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KARAKORAM, 1939

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THE Shaksgam Expedition of 1937 fulfilled its objects in the fixing and detailed mapping of the country surrounding the Aghil pass and the great glacier system lying immediately to the north of the main Karakoram watershed, between K² and the Shimshal pass. There still remained much of the Aghil range to be explored, as well as the mountains stretching to the north-east of the Shimshal pass across the Oprang river, before the map of the main features of the Greater Karakoram could be completed. From the experience I had gained in 1937 it was clear to me that the task would probably best be tackled during the winter, when the rivers, instead of presenting the traveller with impossible barriers, might even be used as high roads by which to penetrate to the heart of the unexplored regions. I mentioned my plans to the Surveyor-General of India on my way through Calcutta to Mount Everest in 1938, and he replied that he was anxious to straighten out the topographical confusion which existed in that part of the main range surrounding the basins of the Hispar, Biafo, and Panmah glaciers. It was obvious that this task could easily be combined with my winter plans, and I submitted detailed proposals to the Surveyor-General, who at once offered me considerable support and encouragement. I therefore decided upon an expedition covering some sixteen months, which was to be divided into four parts. The summer of 1939 was to be spent in the Hispar-Biafo-Panmah area; the winter of 1939-40 was to be spent in the country east of the Shimshal pass; during the spring of 1940 a journey was to be attempted from Shimshal to Leh *via* the Shaksgam river, during which it was hoped to survey that part of the Aghil range lying to the north of the country explored by Mason in 1926; plans for the summer of 1940 were undecided pending political permission to enter certain areas far removed from the Karakoram range.

I asked Mr. Scott Russell to accompany the expedition to assist in the exploration work, to make detailed botanical collections and surveys, and to continue some important physiological researches which he had been making

into the effect of cold climates upon plant growth. Dr. E. C. Fontaine was invited to come as medical officer, to help in the exploratory work, to make zoological collections, and to study certain medical and ethnological aspects of the people of Shimshal. At first I expected to have once more the invaluable assistance of Mr. Michael Spender as surveyor, but at the last moment he found it impossible to come. At very short notice Mr. Peter Mott stepped into the breach and undertook the work of chief surveyor. The Surveyor-General lent the expedition the services of two Indian surveyors: Fazal Ellahi, who had already made a considerable reputation by his mountain surveys and his resource in difficult circumstances; and Inayat Khan, a younger man, but experienced in the type of work to be undertaken. Later Messrs. Campbell Secord and A. F. Betterton joined the party for a short period.

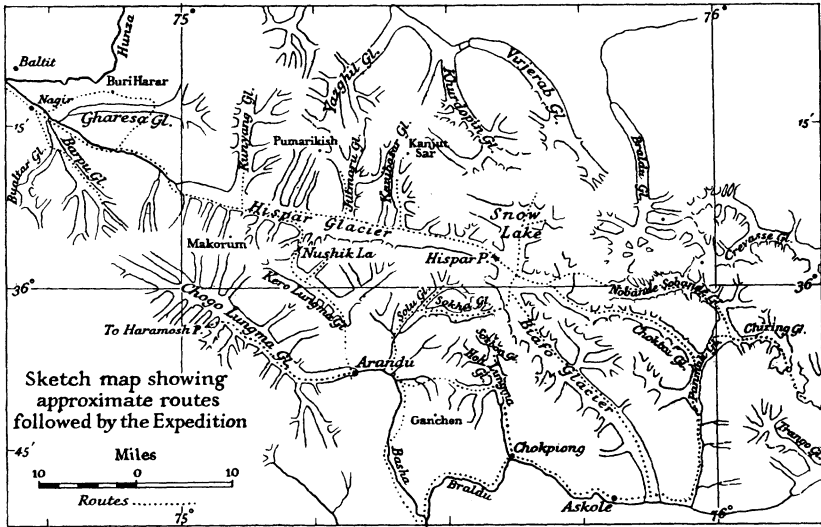
The expedition was financed by grants of money from the Royal Geographical Society, the Survey of India, the Royal Society, the Percy Sladen Fund, the British Museum (Natural History), and the Royal Botanic Gardens, Kew. Mr. R. W. Lloyd and Mr. A. Courtauld also most kindly contributed towards the funds of the expedition. Apart from the length of time it was intended to remain in the field, the estimated cost of the expedition had to be greatly increased by the necessity of providing special winter equipment for the party. Nine Sherpa porters, under my old friend Angharkay, were engaged from Darjeeling.

Michael Spender, in a report written for the Survey of India upon the position of the Biafo watershed, said: "As compared with the rest of the Karakoram range the Hispar-Biafo glacier system may be considered easily accessible to travellers. Yet any discussion of this region is confused by the unreliability of the surveys not only of these two glaciers but also of the neighbouring systems: the Panmah, Hoh Lungma, Kushuchun Lungma, Khurdopin, and Virjerab basins. These surveys were not even properly based on such G.T.S. points as were available." This shows clearly the state of the topographical confusion in this area, and our task during the summer of 1939 was to fix as accurately as possible the major features of the region and to make a detailed map of the Hispar, Biafo, and Panmah glacier basins. We had with us a Wild universal theodolite belonging to the Survey of India, the Wild plane-table outfit of the Royal Geographical Society, a new phototheodolite hired from Zeiss, and two Survey of India plane-table outfits. For time signals we took a three-valve short-wave wireless set, weighing 30 lb. including batteries, designed by Mr. Matthews of the Royal Geographical Society. It gave perfect satisfaction.

My original plan was to take the whole party as soon as possible across the Hispar pass and to establish a base stocked for at least two months on the "Snow Lake," the basin of the Upper Biafo glacier. From this it was proposed to climb several high peaks which would command views of many G.T.S. points in widely separated areas. In this way, with the Wild theodolite it would have been possible to fix the positions of the peaks climbed and to intersect a large number of other peaks in the distance, thus forming a basis for the accurate mapping of the district. While the surveyors were at work parties would have had plenty of time to visit all the accessible cols in the

district and thus, by using the phototheodolite, to make actual connections with the country beyond the various surrounding watersheds, thereby fixing beyond dispute the relative positions of all the glacier systems in that part of the Karakoram. The original plan however was changed and it was decided instead to carry a triangulation from the Indo-Russian system in the Hunza valley up the Hispar glacier and over to the Biafo. This change proved to be a mistake, and I am further convinced in my belief that the most effective way of exploring and mapping a mountain area of this kind is from a base somewhere in the middle of the area.

The main party reached Nagir *via* the Kamri pass and Gilgit on July 3. On that day Mott and Fazal Ellahi ascended Zangia Harar, one of Mason's triangulation stations just below the junction of the Hispar with the Hunza



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river, the former to start the triangulation, and the latter to start a plane-table survey of the large glacier system which lies south of Nagir. Russell went with them to start his botanical collecting. He and Mott did an astronomical fix on Zangia Harar and arrived at Nagir late on the evening of the 5th. The following day Russell, Secord, and Betterton went up the Barpu glacier system to collect plants and to look for a pass to the Chogo Lungma. Mott, Fountaine, and I set out to climb to Buri Harar, another of Mason's trig stations to the north, and with the object also of exploring the hitherto unvisited Ghareisa glacier. We reached Buri Harar on the morning of July 8 and found its position to be totally unsuitable for our purpose. It is on an inconspicuous spur of the main ridge and, though it commands a fine view down the Hunza valley, for which it was intended, we could see nothing of the country towards the Hispar. We moved our camp and after two days reached a prominent point farther along the main ridge to the south. But from there, although we had built a large cairn on Buri Harar, we could not

identify it with sufficient certainty through the theodolite telescope amid the profusion of ridges and gulleys of that vast landscape. All this wasted a great deal of time which was further prolonged by the necessity of selecting and laying out a new base in very difficult country. The two weeks originally allowed for the triangulation seemed likely to be protracted into months. Mott and I returned to Nagir on July 10 while Fontaine went up the Gharesa glacier. Accompanied by Secord we went up the Barpu glacier on the 11th, and on a long ridge dividing the Barpu from the Hispar valley a base about 1½ miles long was measured, which could be connected indirectly to Zangia Harar. This work took two days owing to the difficulties of travelling and setting up stations on the ridge. Further astronomical observations were made for latitude and longitude. I also went up to the head of the Barpu glacier to Fazal Ellahi, who was working there at that time. He had already completed about half the area and had fixed the peaks of the main watershed, which is much farther south than indicated on the existing maps.

The Barpu glacier is very delightful. Along its right bank, almost to the head, there extends a wide ablation valley filled with willows and rose thickets and wild flowers. The roses were then in full bloom and for miles great banks of their gay blossom seemed to fill the valley. Well over half-way up the glacier, in the ablation valley, there is a small village with some cultivation. The head of the glacier is shut in by a great wall of ice-covered mountains, which offer little chance of a pass to the south. There is however an easy route to the nullah which descends to Hispar village. The other big glacier of this region is the Baltar, which stretches right down to the Hispar river and is flanked in its lower reaches by a large area of rich cultivation known as Hopar. Half-way up this glacier a great stone avalanche, continuing to fall for several days, filled the air around with a thick dust haze which hampered survey operations. The Barpu glacier now falls short of the Baltar, which has retreated enormously within the memory of the present Mir of Nagir.

Fontaine returned to Nagir on July 16, after having made a thorough exploration of the Gharesa glacier. He had found that it rose from a range of high peaks, several of which were over 24,000 feet, and is fed by a number of sources. It had evidently retreated much in recent years and several masses of dead ice were found some miles below the present snout. Fontaine found no pass from it towards the glaciers of Shimshal. On July 16 Russell and Betterton started with sixty coolies to lay a dump up the Hispar glacier and to attempt to cross the Nushik La from the Hispar to Arandu in Baltistan. This pass had only once before been crossed by Europeans (Bruce and Eckenstein, members of Conway's expedition in 1892) though it had been several times attempted before and since. The last recorded attempt was by the Workmans, who reported it to be inaccessible from the northern side. Two days later Fontaine and Secord followed Russell's party, and after careful reconnaissance and a good deal of difficulty the two parties together succeeded in effecting a crossing of the pass. The local men would have nothing to do with it, but the Sherpas and the Europeans were able to carry all their loads without help. Russell and Betterton went down to Arandu, and from there Betterton returned *via* Skardu to Srinagar. While Russell was collecting in

the valleys to the south of the Nushik La, Fountaine and Secord did some photo-stations above the glaciers of the Kero Lungma, and also reached another high col in the South Hispar Wall from which they could not descend to the north.

Meanwhile Mott was continuing his triangulation and I remained in Nagir to assist him. On July 21 we moved up to Hispar, and while he was working in that area Angtharkay and I took thirty coolies up the Hispar glacier to lay a dump of food at Kanibasar just below the Hispar pass. I found the Nagir coolies difficult to handle, and in spite of good weather and conditions they were continually making trouble. However the dump was laid and I discharged the coolies and returned down the glacier to await the arrival of the others. The whole party, including Fazal Ellahi, reunited at Makorum (two marches up the Hispar glacier) on July 31. During July Inayat Khan had not been fit, and I decided to leave him for the whole season to work in the less severe country surrounding Nagir and Hispar and the first 10 miles of the Hispar glacier. Fazal Ellahi, using the newly triangulated points, now started his survey. For the next ten days or so the triangulation was carried slowly up the Hispar glacier and Russell was busy with his physiological work, some of which had to be done during the night. Fountaine and Secord went up the Kunyang glacier. They crossed a high pass which led from a tributary to the head of the main glacier. They attempted to reach a high saddle at the head of the latter, which would probably have led them over to the Yazghil glacier, but the danger from ice avalanches rendered the route to it too hazardous, and they abandoned the attempt. They joined the main party on the Hispar on August 7.

I had hoped to have the help of Nagiri coolies in carrying supplies across the Hispar pass and to keep a few of them while we were there. But except for one man they refused to go farther than Kanibasar. They gave various reasons for their refusal, but I am satisfied that the real reason was that nowadays they are frightened of venturing on the upper part of a glacier. We had equipped them with boots, sleeping bags, and tents. The task of carrying all the loads fell upon the Sherpas and ourselves, beside the one Nagir coolie who remained with the party throughout the summer. On August 12 a relay of loads was taken to the top of the Hispar pass, and on the 13th we all occupied a camp there. Two days were spent on top of the pass, during which Mott, Fountaine, and I occupied several high triangulation stations. Fazal Ellahi made use of some of the stations for his plane-table survey, and Russell and Secord ascended the peak on the Biafo-Hispar watershed north of the Hispar pass that had been climbed by the Workmans in 1908. There is no doubt whatever that it was the same peak. We had with us several photographs of it taken by the Workmans from near the Hispar pass. But whereas they estimated the height at 21,300 feet, both our triangulated height for it and Fazal Ellahi's height worked out at 19,400 feet. The weather was perfect and we all got very extensive views from our various stations, reaching as far as Haramosh and K². Russell and Secord spent four hours on top of the watershed peak taking photographs, rays, and vertical angles to all the points of interest with the Wild plane-table outfit. The height for the Hispar pass worked out at 16,910 feet, and our fixing placed it 7 miles to the west of

its position on the old map. This shortens the length of the Hispar glacier to 30 miles.

On August 15 we descended to the Snow Lake. The failure of the Nagir coolies had forced us to abandon much of our fuel supply on the Hispar glacier. This necessitated a radical alteration of the original plan and the postponement of several projects in the vicinity of the Snow Lake. We spent four days working there, during which time Fazal Ellahi got well started with the survey of the Biafo. At this time of year the upper glacier consisted mostly of dry ice and was perfectly safe to move about on, so on August 19 we left Fazal Ellahi with all the available food and fuel, four porters and his personal servant, to continue his work. Fountaine, Secord, and I descended the Biafo glacier in three days to Askole, while Mott and Russell crossed the pass discovered by Tilman in 1937 to the Cornice glacier. Travel on the Biafo glacier is remarkably easy, as the smooth white ice extends from its upper reaches almost to the snout. Except for camping, we made no use of the extensive ablation valleys which stretch for 20 miles up the glacier and are well filled with grass and fuel. In these ablation valleys were many bear tracks, though we never saw any of the creatures themselves. At Askole, Secord left us to return to Srinagar, and Fountaine and I started with three weeks' food for the Panmah glacier. I was pleased to find that our dealings with the men of Askole in 1937 had left them with confidence and an apparent affection for us, and there was considerable competition among them to accompany us, which was a welcome change after our recent experience with the Nagiris.

The lower Panmah is typical of most of the valleys of the district. It is desolate and barren, and its bed is filled with gravel and mud deposits, with large alluvial fans split up by the present streams into high cliffs and deep gorges. Typical also are the frequent oases: grassy glades, willow and rose thickets irrigated by spring water. The largest of these is the grazing ground of Panmah, which is about 12 miles up the valley, at the snout of the glacier.

We had with us the Zeiss phototheodolite, and began the survey of the Panmah glacier system with a high station west of Panmah on August 25. Meanwhile the porters moved our camp a few miles up the glacier to the foot of our second station, which we occupied the next day. The weather then broke. We moved our camp across the main glacier to a point opposite the junction of the Choktoi glacier. We were confined to this camp for three days. Angharkay shot several ibex, which kept us well supplied with meat for the next fortnight or three weeks. On the 30th the weather cleared, and on that day we did a station about 2500 feet above the camp and moved up towards Skinmang at the junction of the Chiring with the main glacier. On August 31 Fountaine, with two Sherpas, went up the Chiring glacier and camped at about 17,000 feet. The next morning he continued up the glacier and soon saw a low col beneath a spur of the mountain that we had identified as Spender's Changtok Peak, which would obviously have led to the north branch of the Sarpo Laggo glacier. Since the view from the col was likely to be limited, he decided to continue up the glacier to a high col 2 miles to the south, the summit of which he reached without difficulty. The descent down the other side to the Sarpo Laggo glacier was no more difficult. The view to

the east included Skyang Kangri (Staircase), K², Broad Peak, and the Gasherbrum Peaks; to the west the "Ogre" group, Kanjut, and many other giants. The pass he was on (the long-sought "New Muztagh pass") affords a very easy means of communication across the main Asiatic watershed; certainly the quickest and easiest known route between Askole and the Shaksgam river. On the following day Fountaine climbed to the head of another branch of the upper Chiring glacier and reached a col leading to a tributary of the Panmah glacier. From the head of this however there seemed to be a practicable route to the Trango glacier. Compass bearings and photographs from both these cols will be a great help in drawing the map.

Meanwhile on August 31 I climbed a peak some miles up the Chiring glacier on its northern side. The peak was about 19,600 feet high and commanded a magnificent view of the whole district while providing me with an admirable survey station. On September 1 I climbed another small peak above the Drenmang glacier for the same purpose, and saw far up the Nobande Sobande glacier. It is difficult to know why this glacier is so named, for it is really a continuation of the Panmah. Nor did the name convey anything to the local men. I found many bear tracks along the side of the glacier up as far as the Drenmang. Skinmang, where I had my camp, is a delightful spot flanked by gentle grass-covered slopes which stretch for many miles, and watered by clear streams. On September 2 I crossed the Panmah glacier again and fixed another station 2000 feet above its western bank. Fountaine joined me that evening after three days of strenuous mountaineering.

We then moved down the main glacier, surveying on the way, and camped on the 3rd on the right bank of the Choktoi glacier. On the 4th we carried heavy loads 8 miles up the Choktoi, taking with us a large supply of juniper fuel. Travelling was easy, over smooth white ice. We now discharged the Balti coolies. When we entered the upper basin we were met by a stupendous view of the granite peaks of the Ogre group standing a sheer 7000 feet above the glacier. As we rounded the corner, one after another the ice spires crowning the knife-sharp ridges of the peaks flicked into view, brilliantly translucent in the afternoon sun. The walls flanking the right bank of the glacier were so steep and unbroken that we had great difficulty that evening in climbing to a point sufficiently high for a suitable station. The next day we climbed high above the opposite bank, and on the 6th we reached a small peak, about 18,500 feet, on the Nobande-Choktoi watershed. The weather was fine and our view extended far over the ranges to the north, while to the south the Ogre group showed its full magnificance. We moved to the head of the Choktoi, completed our survey of it, and moved camp to the crest of the col between the Choktoi and the Nobande Sobande, which had been crossed by Desio's party on the Duke of Spoleto's expedition in 1929. The col afforded an excellent position for a station. On September 9 I descended the Nobande Sobande with two Sherpas. An extremely steep ice-slope overhanging a bergschrund made it impossible to climb down in the ordinary way, and we and our loads were lowered by means of our combined supply of rope. Having acted as human belays, Fountaine and Lhakpa Tensing descended again to the Choktoi with the intention of attempting to cross a col to the Snow Lake. A deep gorge near the head of the Choktoi glacier, formed by

sheer granite cliffs, had prevented a satisfactory view of the col, but we knew that there was a deep depression in the watershed at that point. They camped in the gorge that night and early next morning continued through it. They found the topography to be most complicated. The gorge they were in proved to be a subsidiary passage which connected with a large alley leading from still higher up the main glacier, at a point just below an impossible ice-fall coming down from the col. They climbed on to a broad ice-shelf from which they were able to reach a steep ice-ridge flanking the upper part of the ice-fall. They succeeded in climbing this by cutting steps for about 500 feet, and so reached the col at 1.30 p.m. The weather which had broken during the night had not improved, and they were met at the top by a cold wind and drifting snow, which made photographs and compass bearings difficult. The descent to the Snow Lake was easy, and the following day they reached the food dump left by Fazal Ellahi.

Meanwhile on September 9 Angharkay, Kusang, and I, having been lowered down on to the Nobande Sobande glacier, pitched camp just below the pass we had crossed. The same day we went some way down the glacier and climbed a steep ice-fall of a small tributary glacier flowing in from the north, which provided me with a suitable theodolite station. Again my view extended far across the main watershed to the peaks flanking the Shaksgam river. Our long period of fine weather broke and snow fell in the night. The next day, still carrying a large load of juniper wood collected near the foot of the Choktoi, we pushed on up the Nobande Sobande, making for an obvious gap at its head. Travel on this glacier was very easy; there was only one badly crevassed area, and that we had avoided by crossing from the Choktoi. We reached the col without difficulty, but were met on the top by a heavy wind blowing from the west. Sending the Sherpas on to find a route down the other side, I set up the theodolite in a small bergschrund which was sheltered from the wind. Though heavy clouds hung over the peaks and mist frequently obscured the whole scene, I was able to observe sufficient angles to fix my position and to take the necessary photographs. The descent on the west side of the col was difficult, but by lowering our loads from ledge to ledge down the steep ice-slope we were able to reach the glacier and camp there before dark. On September 11, in drifting cloud and snow, we crossed the Snow Lake and reached the dump at 4.30 p.m. Fountaine and Lhakpa Tensing were already there. There was also a note from Russell saying that he was on his way to our base on the Hispar glacier to fetch supplies. For the next two days bad weather confined us to our tents, but on September 14 Fountaine was able to start down the Biafo to join Mott. Eighteen inches of new snow had fallen covering the features of a badly crevassed area below us, and he had considerable difficulty in the first part of his journey. Late in the evening of the 15th Russell and two Sherpas arrived from across the Hispar pass, which was heavily covered by new snow. He brought news of the outbreak of war, which he had heard by wireless. The news, though not altogether unexpected, was a considerable shock. We had been in the field only a few months, but European politics already seemed very remote, and it was hard to realize the meaning of the disaster. It seemed obvious that we must abandon the expedition, but the party was too widely separated for immediate

recall, and as less than a month was necessary for the completion of our summer programme, I decided to carry on until we were reassembled in Gilgit. First we had to wait for Fazal Ellahi's party, so that we could make a combined crossing of the Hispar pass, which was likely to become difficult with further snowfalls. He was due back at the dump on September 22.

Russell and I with our three Sherpas went up to the northern glacier of the Snow Lake to explore a way across the main watershed. I had hoped that one of us would be able to make a route to Shimshal, for such a passage would have been extremely interesting, but in the present circumstances a further division of the party seemed hardly justified. After two days we camped at the foot of a steep ridge which led up to the watershed. We were held up there by another heavy fall of snow, but on September 20 we made an ascent of the ridge, which presented us with a fine day's mountaineering and a task that took us all our time to accomplish. Angharkay and Lobsang came with us to help with the work, but even so we were obliged to leave the theodolite half-way up and did not reach the top until 4.30 p.m. We found ourselves on the crest of the main watershed at a point about 19,500 feet high overlooking a wide snow basin on the northern side. This basin was obviously one of the upper feeders of the Khurdopin. Our regret at having decided not to attempt the complete crossing was intensified by the fact that a gentle snow slope was all that separated us from the Khurdopin glacier, which would have led us to Shimshal. The view from the pass was magnificent and extremely interesting. We took rounds of photographs and compass bearings, but a bitter wind and the lateness of the hour prevented us spending long on top. The descent was much easier than the ascent, and by going hard we succeeded in reaching camp before it was too dark to see.

Before going down the next day we climbed to a point which gave us a view of some of the peaks across the eastern wall of the Snow Lake, to which we took angles. We reached the dump on the 22nd, and our arrival there coincided almost exactly with the arrival of Fazal Ellahi's party. He had completed the survey of the entire Biafo glacier and its tributaries from source to snout. His map is a beautiful piece of work. On September 23 we all crossed the Hispar pass to our dump at Kanibasar. From here, on the 24th, Russell set out for Gilgit with telegrams to inform those interested in us of our movements, and to place our services at the disposal of the Government. He had certain physiological experiments to complete at Makorum, but he reached Gilgit on October 3. Meanwhile I stayed with Fazal Ellahi to supervise the completion of his survey of the Hispar basin. First we went up the Kanibasar glacier, where we camped for three nights. Fortunately the weather had improved and held for the next fortnight. I was very glad to have the opportunity of being with Fazal Ellahi for a long time while he was at work. I was impressed by the skill with which he chose his stations, the speed and neatness with which he worked, the accuracy of his fixings, and the extraordinary energy which he displayed. Next we went up the Jutmaru glacier, and here, as on the Kanibasar, we found that the topography bore little resemblance to that portrayed on the existing maps. The watershed at the heads of both these glaciers was very high indeed, and at only one place did I see a chance of reaching it; though there was not time to attempt to do so. At the head of the

Jutmaru we followed for miles the tracks of some creature in the fresh snow. The tracks were a good deal bigger than those made by our boots, and though I suppose they must have been made by bear they did not in the least resemble the bear tracks we had seen in the mud at the sides of the Biafo and Panmah glaciers. The difference was possibly due to the melting of the snow. Fazal Ellahi having completed his work, we returned to Nagir on October 12. At Minapin, one march below Nagir, we met Inayat Khan who, having finished the survey of the areas allotted to him (the whole of the Hispar valley from and including the Kunyang glacier to the Hunza river), had come down to survey the Minapin glacier which he had just completed. We reached Gilgit on October 15, where we found the rest of the party waiting for us.

I had not seen Mott for two months. On August 19 he and Russell had left the camp on the Snow Lake and set off southwards towards the gap in the West Biafo Wall, which constitutes the only practicable pass from the Biafo to the much-discussed Cornice and Garden glaciers (the local names for which are Sokha and Solu respectively). Tilman had first crossed the pass in the 1937 Shaksgam Expedition and exploded the myth, originated by the Workmans, of an enclosed Cornice glacier. It was not at first clear which route Tilman had followed, so the day before they began the journey Russell and I had reconnoitred the most likely col. They camped the first night at the foot of the short glacier leading up to the col, and on the following morning started early. The first part of the ascent was easy, but for the last 300 feet there was a steep ice-slope and some hard step-cutting was necessary. Tilman chose a more gradual route that brought him some way above and south of the lowest part of the col, but he had difficulty in getting down the far side. It was necessary to relay their loads up the final slope and, while the Sherpas were bringing up the remaining loads, Mott attempted to obtain a plane-table fix on the col. Falling snow and the lack of any fixed points for resection made this impossible. The descent from the col presented no difficulties, and they threaded their way easily down the icefall to the dry glacier below. They were now at the head of a narrow valley shut in by giant precipices of rock and snow. A mile from the pass the glacier turned to the left and a steep bluff prevented any further view. When the Workmans, and later Tilman, looked down from a high col at the eastern head of the Sosbon it would have in fact appeared enclosed owing to the curtaining effect of this bluff, but it is hard to understand how the Workmans explained the source of the Kuschuchun Lungma river which they crossed at Bisil.

Mott and Russell's first camp over the pass was on the north side of the glacier, and 2 miles from its head. They found some fuel and a welcome bed of grass after weeks spent above the snow-line. The following day Mott began the survey. There were no fixed points visible, so that he was obliged to lay out a base of assumed length and carry out the whole of this part of the survey to an unknown scale and a relative system of heights. Later, on the Solu, he fixed the scales by tying on to two fixed points which were triangulated on the South Hispar Wall, and while at Askole redrew the map to its correct scale with true contours instead of form-lines. Azimuth he obtained by simple observations on Polaris. The whole of this survey would have been rendered far more difficult, if not impossible, without the assistance of



The Snow Lake



The Hispar pass

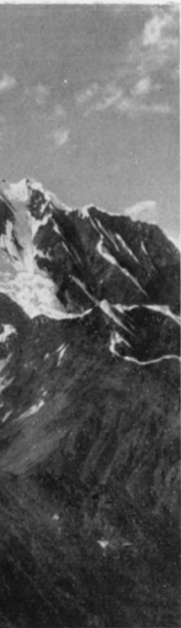




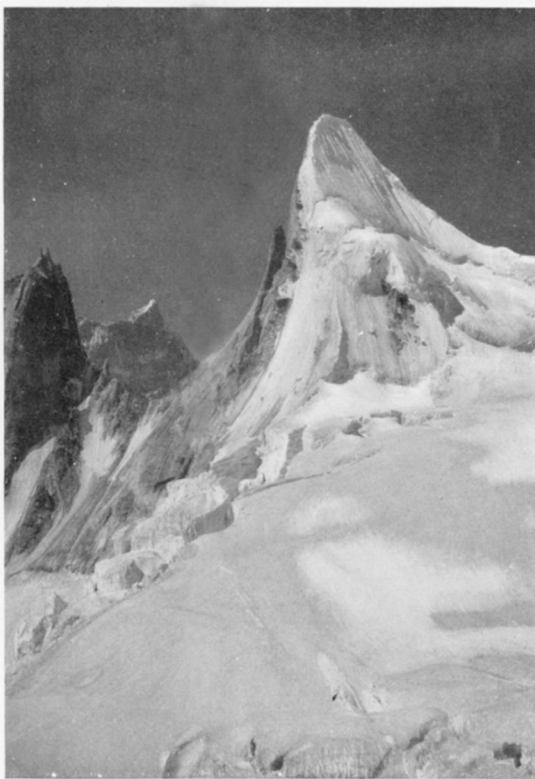
Ganchen, on the left, and Hikmul



The divide in the Sosbon glacier



Kero Lungma glacier from the Nushik pass



Peak above the pass between the Nobande Sobande and Choktoi glaciers

Kanjut Sar
Pumarikish

B i



"Ogre" Pk

West Biafo Wall



Biafo Glacier

Panoramas from a peak (19,400 feet) on the His

B i a f o K h u r d o p i n W a t e r s h e



S n o w

o W a l l

Ganchen

H i s p a r



H i s p a r

om a peak (19,400 feet) on the Hispar-Biafo watershed, north of the Hispar pass, looking north and east (top), south and

Watershed



ow Lake

spar Wall *Nushik Pass* *Makorun P.^k*



spar Glacier

ing north and east (top), south and west (bottom)

the Wild telescopic alidade which enabled him to carry out a graphical triangulation, and fix the relative system of heights with considerable accuracy.

One of the most pleasant aspects of the Sokha and Solu glaciers is the amount of vegetation on the lower slopes. Flowers of every colour and form were a constant delight to the eye during the climbs to the survey stations, and provided Russell with a magnificent field for his botanical work, while a mass of willow and juniper served as an endless source of fuel.

Six miles down the Sokha glacier from the pass a steep and very crevassed tributary glacier descended from a cirque surrounded by gothic pinnacles of rock which Mott was to see again from the west arm of the Sosbon. There are two further tributary glaciers joining the Sokha on the south side. Russell ascended the most westerly of these in the hope of finding a pass over the watershed, but the col he reached (16,500 feet), contrary to expectations, proved to be on a subsidiary ridge south of which a stream led down to the Basha valley.

On the sixth day the party descended the ablation valley on the right bank of the Sokha glacier, reaching the Solu which they crossed, and made camp in the ablation valley on its west bank. The following morning, while Russell continued his botanical collecting, Mott proceeded up the Solu far enough to see round the bend, a mile from its head, where the glacier takes a sharp turn to the east. From his plane-table station, on a hillside surrounded by willows, grass and flowers, he could see the whole of the basin hemmed in by the Biafo rock wall, and the col Tilman reached from the Snow Lake. It is doubtful whether a descent west from the col is possible owing to the very formidable ice fall at the head of the Solu. Tilman did not attempt it. They came across many fresh bear tracks, which are common in this area, though the animals themselves were not seen.

On August 27 they moved down to the snout of the Solu glacier where there is quite a large grazing village named Dabados, where they were able to buy fresh food. They spent two days there rounding off the survey of the two glaciers, and then descended to the Basha valley, whence they travelled to Askole by the normal route. At Askole Russell left Mott and proceeded up the Biafo to meet me on the Snow Lake. Mott returned down the Askole valley as far as Chokpiong to survey the Hoh Lungma and Sosbon glaciers. From his first station on a ridge west of the Hoh Lungma nullah he was fortunately able to pick up Kanjut Sar and Conway's Ogre which, with Ganchen, gave him a perfect fix. The view from this station was magnificent, the whole area to be surveyed being visible. Four main glaciers drain into the Hoh Lumba river. The largest of these, the Sosbon, flows southwards and, at its head, splits into two arms which are divided by a narrow rock ridge. The western arm flows beneath the pinnacles the party had previously seen from the Sokha glacier. It was from a col above its western arm that the Workmans and Tilman looked down on to the head of the Sokha. Tilman took the western arm of the Sosbon for the Hoh Lungma, but according to local tradition the name refers to the glacier flowing north-east from Ganchen. The Hoh Lungma is joined by another glacier, flowing from the west, named the Tailbu. Two weeks later Fountaine ascended this glacier and crossed a col (17,000 feet) at its head to the Basha valley. South of the Hoh Lungma a

smaller glacier, the Chongahanmung, drains into a wide sandy flat. In Spender's compilation the name Zarn glacier appears to refer to this glacier. Owing to bad weather it was two days before Mott was able to get a second fixing. There were several heavy snowfalls and the temperature dropped. At the end of a week he completed the survey of the Hoh Lungma and its adjacent glaciers and moved camp to the divide of the Sosbon. From the top of the ridge he was again able to check his position in relation to Kanjut Sar. Fountaine meanwhile had descended the Biafo glacier after leaving me on the Snow Lake, and on September 18 met Mott in the Hoh Lungma valley just below the glacier.

It had been intended that Mott and Fountaine should work together from now on. But unfortunately Mott had developed a form of septic rash which forced him to lie up for several days, and as the time for the return of the expedition to Gilgit was drawing close it was decided to abandon the proposed survey of the Kero Lungma glacier. When he was somewhat better Mott completed his work in the Hoh Lungma area and made his way back to Gilgit *via* Rondu and Astor, crossing the Ganto La (above the Basha valley) and Harpo La on the way. Lhakpa Tensing, who was suffering from severe toothache, remained with Mott while the other two Sherpas went with Fountaine.

The latter party made their way up the Hoh Lungma glacier and camped about a mile from a steep col at the head of the Tsilbu, which is flanked by Hikmul Peak on the south and a low rock ridge on the north. The next day they set out to cross the col (later named the Hikmul pass). The first one and a half hours were through deep snow, but after that the ground steepened and they had to cut their way up an ice-slope covered by a thin layer of loose snow. After negotiating two difficult bergschrunds, some rocks and a steep gully, they reached the top of the col, from which Fountaine took a round of photographs and bearings. To the east the Ogre Peaks could be seen, while westwards they had a fine view up the Chogo Lungma glacier to Haramosh. It was surprising to see that a few miles from its snout there was a right-angled bend in the glacier. After descending the col on the other side they reached the snout of the glacier by evening. The valley they were in was exceedingly steep and dropped 8000 feet from the col they had crossed to the Basha valley, in a distance of less than 4 miles. This made the descent to the village of Bisil difficult. From Bisil to Arandu the party had further trouble owing to the fact that a rope bridge between the two places was down.

From Arandu Fountaine and the two Sherpas started up the Chogo Lungma on September 26 to attempt to cross the Haramosh pass at its head. They took with them enough food for ten days and carried heavy loads. They followed an ablation valley which ran along the northern bank of the glacier and provided them with an easy route. On the first day they camped early, about 3 miles up the glacier, so that they might prepare a large supply of *tsampa* in order to conserve their paraffin when they got beyond the wood fuel in the higher reaches of the glacier. The next day they continued up the ablation valley, which was wide and well wooded. About 5 miles above its snout the main valley took a decided turn to the north, confirming what they had seen from the Hikmul pass. They passed several deserted shepherd

villages during the day and camped that night by the last willow tree on the north side of the glacier, about 10 miles from the snout. They had left the last of the juniper 2 miles lower down. Here again they found a great number of bear tracks. A little farther on they left the ablation valley and proceeded up a band of white ice on the glacier. At about this point a large glacier joins from the south, at the head of which they saw a col which on their side appeared to be practicable. On the night of September 28 they camped on the south bank, at a point about 2 miles below the junction of Haramosh. On this side of the glacier at about 13,500 feet there was still plenty of willow. The following day they went up the Haramosh glacier and camped on its north bank about 5 miles below their pass, which they reached on September 30 after a laborious trudge through deep snow. The view down the other side of the Haramosh pass presented a dramatic contrast from the great glacier they had just come up. Directly below them at the foot of a steep rock face was a thick jungle. The willow and birch trees in their autumn foliage filled the bottom of the valley with gold and red for 4 miles, where the colour changed to the dark green of pine forest. Beyond this deep well of colour Dobani stood in splendid isolation. To the south stood the mighty cliffs of Haramosh draped in hanging glaciers. Later from one of these they saw an avalanche fall which travelled 4 miles down the valley. They climbed down the rock face, which was quite difficult, and in places dangerous owing to falling stones and ice, and reached the valley 4500 feet below by nightfall. Three days later they reached Gilgit, when for the first time they heard news of the war.

It was difficult in Gilgit to get much idea of what was going on in the outside world, or whether we were likely to be required either in India or in England. However it seemed obvious that we must come back, though it was a bitter disappointment to all of us to have to abandon an expedition which had promised to be one of unusual interest and value. But for all that we are lucky to have been able to snatch a few more months of life from the wreck of the future. The summer part of the programme had been a success. I think that it may be fairly claimed that the geographical problems surrounding the Hispar, Biafo, and Panmah basins have been cleared up once and for all. Triangulation was carried from the Indo-Russian system in the Hunza valley, up the Hispar to the head of the Biafo glacier, which has made it possible to fix the major features accurately; 1750 square miles of this country were surveyed in detail; and several interesting new passes were crossed. A summary of Scott Russell's botanical work is given below.

APPENDIX: BOTANICAL INVESTIGATIONS

R. SCOTT RUSSELL

The flora of the Karakoram is small compared with that of the central or eastern Himalaya, and few of the species are sufficiently striking to interest the horticulturist. Thus the Karakoram offers but little attraction to the botanist whose primary object is to collect new or beautiful species. To the ecologist however it presents many interesting problems, and its position north of the main Himalayan chain and bordering on Afghanistan and the great deserts of Central Asia makes it an important link between floras of entirely different types.

The majority of botanists undertaking intensive investigations in the Himalaya have been interested primarily in finding new plants, and have therefore been attracted by the more luxuriant valleys farther east. Thus large areas, especially in the higher and more inaccessible parts of the Karakoram, are entirely unknown. The collections of dried plants made by a number of expeditions are of great interest, but in the majority of cases botanical work was but a secondary object, and the collections were consequently small. Thus when we visited the Karakoram in 1939 there was a virtually new field for investigation.

The work I proposed to carry out was divided into three sections: the collection of all flowering plants within the area, an ecological survey, and certain physiological investigations. The curtailment of the expedition due to the European War caused much of the programme to be abandoned. The physiological studies, in which it had been planned to make observations at all times of the year, were especially affected; but the work planned for the summer was completed. Dried plants were collected mainly at altitudes above 11,000 feet from the basins of the Barpu, Hispar, Kero Lungma, Sokha, Solu, and Biafo glaciers, and in the later part of the season the seeds of the most interesting species were gathered. The main herbarium collection will be kept at the British Museum (Natural History), while the seeds are being distributed by the Royal Botanic Garden, Edinburgh. The dried material, representing 870 collections, together with the appropriate field notes, will enable a description of the ecology of the area to be prepared. The full results of the work will be published later, and it would be out of place in this *Journal* to consider them in detail. Some brief description of the general type of vegetation in the region may however be of interest.

The most important factor controlling the development of vegetation in the Karakoram is water supply. In many parts desert conditions prevail and almost everywhere the effect of water shortage is marked. This situation is readily explained by the geographical position of the range. The moisture-laden winds come from the south, the northerly winds, which have crossed the great deserts of Central Asia being dry. To the south the high ranges act as a rain curtain, so that little rain reaches the main Karakoram chain. This curtaining effect is well shown as one approaches the Karakoram from Kashmir; on the hills above Srinagar there are well-developed pine forests and an abundance of alpine plants, while in the Indus valley and at Gilgit the hillsides are generally barren. The rainfall in Gilgit is from 4 to 7 inches a year. It may be noted also that the humidity of the atmosphere in the Karakoram is generally low, due to the strong insulation. In July, at the altitude of 12,500 feet on the Hispar glacier, the relative humidity was below 10 at noon on clear days. In consequence of these conditions the flora of the Karakoram consists of plants which have low water requirements. This situation is in strong contrast to that found in the central or eastern Himalaya, which lie farther to the south and receive the full force of the monsoon. The entirely different types of vegetation found in the two regions are thus accounted for.

In the areas studied on the present expedition little or no vegetation occurred on open hillsides unless a constant water supply was provided by snowfields on the higher slopes. The most varied flora was usually found in the ablation valleys flanking the glaciers. Hillsides with unusually varied vegetation were examined on the southern sides of the Barpu and Hispar as well as above the Kero Lungma, Sokha, and Solu glaciers. In these localities water supply was provided either by seepage from the snowfields or by springs. The aspect of the slopes protected them from excessive insolation. These areas varied in altitude

from 12,000 to 15,000 feet. The highest level at which plants were found was about 17,000 feet.

The most important trees and shrubs were willows (*Salix*). A number of species were collected, varying from small shrubs to small trees 15–20 feet high. Considerable areas of hillside were covered with willow shrubberies beneath which a wide variety of herbaceous plants was found. Juniper (*J. pseudosabina*) was less abundant but occurred, often as isolated trees in rocky places, over the greater part of the region, while at the lower levels roses were common. Other trees were in general absent. A few of the more interesting herbaceous species may be mentioned, but it should be noted that, until the collections are compared with type material, the specific determinations must be regarded as tentative. Between the altitudes of 12,000–13,000 feet a species of aconite (perhaps *Aconitum violaceum*) with striking bluish-purple flowers was often common. It was particularly abundant in the Sokha valley. *Papaver nudicaule* was collected in many localities, but it was nowhere abundant; no other poppies were found. In almost all localities between 12,000 and 14,000 feet the blue geranium (probably *Geranium pratense*) was one of the most common and most striking plants. Several epilobiums were collected, including the large-flowered *E. latifolium* growing usually on semi-stable moraine. The family Leguminosae was well represented, mainly by species of *Oxytropis*, *Hedysarum*, *Lathyrus*, and *Astragalus*. A number of species of *Potentilla* occurred commonly. In dry localities *Sedum* species were among the most important plants. A number of asters were abundant in grassy slopes. Another interesting composite was *Saussurea*, which grew only above 15,500 feet. Several primulas were found, usually in moist localities at fairly high levels. *Acantholium lycopodioides* was a striking plant in dry localities between 10,000 and 11,000 feet. The family Gentianaceae was represented by several gentians of which the most widely distributed was the small *Gentiana venusta*; *Pleurogyne spathulata* occurred in restricted areas mainly by the Sokha glacier. Striking blue patches of *Martensia Tibetica* were found in a few places above the Hispar glacier, while a small species of *Myosotis* was abundant in the ablation valleys. At the margins of *Salix* shrubbery species of *Pedicularis* were frequent.

The purpose of the physiological investigations was to show the effect of the environment on the metabolic processes which control plant growth, more particularly those by which carbohydrates are formed and utilized. A large amount of laboratory analysis will be necessary before the results of this work are available. Similar investigations were carried out in the Arctic by the Imperial College Expedition to Jan Mayen in 1938, and one of the interesting applications of the present results will be to compare the effects of high mountain and arctic conditions on plant growth. The environments are similar in many respects, notably the long cold winter, but on the other hand the quality and duration of sunlight, most important biological factors, are markedly different in the two cases. Field investigations of this type are at present seldom undertaken, but eventually they should lead to a full understanding of the manner in which different climates affect the growth processes of plants.

As by no means all parties whose object is geographical exploration include a botanist, it is appropriate to consider the importance of botanical work in geography and the type of investigation which can be undertaken on an expedition travelling in difficult country. In a recent discussion (*Geogr. J.* 91 (1938) 338) Sir Francis Younghusband defined the function of geography as being the description of the surface of the earth. Except in heavily glaciated or desert regions the plant-covering is one of the most important features of the earth's surface. Geographers naturally regard with little interest botanical publications

which consist solely of enumeration of species occurring within a given area. But if the botanist is prepared to devise physiological and ecological methods which can be applied in the field he is able not only to describe the flora, but also to discuss the vegetation in relation to the prevailing climate on the one hand and the nature of the underlying rocks and the development of land-forms on the other. Such results should be of value to the geologist, the meteorologist, and the geographer.

A light expedition naturally sets rigid limits to the amount of collecting material and other apparatus the botanist can employ, but even so much valuable work can be done. Careful organization is much more important than elaborate equipment. On the present expedition the equipment required for the summer totalled little more than two coolie loads, while on journeys from the base depot on the Hispar glacier never more than one load was taken. Nor is an elaborate camp necessary. Though it is no doubt more pleasant to sort one's specimens sitting at a table, the job can be done with equal efficiency reclining on a sleeping-bag in a bivouac tent. I would disagree with the opinion recently expressed that the conditions of a light expedition are not conducive to exact scientific work. In the Karakoram the amount of time and energy expended in transporting camps and quelling disputes among coolies increases in geometric ratio to the size of one's *bandobast*. It is a tribute to the powers of organization of many early explorers that, with their elaborate outfits, they had time to bring back any results at all. In this connection it is of interest to note that in the arctic, where detailed botanical work has been carried out more often than in the Himalaya, small and mobile expeditions seem in general to have been more successful than parties with elaborate bases. At the same time it is obvious that where transport presents no difficulties nothing is to be gained, and a great deal may be lost, by the indiscriminate restriction of supplies and equipment. Such conditions are however seldom realized in difficult mountain regions.

DISCUSSION

Before the paper the PRESIDENT (Field-Marshal Sir PHILIP CHETWODE) said: Early in the summer of 1939 Mr. Eric Shipton, with Mr. Scott Russell, Mr. Peter Mott, and Dr. E. C. Fountaine, returned to the Karakoram to resume and if possible complete the explorations upon which he gave us so important a paper on 10 January 1938. He had filled in several blanks upon the map of the northern face of the Karakoram range and the Shaksgam region, already known to us from the discoveries in 1887 by Sir Francis Younghusband and by Professor Mason in 1926.

In September 1939 Mr. Shipton heard of the outbreak of war and felt it his duty to return to place himself and his companions at the disposal of the Government of India. We have recently heard that after spending some months at Dehra Dun working up and handing over his survey results to the Survey of India, he is now under orders to join the Indian reserve of officers for training. His companion, Mr. Scott Russell, is primarily a botanist interested in the physiological side of that science. He came home two or three months ago, and we are fortunate in having him here to give us the substance of Mr. Shipton's paper. He is shortly to return to the East to take up a scientific appointment.

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

Sir FRANCIS YOUNGHUSBAND: It has been a delight to me to listen to the interesting lecture and to see these beautiful slides. I visited the country over fifty years ago, and in those days the photographic apparatus of the portable type had not been invented. Therefore when I lectured to the Royal Geo-

graphical Society in 1888 I had to rely upon my own description, and being unable to illustrate the country by means of lantern slides, I said that the region I had traversed resembled hundreds of Matterhorns put together. That was the nearest I could get to it, and I remember seeing Mr. Douglas Freshfield raise his eyebrows at such a description. But after looking at the slides shown during the course of this lecture I am not so sure that I was wrong. You will have noted the extraordinarily spiky character of the peaks in that region.

I was glad to hear the lecturer mention that great surveyor Colonel Godwin Austen, of the Survey of India, who was the original explorer of this region. He did not get over on to the far side of the Himalaya, but surveyed all this part on the near side. On the map he then made all other maps have been founded.

I was led to doubt as I listened to the lecture this afternoon whether it is advisable to send such large expeditions into those regions. Perhaps it would be better to confine one expedition to making the map, another to botanical purposes, another to zoological, and so on. It is really a great tax upon the peoples of the country to be taken out of their homes and carried across most inhospitable regions at great risk to themselves. I would also suggest that a great deal more use should be made of the men of Hunza. They in my time were the raiders who crossed into Central Asia. They made marvellous expeditions across the mountains, with very little food, and had to return carrying all the booty they could. They are most hardy men and good mountaineers; and their diet, as it happens, is perfect. I should say that just as a good deal of use has been made of the Sherpas, so in future more might be made of the men of Hunza who are there on the spot.

The object of my journeys in 1887 and 1889 was to ascertain if there was any way by which the Russians could send an expedition across the Himalaya. I think from the slides you have seen this afternoon you will realize that that is impossible so far as the region visited is concerned. I came across the old Muztagh pass a little farther to the east. I did not go up the Biafo glacier beyond the snout of the Panmah glacier to discover the "New Muztagh pass." But I saw quite enough to be able to report to the British Government that there was no possibility of Russian forces being able to cross the range.

I thank you very much, Mr. Scott Russell, for the paper you have read. It has given us a most encouraging idea of what can be done in the region, and we look forward to other expeditions going there.

Professor KENNETH MASON: In the first place I should like to congratulate Mr. Shipton and Mr. Scott Russell on their fine performance and their excellent survey work in difficult country. The map that they had to commence with was mainly a compilation of Lord Conway's very rapid plane-table traverse up the Hispar, down the Biafo, and up the Baltoro glaciers, and of the Workmans' surveys, of which we have heard to-day. The latter, unfortunately, were not trained surveyors. It was not until 1912-13 that we were able to take a really accurate triangulation up the Gilgit and Hunza valleys. By the way, the stations mentioned by the lecturer in the Hunza gorge were not visited by me but by my assistant, Mr. V. D. B. Collins. I worked back from the Pamirs and joined on with his work farther north. Our stations on each side of the gorge were not very high; we made a rule to go no higher than we had to. The country is extremely difficult. We were observing to light signals, which meant leaving men on the mountain-tops, perhaps for a week on end, ready to show a lamp by night or a helio flash in the sun by day. The average height of our stations was as low as 17,000 or 18,000 feet, but we had to carry up heavy theodolites. It is a very different matter to-day when one can use a light field theodolite for stereo work: the modern mountain surveyor can now climb with a light

instrument, take a round of photographs, and come down. Moreover present-day surveyors can use the points their predecessors fixed, the earlier surveyors could not. We must not therefore be too hard on the Workmans and others who went before. When we joined our triangulation with that of the Russians the probable error was only 1.5 metres, so that we were not far out.

As to Sir Francis Younghusband's reference to the Hunza men, I would emphasize that the Hunza man is much more reliable than the Nagir man as a climber, especially on rock. Only last night I was talking to Sir Robert McCarrison, the expert on diet, on this subject at Oxford; he attributed it firstly to the fact that the Hunza man's diet is better and more suitable than that of the Nagir man; secondly—and this will appeal to biologists—the Hunza man lives on the sunny side of the valley; the Nagir man on the shady side. The Hunza man is bright and laughing; the Nagir man is dour and sad. The Hunza man is a better climber and a happier man, and he will never let you down.

Fazal Ellahi is a magnificent surveyor, as good as the best of Indian surveyors, which is high praise, and a very worthy successor to the old pundit explorers and other excellent men in the Survey of India. His immediate predecessor in the line, who served so well with me, Khan Sahib Afraz Ghul Khan, a recipient of two of our awards, is now tehsildar at Gilgit and anxious to help any one who goes to that part of the world in the future.

I should like to ask the lecturer whether he saw the Yenguts Har glacier, one of the most interesting glaciers of Nagir, in a side valley near the village of Hispar. In 1902 it came forward so quickly that, according to native report, it caught up two old ladies who were running in front of it! I do not altogether believe that story, but there is no doubt that it moved forward 2 or 3 miles in about six weeks. It could be seen advancing. It has been deteriorating since then until it is now 3 or 4 miles farther back. Up in its basin there has been a heavy accumulation of ice and snow; and there is no doubt in my mind that this accumulation must be released shortly. This will happen either in May this year, in May next year, or in May the year after. If anybody likes to be on the spot with a cinema camera, when the "corn is a hand's breadth high," he will be able to photograph something that has never been photographed before.

Captain KINGDON WARD: It is always a pleasure to a botanist like myself to see the younger generation carrying on the work of botanical exploration. I came here full of anticipation to hear what Mr. Scott Russell had to say about the plants of the Karakoram. When I saw the magnificent photographs of snow-peaks and glaciers, bergschrunds and crevasses, I could not help thinking that possibly Mr. Scott Russell was botanizing at a slightly high elevation; there did not appear to be very much flora there. However I gather he was deputizing for his leader and that he had for that reason to concentrate more on the climbing and cartography than on the botanical work. If he had had his own way, I think he would have told us some extremely interesting facts about the flora of the Karakoram.

I was particularly glad to hear Mr. Scott Russell say towards the close of the lecture that people are not only interested in lists of the flowers which grow in these places, but also in the study of their associations and the conditions under which they live. I should much like to have heard something on that aspect. I have always felt that the Karakoram is not really a botanist's paradise, such as the Eastern Himalaya, so I am not proposing to go there to look for plants; it is outside my scope. Nevertheless, I hope that at some time Mr. Scott Russell will have more to tell us about the plants he saw.

MR. MICHAEL SPENDER: My principal feelings about this paper are of pleasure and gratitude at seeing some pictures of mountains and thus being reminded

that the mountains are still there. Nevertheless, I feel bound to enter into something which is dangerously near to being ponderous, because I should like to relate this expedition to the journeys of previous travellers in the same region. It was Conway who first ascended the Hispar; he made a very good survey indeed; but others came along later and in their efforts at map-making got surveys of the district into appalling confusion. What Shipton did was to tidy up in one fairly short expedition the work of several expeditions. He used his forces and disposed his food and Sherpas so that he did in the course of a short time an amount of work which would have taken an earlier expedition a great number of seasons. It is important that none of this was new work over new country. It was all done simply out of the feeling that it had got to be done; the surveys of this area had to be straightened before he could get on to what he really wanted to do.

Shipton likes going to new country; he likes exploration. When we finished in 1937 we left one or two fascinating problems unsolved. There was the great patch of country near the Aghil pass to which Sir Francis has just referred, which is still unexplored. Looking to left and right from that pass we saw a large area of country still to be spied out and put on the map. That was what Shipton was looking forward to going back to. He had planned to spend the summer of 1939 doing the duty part of the work, and to spend the winter doing the interesting part. That point was not brought out during the paper, so I hope you will forgive me for stressing it now. It is important to me and important, I am sure, to Shipton.

Shipton went to the mountains for their own sake. At a time when so many do things for the wrong reasons—because they will get some *kudos* or promotion or because the newspapers will write about them—it is important that there should be those who insist on doing things for their own sake; that there should be those who insist on removing inessentials, on discarding what is unimportant to the job in hand. That is why Shipton has been a successful leader, a leader with whom it has always been and always will be a great inspiration to work. He spent the summer preparing and laying the foundations, so to speak, laying out his depots in more senses than one, anticipating an interesting winter's work. I want you, in judging the expedition, to realize that it was cut off before the main part had begun and after the foundations had been laid.

Mr. SCOTT RUSSELL: Sir Francis Younghusband has stressed the desirability of using Hunza men as porters. We were unfortunately unable to do so as we were travelling through Nagir, and a healthy rivalry exists between the two states. It would have given rise to great complications had we attempted to take Hunza men through Nagir.

Professor Mason has mentioned the interesting Yenguts Har glacier. Unfortunately when I passed it on my way up to Hispar it was shrouded in mist, and on the way down I was hurrying to Gilgit, so I was unable to examine it. It was however mapped by the surveyor Inayat Khan.

The PRESIDENT: It only remains for me to ask you to thank the lecturer for the extraordinarily interesting afternoon he has given us, and especially for those wonderful photographs. I have had the privilege of actually looking upon those magnificent peaks from a distance because, as an irreverent young subaltern, I went in 1890 to that part of the world, through Kashmir, after a gentleman we knew as Lal Palu, or the Red Bear. Again as Commander-in-Chief in India I spent ten days or so in the dignified and contemplative recreation of fishing in those wonderful streams in Kashmir. For the benefit of those who have not seen the country, I may say that the photographs have not exaggerated it in the least.