir State, P. O. Jammu, N. W. Rly.; and J. Kelly, Esq., M.A., Aitchison College, Lahore.
Chamba ..	..	Dr. J. Hutchinson, Chamba, via Dalhousie, Punjab.
Kulu ..	..	Captain D. G. Lowndes, 2-18th Royal Garhwal Rifles, Razmak.
Lahul and Spiti	..	Capt. J. S. Lethbridge, R.E., Staff College, Quetta.
Dharmsala Hills	..	Captain J. W. Rundall, 1-1st K.G.O. Gurkha Rifles, Dharmsala.
Bashahr ..	..	R. Maclagan Gorrie, Esq., I.F.S., Research Division, Forest Office, Lahore.

Mandi State	..	H. L. Wright, Esq., Chief Conservator, Forests, Jammu and Kashmir State, P. O. Jammu, N. W. Rly.
Everest Group	..	Captain J. G. Bruce, M.C., 6th Gurkha Rifles, Abbottabad, N.W.F.P.; E. O. Shebbeare, Esq., C/o Forest Office, Darjeeling.
Sikkim ..	..	Lt.-Colonel H. W. Tobin, D.S.O., O.B.E., "The Glen," Darjeeling.
Chumbi Valley and Eastern Tibet	..	Lt.-Colonel J. L. R. Weir, Political Officer, The Residency, Gangtok, Sikkim.
Shillong ..	..	Lieut. J. B. P. Angwin, R.E., Survey of India, Shillong.

II. The Himalayan Journal, Vol. IV, 1932.

It is hoped to publish the Fourth Volume of *The Himalayan Journal* in April 1932. All papers and other communications for publication must reach the Honorary Editor, Major Kenneth Mason, Survey of India, Maymyo, Burma, by 31st December, 1931. The non-receipt of promised papers causes delay in publication, extra expense to the Club, disappointment to members, and much additional work to the Honorary Editor. Sketch-Maps to accompany articles should be sent with papers; they need only be rough, but should be clear enough to be re-drawn by draftsmen who do not know the country. Photographs should be printed on glossy bromide and should show good contrasts in light and shade.

III. Presentation of Books to the Library.

Books presented to the Library, including those sent for review, should be addressed to the Librarian, the Himalayan Club, Simla, and not to any official by name. The same applies to periodicals received from Societies, Clubs and other institutions in exchange for *The Himalayan Journal.*

IV. Changes of Address.

The following changes of address are notified:

The Mountain Club of South Africa,
Benson House, 57a Long Street, Cape Town.

Club Alpin Francais,
121 Boulevard Haussmann, Paris (VIII^{e}).

LIBRARY NOTICES.

BOOKS ADDED TO THE LIBRARY.

(*1st February* 1930—*31st December* 1930.)

Author.	*Title.*	*Presented by*	*Classification.*
Archer	Tours in Upper India (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	India and Himalaya.
Buckingham, J. S. ..	Buckingham's Travels.	Purchased.	Western Asia.
Burnes, A.	Travels in Bokhara (3 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Do.
Coventry, B. O.	Wild Flowers of Kashmir (Series III).	Author.	Botany.
Cunningham, A.	Ladak.	H. E. Field-Marshal Sir William Birdwood.	Western Himalaya.
Davidson, C. J. C. ..	Travels in Upper India (2 Vols.).	Do.	Central Himalaya.
Dunmore	The Pamirs (2 Vols.).	Purchased.	Central Asia.
Dutton, E. A. T.	Kenya Mountain.	*Statesman.*	Mountaineering.
Fane, H. E.	Five Years in India (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	India and Himalaya.
Ferrier, J. P.	History of the Afghans.	Do.	Western Asia.
Fraser, J. B.	The Himala Mountains.	Do.	Central Himalaya.
Galwan Rassul	Servant of Sahibs.	Editor.	Central Asia.
Guillarmod, Dr. J. Jacot ..	Six Mois dans l'Himalaya.	Mme. Jacot Guillarmod.	Karakoram.
Do.	Au Kangchinjunga.	Do.	Eastern Himalaya.

BOOKS ADDED TO THE LIBRARY—*contd.*

Author.	*Title.*	*Presented by*	*Classification.*
Hugel, Von	Travels in Kashmir and the Punjab.	H. E. Field-Marshal Sir William Birdwood.	Western Himalaya.
Knight	Diary of a Pedestrian.	Do.	Do.
Knight, E. F.	Wh[illegible] Three Empires Meet.	Purchased.	Do.
Landor, H. S.	In the Forbidden Land (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Tibet.
Lattimore, Owen	The Desert Road to Turkistan.	Mrs. K. E. Barrett.	Central Asia.
Lloyd, G.	From Caunpoor to the Himalaya (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Central Himalaya.
Malcolm, H.	Travels in South-Eastern Asia (2 Vols.).	Do.	Eastern Asia.
Mason, Kenneth	Glaciers of the Karakoram.	Author.	Geology and Geophysics.
Do.	Nomenclature in the Karakoram.	Do.	Geography.
Masson, C.	Baluchistan, Afghanistan and the Punjab (3 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Western Asia.
M'Gregor, Col. C. M. ..	Journey through Khorassan (2 Vols.).	Purchased.	Western Asia.
Moorcroft	Travels in the Himalayas (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	India and Himalaya.
Mundy	Sketches of India (2 Vols.).	Do.	Do.
Norden, H.	Africa's Last Empire.	*Statesman.*	World-wide.
Oldham, T.	Geology of the Khasi Hills.	H. E. Field-Marshal Sir William Birdwood.	Geology and Geophysics.
Old Punjaubee	The Punjaub.	Do.	India and Himalaya.
Parker, Eric	Shooting by Moor, Field and Shore.	*Statesman.*	Shooting.

Parkes, Fanny	Wanderings of a Pilgrim (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Central Himalaya.
Pascoe, Sir E.	General Report, Geol. Survey, India, 1928.	Author.	Geology and Geophysics.
Risley, H.	The People of India.	H. E. Field-Marshal Sir William Birdwood.	India and Himalaya.
Ross, D.	The Land of the Five Rivers and Sindh.	Do.	Do.
Schuler	Turkistan (2 Vols.).	Purchased.	Central Asia.
Skinner, T.	Excursions in India (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Central Himalaya.
Smythe, F. S.	The Kangchenjunga Adventure.	Messrs. Victor Gollancz.	Eastern Himalaya.
Stein, Sir Aurel	Innermost Asia : Its Geography as a Factor in History.	Author.	Central Asia.
Do.	Archæological Exploration in Chinese Turkistan.	Prof. S. G. Dunn.	Do.
Steinback	The Punjaub.	H. E. Field-Marshal Sir William Birdwood.	India and W. Himalaya.
Survey of India	Geodetic Report, Vol. IV, 1927-28.	Surveyor-General.	Survey of India.
Do.	Do. Vol. V, 1928-29.	Do.	Do.
Sykes, Ella C.	Through Persia on a Side-saddle.	Purchased.	Western Asia.
Sykes, Sir Mark	The [illegible]iph's Last Heritage.	Do.	Do.
Do.	The Travels and Adventures of Dr. Wolf (2 Vols.).	Do.	Do.
Taylor, W.	Scenes and Adventures in Afghanistan.	H. E. Field-Marshal Sir William Birdwood.	Western Asia.
Thomson, T.	Western Himalaya and Tibet.	Do.	Western Himalaya.
Torrens	Travels in Tartary.	Do.	Central Asia.
Trinkler, Dr. Emil ..	Through the Heart of Afghanistan.	Purchased.	Western Asia.

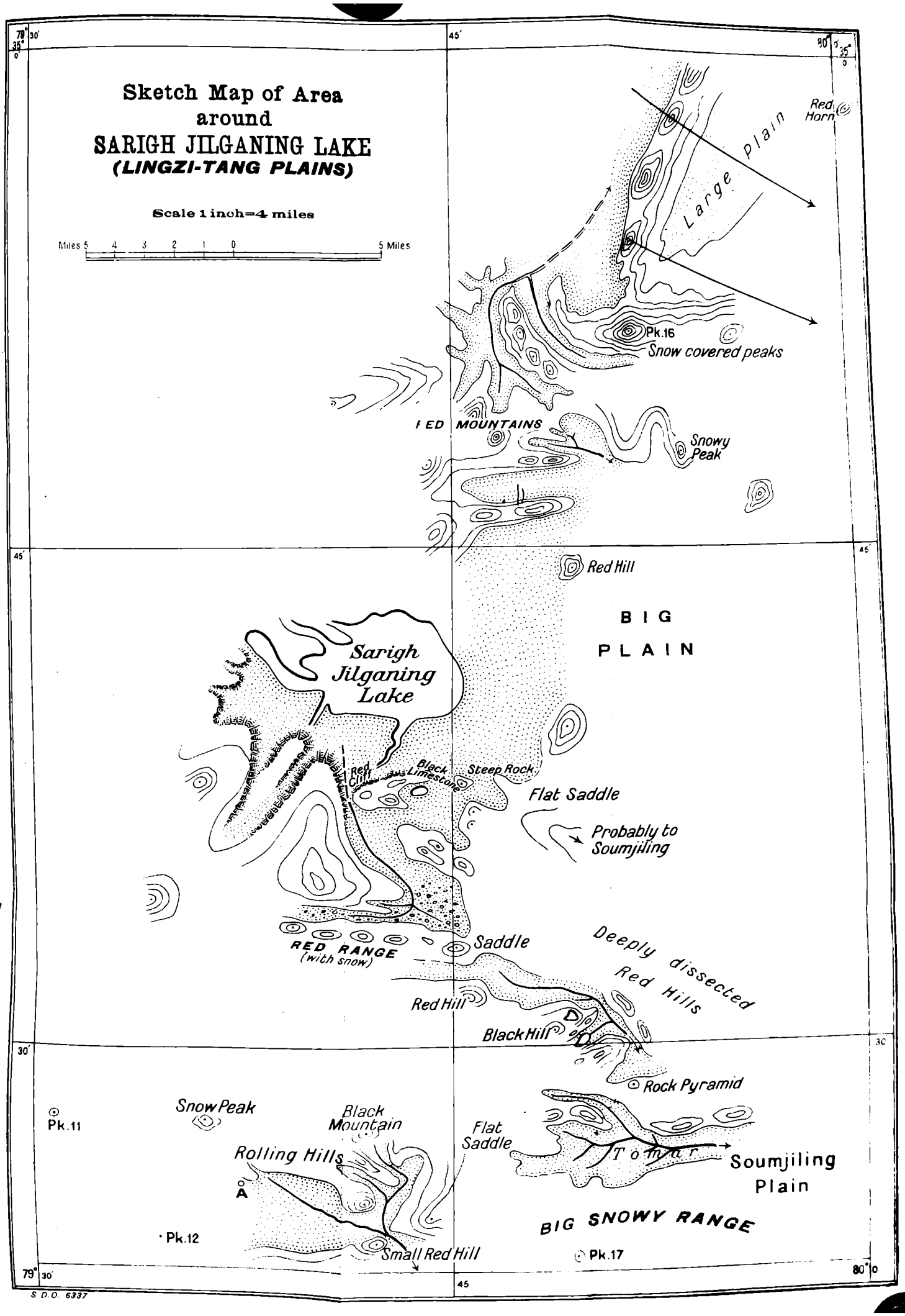
BOOKS ADDED TO THE LIBRARY—*concld.*

Author.	*Title.*	*Presented by*	*Classification.*
Vigne, G. T.	Travels in Kashmir (2 Vols.).	H. E. Field-Marshal Sir William Birdwood.	Western Himalaya.
Ward, Col. John	With the Die-hards in Siberia	Purchased.	Eastern Asia.
Wood, J.	Journey to the Source of the Oxus.	H. E. Field-Marshal Sir William Birdwood.	Central Asia.
Woolrych-Perowne, J. T. ..	Russian Hosts and English Guests in Central Asia.	Purchased.	Do.
Wright, T.	Travels of Marco Polo.	H. E. Field-Marshal Sir William Birdwood.	Do.
Various	The Climber's Club Bulletin, Nos. 2, 3, 5, 7, 8, 9, 10, 12 and 13.	Prof. S. G. Dunn.	Mountaineering.
Do.	The Geographical Journal, 1911 (*Nov.*, *Dec.*), 1912—1921, 1922 (except *April*), 1923—1928 (incomplete).	Do.	Geography.
Do.	Kangchenjunga Expedition (1930) (*Newspaper Cuttings*).	Capt. A. E. Armitage.	Eastern Himalaya.
Do.	Papers relating to the Shyok Flood, 1929. (Typescript reports).	Kenneth Mason.	Karakoram.

Sketch Map of Area around SARIGH JILGANING LAKE (LINGZI-TANG PLAINS)

Scale 1 inch=4 miles

Miles 5 4 3 2 1 0 5 Miles



S.D.O. 6337

36° 78° 79° 80° 36°

KUSHKU MAIDAN

Kara-tagh Pass

.20416

Karakoram Pass

22750

.20660

SODA PLAINS

Khitai-dawan

21750

Chomsha valley

22500 23310

AKSAI CHIN

L. 20950

Lokzung Mts

35° 35°

Shyok

Tso-tang

LINGZI TANG

S1.

S2

Sarigh-Jilganing-Köl

Nopta tso

Soumjiling Plain

Tsag-gar-tso

Changlung-yogma

Chang-lung-barma

Tirit

Shyok

.20111

Tomar Shum

Lanak La

Chang-Chenmo

Pamsal

Kyam

21270

D

Leh

Keptung La

19935

Rimdi

Tsultak

Drugub

Tankse

Eunkur

Marsimik La

Chor-Kangma

Phobrang

Chang La

20079

22420

34° 34°

Indus

Pangong

THE WESTERNMOST PORTION
of the
TIBETAN PLATEAU.

Dr. Trinkler's Route thus..... ----

S.D.O. No 6338

78° 79° 80°

Scale 1·014 inches = 16 Miles.

Miles 10 5 0 10 20 Miles