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EXPLORATIONS IN THE KARAKORAM

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Read at the Meeting of the Society, 22 February 1926. Folding map follows p. 532.

TO the north of the great Karakoram range in the Hunza region there is a mountain country that belongs to the last unexplored tracts of the Indian Empire. The Hunza valley itself was well known, being an important way of communication between India and Chinese Turkestan. Sir Francis Younghusband and other travellers had made known many details about the valley which had been the scene of one of the most remarkable campaigns in frontier warfare, and which is admirably described in Knight's book about Hunza and Ladakh, entitled 'Where Three Empires Meet.' In 1911 Major Mason had joined the trigonometrical survey to that of the Russians.

Sir Aurel Stein had already traversed the principal western valley, and General Cockerill, in 1892, had visited two of the eastern side valleys, namely, the Khunjerab and the Shingshal. In this eastern region the surroundings of the Bara Khun river were still unknown, while the country at the head of the Khunjerab and the Shingshal valleys had never been mapped. Also the entire Gujerab valley was *terra incognita*.

It is therefore not surprising that this region tempted us, as it held a promise of revealing many an interesting geographical problem, besides being a part of the Earth where nature was sure to show its grandest and most impressive aspect. It was, however, not an enterprise upon which one could enter lightly. It was a well-known fact that the British Indian Government rarely gave permission to travellers to enter the country, owing to the scarcity of supplies and the great difficulty to secure transport.

Even the road to Gilgit is closed to ordinary travellers; and on the Hunza road the transport difficulties grow greater as one nears the Kilik pass, which descends into Chinese Turkestan.

We were thus most grateful to the British Indian Government, and to Lord Reading especially, for so kindly giving us permission to travel in the Hunza. Our thanks also are due to the Survey of India for the

valuable help they gave us, also enabling one of their most excellent surveyors, Afraz Gul Khan, to join our expedition.

Major Mason, of the Survey of India, most kindly helped us to work out our plans, which comprised the exploration of the following regions :

1. The unexplored tract of country to the west of the Hunza river, formed by the Pasu and Batura glaciers and their surroundings.
2. The region to the east of the Hunza river, formed by the Khunjerab, Gujerab and Shingshal valleys with their tributary streams.
3. If time permitted, the regions between the Shingshal river and the main range of the Karakoram.

We were specially anxious to make a map of the Central Asian watershed in the last two regions, where it forms the Eastern boundary, this being one of the most important geographical problems yet to be solved in this region. It is well known that the Central Asian watershed is formed by the Karakoram, that is to say, from its eastern boundary—the Trans-Himalaya also being counted as part of the Karakoram—to a point situated at about $75^{\circ} 50'$ E. of Greenwich, where this important function is suddenly taken over by a mountain chain curving to the north, which, unknown in its greater part, was reckoned as belonging to the Sarikol Range.

We did not propose to confine ourselves to topographical work, but also intended, if such were possible, to make collections of botanical, geological, and zoological specimens, and to make observations concerning meteorology and glacier movement. At the instigation of Prof. Magnus, of the Utrecht University, a series of physiological tests were to be made concerning the effects of great altitude on the human system, and especially the value of acclimatization. These tests were first to be made in a pneumatic chamber and also in a flying machine, and were to be repeated by the same person at the same height on the mountain.

The expedition included the following members, the work being thus divided : Ph. C. Visser (leader), meteorology and geology ; Mrs. Visser, botany and the collection of butterflies ; Baron van Harinxma the Slooten, zoology ; Afraz Gul Khan, surveyor ; and Franz Lochmatter and Johann Perren, guides.

The mapping was to be done chiefly with a plane-table, working from the fixed triangulation points. The map was to be on a scale of $\frac{1}{2}$ inch to 1 mile.

The expedition started from Srinagar on April 25. Bad weather at the foot of the Burzil pass caused a delay of a few days, as it was impossible to use ponies for transport. The caravan consisted of ninety coolies. The remainder of the supplies were to be sent on as soon as the pass was open for the summer traffic.

On May 20 the journey was continued from Gilgit to Hunza. Major Loch, the Political Agent at Gilgit, had requested the Mir to assist us in collecting the necessary transport and supplies of flour. We found

twenty-six permanent coolies awaiting our arrival, and two jemindars, who were to accompany us as headmen of the transport column.

The first base camp was made at Pasu, and the Pasu glacier was the first to be explored. It appeared during this expedition that the condition of the snow in the higher regions was not favourable for a prolonged undertaking. It was still too early in the season, and the exploration of the Batura glacier was deferred for this reason until a later date.

On the Pasu glacier great difficulties were encountered owing to the labyrinth of seracs. After three days it was impossible to go any farther owing to the quantity of winter snow and the danger of avalanches. But in any case the journey had not been in vain, as we had penetrated far enough to see that the glacier was longer than we had thought, and as was also indicated on the Survey map of 1915. The total length was 16 miles. It was noticeable that the mountain wall on the right (southern) side of the glacier fell in unbroken precipices, while on the northern side several places looked as if they might be climbed.

On our return from the Pasu glacier we accordingly, passing the snout of the Batura, which descends right into the Hunza valley, established a second base camp at Gircha, our starting-point for the mysterious, unknown valleys at the head of the Hunza river.

The Mir had warned us that it was impossible to penetrate into these gorges excepting in the winter months, as they are completely filled by the seething water of the swollen rivers, and we had already read of the difficulties General Cockerill had experienced there even at the season when the water is at its lowest. The coolies disliked the thought of entering these valleys, and, although situated in the vicinity of the Kashgar mail route, they still had the reputation of being inaccessible, and we had not even been able to get information concerning them in the villages of Hunza.

We found that the Mir's statement was indeed accurate, only his judgment had not proved reliable in so far that at the date that we found ourselves at the entrance of the Khunjerab valley—on June 9—at the spot where the Kilik joins the Hunza river, it was still possible, although with considerable difficulty, to force a way into the gorge. However, we were fortunate indeed, as the rapidly rising water confirmed us in our fears that it would soon be too late either to effect an entrance or a retreat. It was doubtful if a feasible passage existed leading from the Khunjerab into the Gujerab valley, while the route over a possible pass into the Oprang region could not be taken into consideration as a way of exit, as we should be then completely out of reach of our base camp and the means of getting supplies.

It was indeed something of a risky undertaking to enter the Khunjerab in these circumstances. During the first marches we were continually forced to ford the river: the terrible current and the mass of seething

water at some places made it a hazardous and difficult task. General Cockerill has already given a description of the Khunjerab in his interesting account of his travels there in this *Journal*. We had the opportunity of realizing the amazing accuracy with which the topographical surveys were made, considering the simple instruments used and the difficult circumstances under which this mapping had to be done.

We found the descent of the Trip Sar (which Cockerill named the Titirrip pass) in a much better condition than on the occasion when he first arrived there, and found the terribly steep slope coated with snow and ice.

At the Bara Khun junction we decided to explore the unknown Bara Khun valley. We found it different from the other valleys we had traversed, as it showed a decided step, about 300 feet high, which is rarely encountered in this region.

The enormous slopes of scree and loose boulders on both sides made it impossible to discover any traces of former glaciation, nor whether the Bara Khun was a U-shaped or a V-shaped valley.

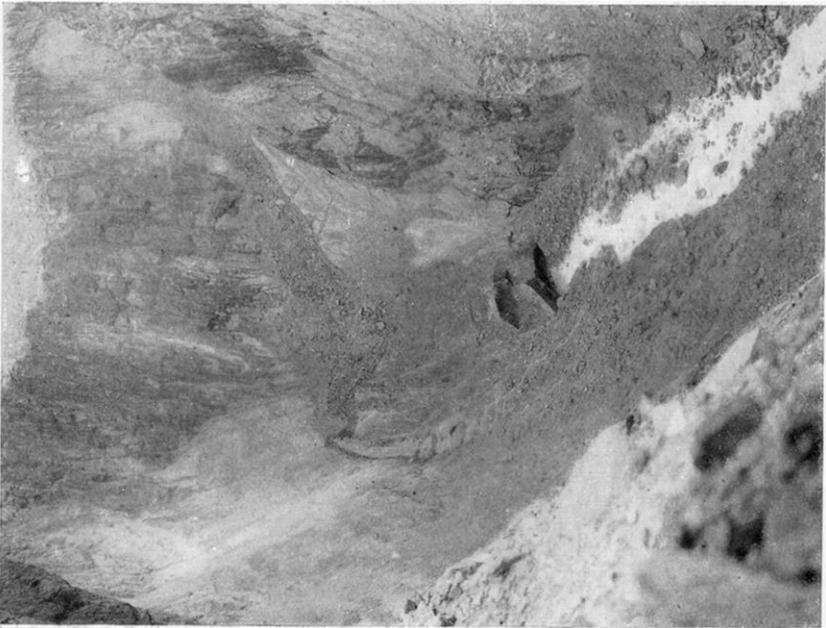
At intervals we found groves of trees and shrubs; higher up there was a plentiful Alpine flora.

The upper part of the valley was filled with a great glacier, which seemed to be advancing. Although the fact that we had found a step led us to expect great ice-falls, we found that on the contrary the glacier was not difficult, and that we could advance rapidly. A long climb brought us to the great watershed between Hunza and Oprang. There were two deeply cut passages in the ridge, at a short distance from each other: from the northern col a terrible precipice fell in a sheer drop to the east, but the southern gap formed an easy pass; the other side, as far as one could see, led down to a glacier which seemed to have a flat surface. This glacier divided into two branches, at a distance of about $1\frac{1}{2}$ miles, and continued in opposite directions, north and south. Probably one could descend along the northern branch to the Karachukor river, and along the southern branch to the Oprang region.

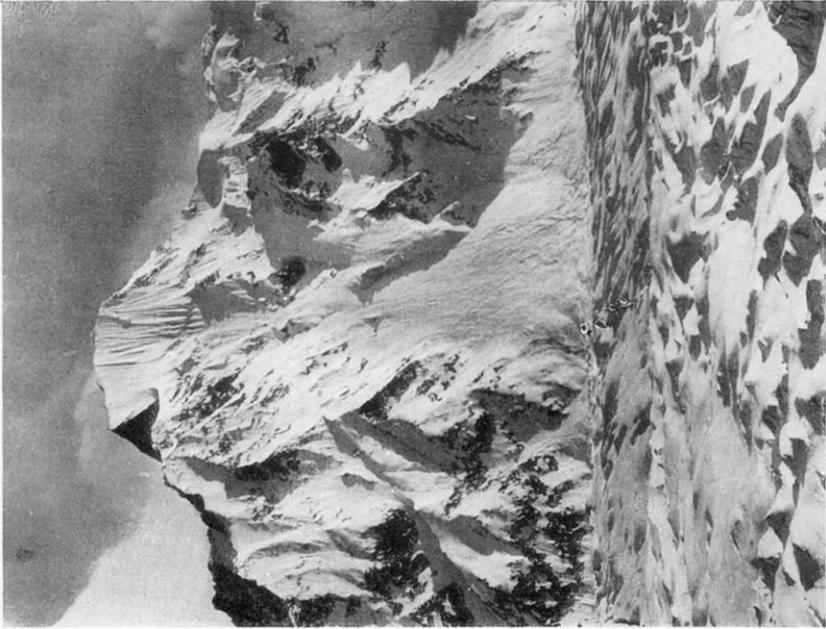
The height of the pass was, according to our aneroid, about 18,000 feet. There probably is a pass between the Bara Khun valley and the Karachukor valley. One of the northern side valleys of the Bara Khun led by an easy way up to the ridge. In this valley we had seen camp fires in the evening, which showed that there were human beings. They were probably shepherds who had come across from the grazing-grounds on the other side of the range.

On our return we found our coolies in a pessimistic mood. It appeared that the water in the gorge had risen so high as to cut off our retreat to the Hunza valley by the way we had come. It had now become a necessity to find another way out of the Khunjerab.

A Shingshali who accompanied us said that he knew of a way to the



1. *Hassanabad glacier, from a point recently covered by the ice*



2. *Mountain to south of Pasu glacier, typical of mountains north of main range, Karakoram*



3. One of the twenty crossings of the *Klumjerab* river



4. Advancing snout of *Parpik* glacier, *Bara Khun* valley

Gujerab. On the fourth day after our arrival at the Bara Khun junction we reached the point where General Cockerill had turned to the north to reach the so-called Khunjerab pass.

We followed the valley which our coolies called the Kuksel valley, and which without doubt was the main valley, and on June 26 reached its head. Here was the source of the Khunjerab. We then turned into a left side valley which brought us on to a glacier, and reached a pass by which it was possible to get our laden coolies without too much difficulty, although the descent into a northern side valley of the Gujerab was down a terribly steep slope of scree.

We were greatly surprised to find the Gujerab a broad valley where rolling uplands covered with meagre pasture formed grazing-grounds for flocks of diminutive sheep and goats, and even some yaks. There was a small village inhabited by about thirty persons, men, women, and children, who were greatly alarmed at our appearance. They appeared to be inhabitants of a Shingshali summer settlement. This discovery relieved our anxiety, as we were now sure of being able to find a way out of the Gujerab to Shingshal. By the way the shepherds came, it was however a four days' expedition. It was in no circumstances possible, they told us, to enter the Gujerab from the Khunjerab junction, the narrow gorge being completely filled with water, with terrible precipices on either side.

We decided that Afraz Gul should follow the route of the shepherds to Shingshal, while we intended to try to find a way through the unknown territory at the head of the Gujerab valley.

During our march up the valley, which grew narrower and narrower as we advanced, we were several times exposed to the danger of falling stones, and during the night were nearly buried by a stone avalanche which just missed the site of our camp. This was the second time we had a narrow escape in the same way. The Gujerab valley was longer than we had supposed it would be, being even longer than the Khunjerab, so that in discovering the source of the Gujerab on July 3, we had also traced the Hunza river to its source.

The glacier stream issued from a big glacier, up which we climbed; at its head we found, the next day, a pass of 18,000 feet, over which we managed to bring our caravan. The descent along the slope facing south was precipitous and dangerous owing to the falling stones. At the foot of the pass we reached a glacier flowing in a southern direction, and lower down, a valley which we surmised would be a side valley of the Shingshal. Here we found another little colony of shepherds.

Here once more the water barred our way and we were forced into a side valley running to the west. We crossed another pass of 17,000 feet and descended into the Zardigarbin valley, where we found Afraz Gul, who had just arrived from Gujerab by the ordinary route. The Zardigarbin is one of the most beautiful valleys we encountered in this region.

A last difficulty awaited us just before reaching the village of Shingshal. The rope bridge had been destroyed by high water, and it took a whole day's hard work to make a new one and to get our entire caravan safely across the swollen river.

In the Shingshal valley we once more trod the tracks of General Cockerill, who had done the first pioneer's work there; during his expedition up the valley he had, however, turned up a northern side valley in order to reach the so-called Shingshal pass, which leads to the Oprang.

We first intended to try to discover the source of the Shingshal. Two marches beyond Shingshal we made the exciting discovery of an immense glacier region which was quite unknown. Although there was every reason to suppose that there would be an extensive tract of snow and ice at the head of the Shingshal valley, this immense glacier complex, the greatest in Central Asia, was beyond our expectations, for, as we argued, the southern and south-western monsoon must have already deposited its burden of snow on the snowfields of the Himalaya and Laskar range, and on the southern slopes of the Karakoram.

On the first march beyond Shingshal we crossed a great glacier which the natives called the Yazghil, flowing from the south and reaching right across the Shingshal valley. The head of the valley was entirely filled by another great glacier, the Khurdopin.

The snout of this glacier was at a height of about 11,000 feet. The upper end descended from a step, so that for many miles it had the aspect of a wild sea of ice. The masses of broken ice with its terrible labyrinth of seracs and crevasses made it impossible to advance, but by ascending a high point we were able to gain a view of the glacier up to its head. Its entire length was not less than 32 miles.

Very typical of the Khurdopin was the series of beautiful little glacier lakes, which, although extremely picturesque, are a source of great danger. We were also struck by the curious little valleys between the glacier and the mountain side, to which I have given the name of moraine valleys. We had already noticed them in the Sasir group in 1922. As these little valleys form deep and narrow gorges along the outer curve of the glacier, they might be considered as "Randklufte," occurring generally on the northern side of the glacier, thus against the mountain side facing south, and the supposition is not too far-fetched that these moraine valleys are produced by the great heat given out by the mountain wall, which prevents the ice from touching it. It is needless to say that at this latitude the circumstances which are brought about by the intense heat of the sun are particularly conducive to the formation of these moraine valleys. The vegetation is generally abundant, and these little oases in the midst of a landscape of death, composed of barren rocks and snow and ice, come as a pleasant surprise. Sometimes a little stream flows through the tiny valley for a distance of several miles, another typical proof of the compactness of the ice, showing that the water can nowhere find an



5. *Sarikol Watershed, head of Parpik glacier*



6. *Gujerab valley*



7. Southern side of col between Gujerab and Shingshal valleys



8. Shingshal village

outlet under the glacier. The width of these valleys varied between 30 to 40 feet and $1\frac{1}{2}$ miles.

Although until recently I had always believed that this formation was confined to tropical and sub-tropical mountain regions, this supposition seems to be denied by an observation in an article by H. F. Lambart (*The National Geographical Magazine*, vol. 49, No. 6, June 1926), in which he describes the ascent of Mount Logan, and which is contained in the following sentence: “. . . They discovered that between the wall of the glacier and the land there was a deep canyon, through which flowed a turbulent icy stream. . . .” It appears that there also a kind of moraine valley had been formed.

Another phenomenon that struck me on the Khurdopin glacier, and that I noticed later on other glaciers (I had already observed it in the northern side valley of the Shingshal through which we had come over the Mai Dur pass from the Gujerab) was that all these ice-flows showed a tendency in their upper part to take an easterly direction and to curve afterwards with a sharp bend to the west.

During our expedition up the Khurdopin glacier we passed under an immense mountain peak—its height proved to be 25,460 feet—which we afterwards identified as being the Kanjut Peak, which had been already fixed on the map from the southern side. The Workmans, however, must have failed to place it accurately during their visit to the Hispar region.

The mountains on the northern side of the Karakoram are of terrific steepness and the scenery of indescribable grandeur.

Returning to the snout we continued our exploration up the broad northern valley to which the natives give the name of Virjerab. This again was filled by another enormous glacier. It was 26 miles long and entirely covered with dirt and loose stones and boulders of colossal dimensions. The region it drained seemed to be relatively small, considering that the lower part of the ice-stream descended to 11,000 feet, and that its head was situated close to that of the Khurdopin glacier, being surrounded however by extremely high peaks.

On our return to Simla, aided by Major Mason, we subjected the results of these observations to a detailed examination, so as to be able to find the connection with the regions on the southern side of the main range of the Karakoram, which had been mapped by Sir Martin Conway and the Workmans during their expeditions there in 1892 and 1910. This did not cost us much trouble, and without having to make any important alterations we found that both the Khurdopin and the Virjerab glaciers are situated in the immediate vicinity of the great “Snow Lake,” discovered by Sir Martin Conway, where the Hispar and Biafo glaciers rise. The next question naturally is, whether the Khurdopin and Virjerab glaciers do not also flow from this gigantic snow basin?

At the spot where the Virjerab joins the Khurdopin valley we found a

glacier lake which reaches up to the side wall of the Khurdopin glacier and has found an outlet under the last-named glacier to the Shingshal river. It is clear that the existence of this lake must be a continual danger, causing inundations in the Shingshal and Hunza valleys. At any time it may occur that the pressure of the glacier prevents the water from flowing under the ice ; the lake then rises to a great height. When however the obstacle is suddenly removed it discharges itself with tremendous speed, and a catastrophe arises. We could clearly observe that the height of the water varied considerably, as the horizontal lines on the mountain side showed that at one time it had reached an elevation of more than 300 feet above its actual surface.

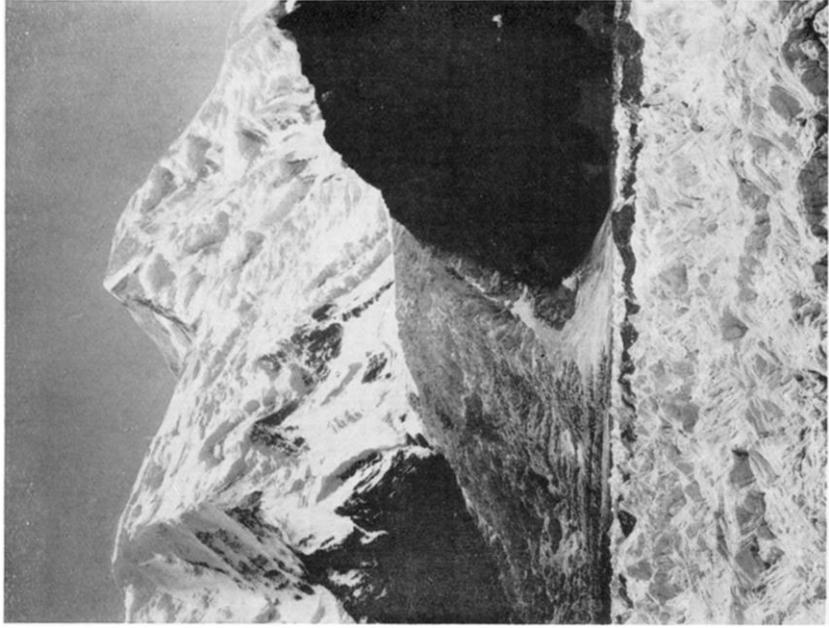
This lake might be compared, although on a larger scale, to the well-known Märjelen See in Switzerland. The inhabitants of Shingshal appeared to be aware of the danger which thus threatens them, and the flood which years ago almost completely destroyed the entire village, nearly certainly found its origin in this glacier lake, which however is not the only source of danger, as the small lakes farther up the Khurdopin glacier also drain into the lower and bigger one.

Before returning to Shingshal we explored the Yazghil glacier, the third great ice-flow of this region. We managed to reach the upper part, but unfortunately bad weather prevented us from gaining a clear view. The length of this longitudinal glacier may be reckoned to be about 23 miles.

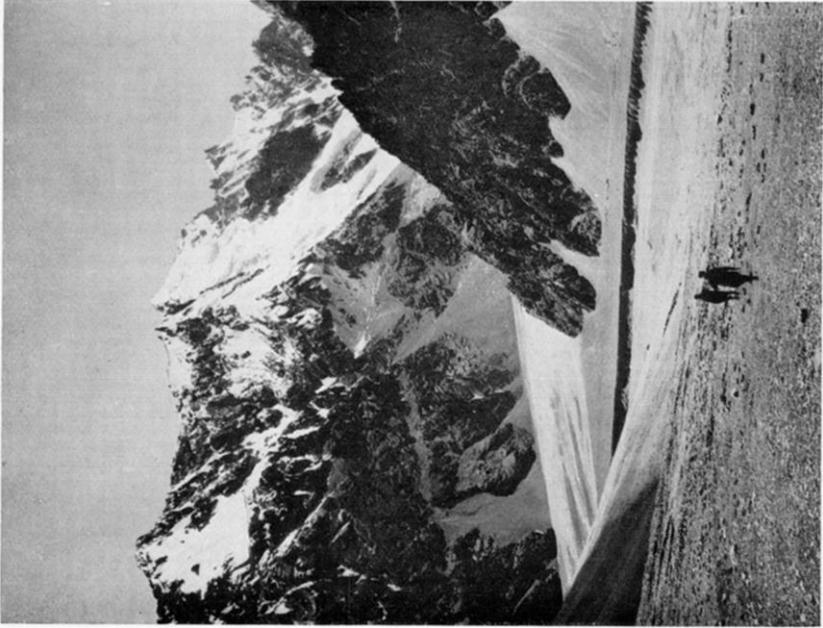
It is unnecessary to point to the fact that the question of food supplies for a comparatively big caravan in these uninhabited desert regions of the high mountains, where all progress is extremely difficult and dangerous, is a problem which causes considerable anxiety. Nevertheless we had been able to extend the expedition to the head of the Shingshal, originally intended to last not more than a week, to an eighteen days' sojourn in the most tremendous ice wilderness we had ever encountered, traversing in the meanwhile a distance of more than 100 miles. Our coolies deserved our admiration for the pluck and endurance they had displayed. The falling stones and mud avalanches had been a continual danger.

Our next expedition was to the Malangutti glacier, formerly mentioned by General Cockerill. It is of special interest, as at its head rises the highest peak of the western Karakoram. This magnificent summit was found by Major Mason to be 25,668 feet high, when he saw it from the surroundings of the Hunza valley. General Cockerill called it Malungi Dias, but probably the glacier only is called Malangutti Yaz, which means Malangutti glacier. The natives call the mountain Dasto Ghil, a word which is used for the enclosure of stones in which the sheep are driven at night, the shape of the mountain recalling this structure.

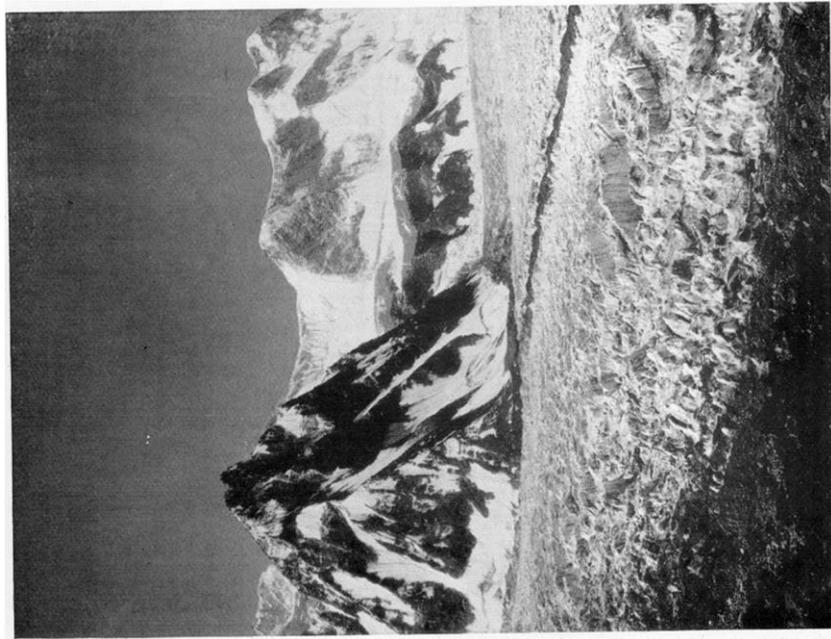
We penetrated three marches up the glacier in the immediate vicinity of the great peak, but owing to bad weather were forced to return to the



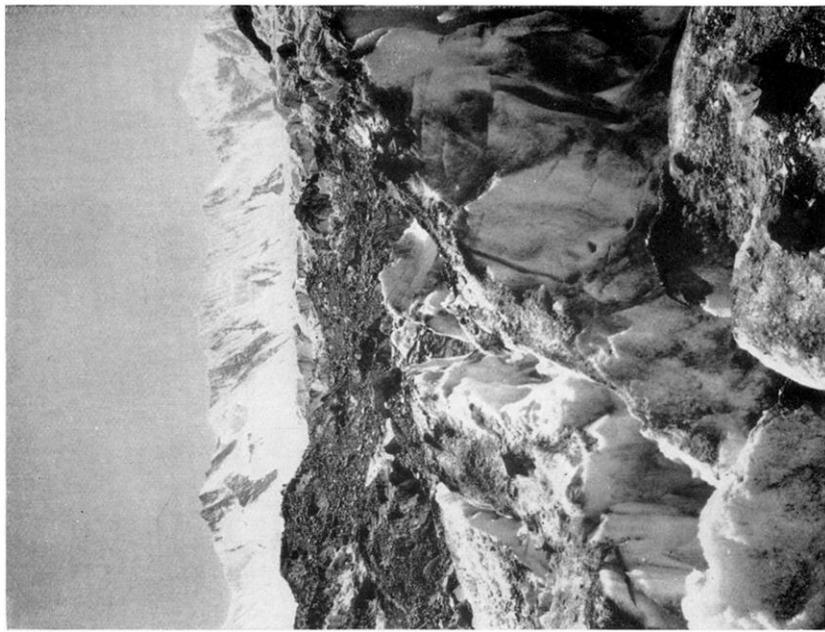
10. Kanjut Peak (25,460) above Khurdopin glacier



9. Zardigarbin valley, northern tributary to Shing-shal valley



11 *Khurdopin glacier 18 miles from snout*



12. *Southern tributary of Khurdopin glacier, and Karakoram range*

Shingshal valley. However we had had the opportunity to observe our surroundings closely, and we once more came to the conclusion that the northern slopes of the Karakoram rise out of the deeply cut valleys and glacier troughs with such terrible precipices that an ascent from this side is a sheer impossibility.

Another result of our investigations was to show that the supposition—such as was also indicated on the Survey maps—that the Malangutti glacier found its origin on the southern side of the Dasto Ghil, was not correct.

There is no doubt that the glacier rises on the northern side of the last-named mountain. But having stated this fact, another problem presented itself. If the glacier did not come from the southern side of the Dasto Ghil, what then lay behind this great peak? According to the map of Sir Martin Conway and the Workmans the main range of the Karakoram was situated farther to the south, and between this and the Dasto Ghil in that case there must exist a snow basin. But where did it drain, if it proved to be thus? This question occupied our thoughts without our being able to find an answer to it.

When, a few days later, we passed the Momhil glacier, on our way down the Shingshal valley, we observed that it could not drain on to this side, so that the only outlet could be either to the east along the Yazghil glacier, or to the south by the Hispar glacier, which however did not conform to the indications of Sir Martin Conway and the Workmans.

As it was impossible to gain a view of the unknown snow basin from the northern side, the only way of solving the problem would be from the southern or Hispar side, and we determined, if we had time enough left, having finished our work on the Batura, and if the approaching winter did not bar all exploration in the high snow regions, to try to solve the problem on our return to Hunza and Nagar.

At this season the gorge at the entrance of the Shingshal valley is completely filled by the swollen river, so that we were forced to return to the Hunza valley by the so-called summer route over the Karun Pir pass, which has already been described by General Cockerill. This route is greatly dreaded by the coolies. It involves a climb of 7000 feet, from the Shingshal valley, up steep slopes of barren rocks and scree, without encountering a single spot of shade nor, worse still, a drop of water.

After many weeks in the pathless wastes of the Hunza gorges and glaciers, the Kashgar mail route appeared a veritable high-road and Pasu a luxurious retreat. The base camp here was our starting-point for the Batura expedition. Only about 3 or 4 miles above the snout were known, and the Mir and the inhabitants of the neighbouring villages had assured us that it was impossible to go any farther.

However, we managed to penetrate into the very heart of this unknown

mountain region and to explore the glacier up to its head, including its tributary ice-flows, so that this part of the expedition included some of the most interesting discoveries we made, besides revealing to us the most glorious and wonderful mountain scenery that can be imagined. We found that the glacier had a length of 37 miles, thus is among the greatest glaciers on Earth, outside the polar regions.

It is not possible here, owing to lack of space, to give a detailed description of this most interesting region. It was specially noticeable that as regards the southern boundary of the glacier individual peaks really did not exist, but that a mighty mountain chain like a great wall continued for about 25 or 30 miles, with an occasional summit on this ridge rising to a height of more than 25,000 feet. As in other parts of the northern side of the Karakoram, the great ice-clad cliffs drop in terrible precipices down to the glacier.

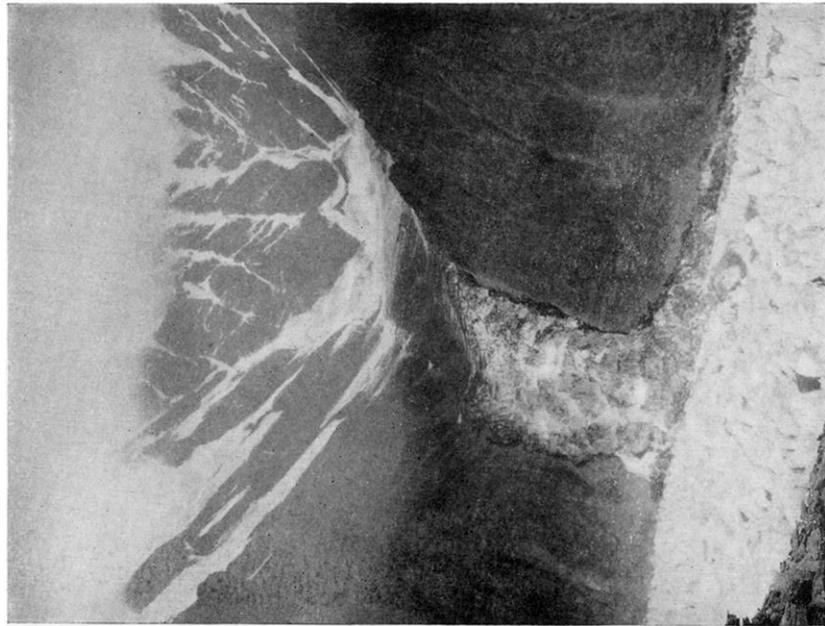
The Survey of India places the Batura in the Hindu Kush, but it is more accurate to consider this southern boundary, geographically as well as geologically, as belonging to the continuation of the Karakoram, through which the Hunza river has forced a way. It is as yet impossible to know exactly how far the Hindu Kush advances to the northern boundary of the glacier, but it is certain that we must look for the region that feeds the Batura principally on the southern boundary, that is on the side of the Karakoram, so that I would venture to propose reckoning this glacier as belonging, not to the Hindu Kush, but to the Karakoram.

Another characteristic feature of the Batura is that the glacier is extraordinarily flat, even more so than the Khurdopin. Over a distance of more than 20 miles it hardly falls more than 2000 feet; this accounts for the remarkable fact that about 20 miles above the snout we found the water on the glacier flowing for a considerable distance in the wrong direction, as one might express it—flowing uphill!

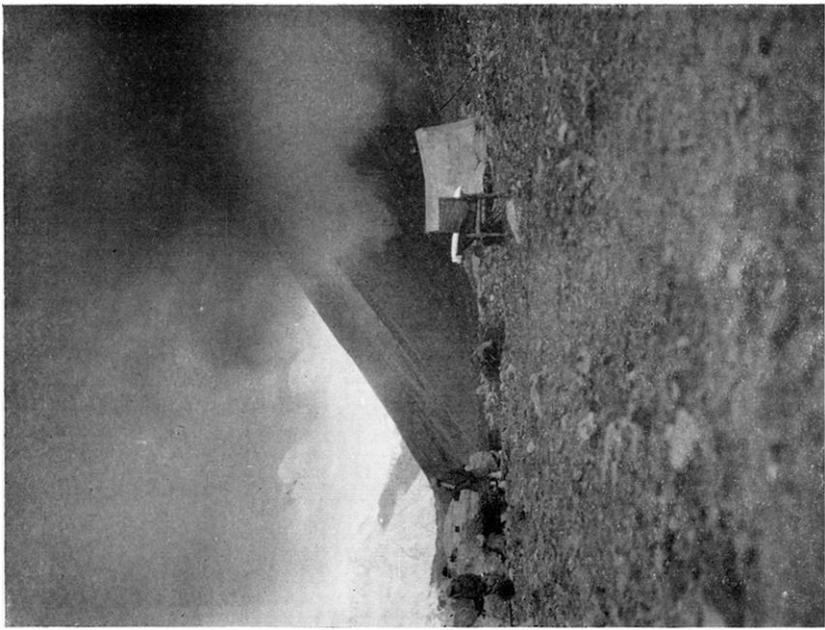
The moraine valleys were of a great dimension; in one place, about 12 or 13 miles up the glacier, we found one of these valleys about 1500 to 1600 feet wide, with trees growing in the desert soil, while higher up there was abundant vegetation. A broad and turbulent stream flowed for several miles through this valley.

We much regretted that we were not able to examine the movement of the glacier, for without doubt the progress was exceedingly slow. Speaking about this question with a well-known glaciologist, he observed that here probably was a case of so-called "dead ice," that only now and then is pushed towards the valley by an accumulation of fresh masses of snow.

If such should prove to be the case one can only be more impressed than ever by the enormous volume of these masses of ice, that withstand the burning heat of the summer in the valleys to such a degree that the ice descends right into the Hunza gorge, which is as low as 8000 feet, blocking the entire valley.



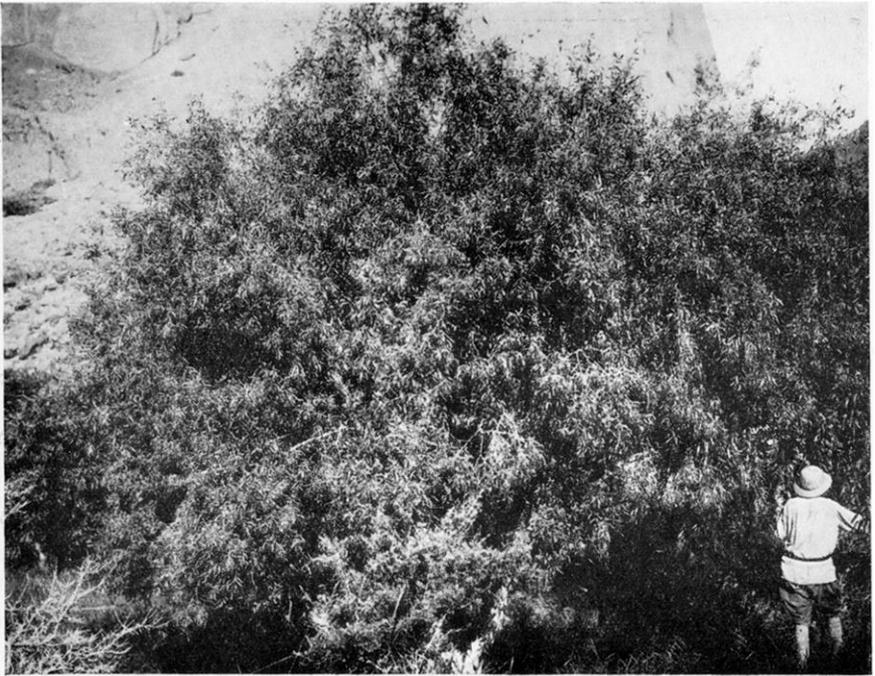
13. *Yasghul glacier and tributary*



14. *Stone avalanche in the Virjerab valley*



15. *Kunyang glacier (Workmans' Lak glacier). Dasto Ghil on right*



16. *Rosebush in moraine valley beside the Malangutti glacier*

Once more the question arises : What is the reason that we find these enormous glaciers on the northern side of the Karakoram ? The solution of the problem must be purely meteorological. The winds bringing the moisture must be the south and south-western monsoon. Everywhere in the regions of the Karakoram which we visited the cornices hang over to the northern side. However, the greater part already having been deposited on the slopes of the Himalayan and Laskar ranges, other reasons must prevail, and probably the average lower temperature of these northern regions has something to do with it. The deposit of moisture is less, but also less of the snow and ice melts than in the regions to the south. Snow and ice avalanches were very frequent here.

An effort to reach the summit of the ridge at the head of the Batura had to be abandoned owing to the impossibility of climbing the perpendicular wall of rock ; the intense cold forced us to retreat 150 feet below the top at a height of 20,000 feet.

During an exploration of the great northern branch, starting from the so-called " Junction," we reached a pass which eventually would lead into the Chapursan valley ; the descent however was too difficult for our caravan of heavily laden coolies, and the bad weather forced us once more to turn back.

The whole Batura expedition, during which we traversed about 120 miles, took us twenty days. On September 13 we once more reached Pasu.

Although the winter season was approaching rapidly in the high mountain regions, we determined to try to solve the problem of the Dasto Ghil from the Hispar side before returning to Gilgit.

In Nagar we made all our arrangements, abandoning our Hunza men, and taking on Nagar coolies, with which the Mir provided us. We started on September 20, and four days later reached the side glacier on the right bank of the Hispar which is indicated on the map of the Workmans as the Lak glacier. The name however is not accurate : the natives call the mountain and the grazing-grounds Lak, but give the glacier the name of the Kunyang glacier. We found that the map of the Workmans was correct as far as could be seen from below. Unfortunately, to our great disappointment a snowstorm which lasted three days prevented us from penetrating further up the Kunyang glacier beyond the first two marches. As soon as the weather cleared up we however managed to climb a small peak, from which we obtained a good view of our surroundings. This led us to the conviction that the unknown basin drained along the Kunyang glacier. What the Workmans and we also, as long as we had only seen it from below, had believed to be a low pass, proved to be in reality nothing but a platform down which the glacier suddenly fell. This discovery changed the position of the Karakoram watershed and enabled us to place the Dasto Ghil on the watershed itself.

The Dasto Ghil was visible from the small peak we had ascended, but not from the glacier. If I have seen correctly, there were two middle moraines on the part of the glacier that issued from the basin, thus proving that it contained three small glaciers.

On October 1 we commenced our return journey. Fresh winter snow covered the summit of the Burzil, and the Tragbal pass looked like a Polar landscape when we passed it four weeks later. On October 30 we reached Srinagar, having travelled more than 1200 miles; 2580 square miles had been mapped, the greater part being *terra incognita*.

The various collections have been placed in the hands of specialists, who have undertaken to determine them. The results will be published later on.

According to the practice of the Royal Geographical Society and the Survey of India, the names indicated on the map are those used by the inhabitants, and the local names are the only ones which have been given. For important unnamed peaks, passes, etc., we propose that such names should be given as can be derived from existing names of neighbouring valleys, glaciers, grazing-grounds, etc.

The name Karakoram was known to the Mir of Hunza, but he only thus indicated the mountain range to the east of the Hunza river. The range to the south of Pasu and the Batura glacier was called by him Mustagh, which, meaning "white mountain," is a more appropriate appellation than Karakoram, or "black gravel."

Before the paper the PRESIDENT (Dr. D. G. HOGARTH) said: We now proceed to the main business of the evening, the interesting and exciting experience of hearing an account from Mr. Visser of the remarkable expedition from which he and Mrs. Visser have just returned. At the same time, we assist at the obsequies of another little bit of the unknown world. This most obscure corner of the Himalayas is apparently one which demands the greatest courage and endurance from its explorers. The Vissers know only too well what travel in that country means, and the extreme danger not only of being shut up by the snow in the passes, but also of the continual rain of falling stone. Those who have been members of the Society for some time past will remember the very interesting account of the region which was given in 1922 by General Cockerill. Since it was in that same year that Mr. Visser published his first book upon the Himalayas, you will understand that this recent expedition was not the first experience which Mr. and Mrs. Visser have had of these mountains. Mr. Visser comes before you as an old and tried Himalayan explorer, and as now having accomplished what has for long defied and defeated the ambitions of many explorers of that great range. I gather that he intends to go back into the Himalayas, but he will not find anything when he returns quite so unknown, quite so remarkable, quite so stupendous as that which he is going to describe to-night. I therefore have every pleasure in introducing Mr. and Mrs. Visser and, in the name of yourselves—that is to say of the Society—I beg Mrs. Visser to accept these flowers from us, and these, which are the gift of General and Mrs. Cockerill, as a delicate tribute



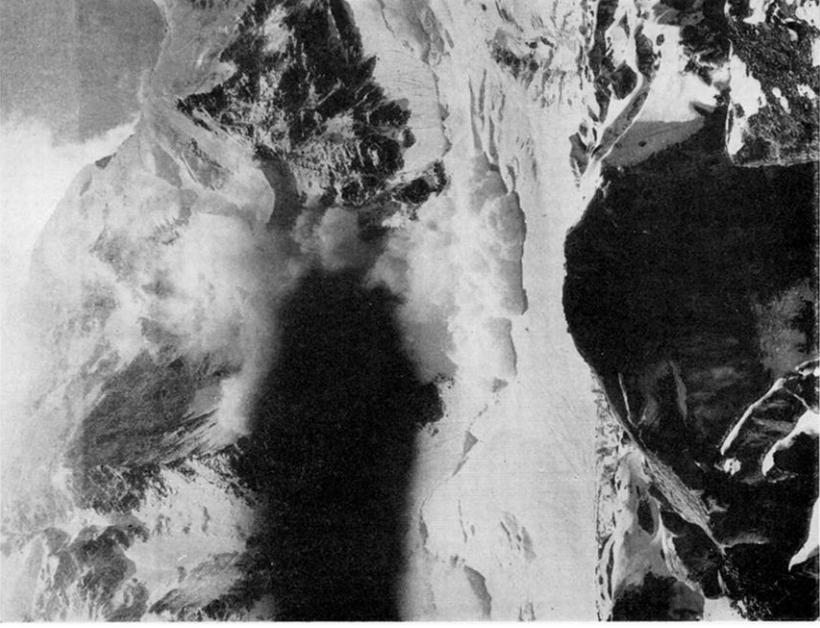
17. *Moraine valley beside the Batura glacier twelve miles from snout*



18. *Descending the Batura glacier*



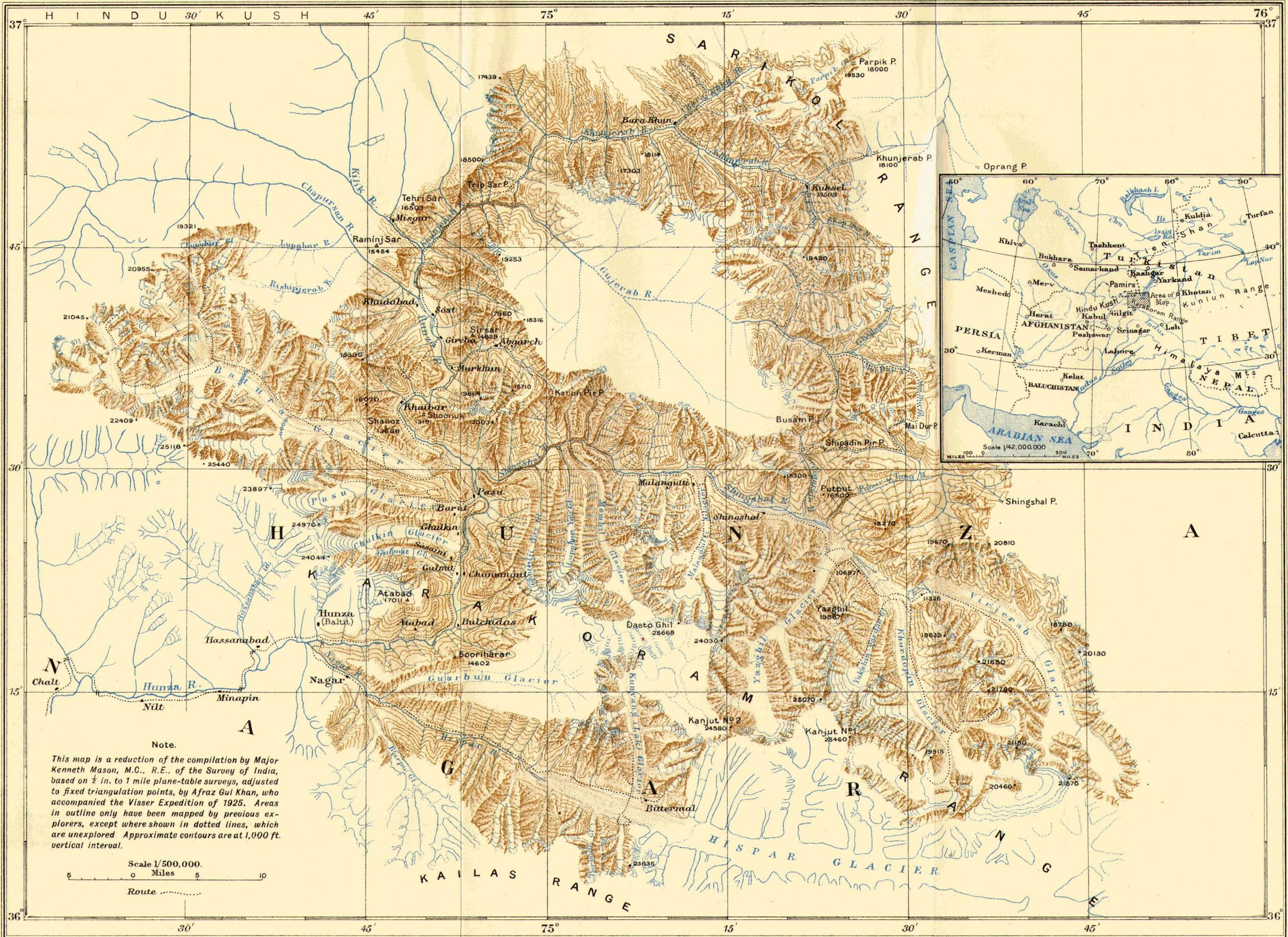
19. Mountain wall of Batura glacier rising to 25,540 feet



20. Snow avalanche, Batura glacier

Map to illustrate the paper on
EXPLORATIONS IN THE KARAKORAM
 BY PH. C. VISSER

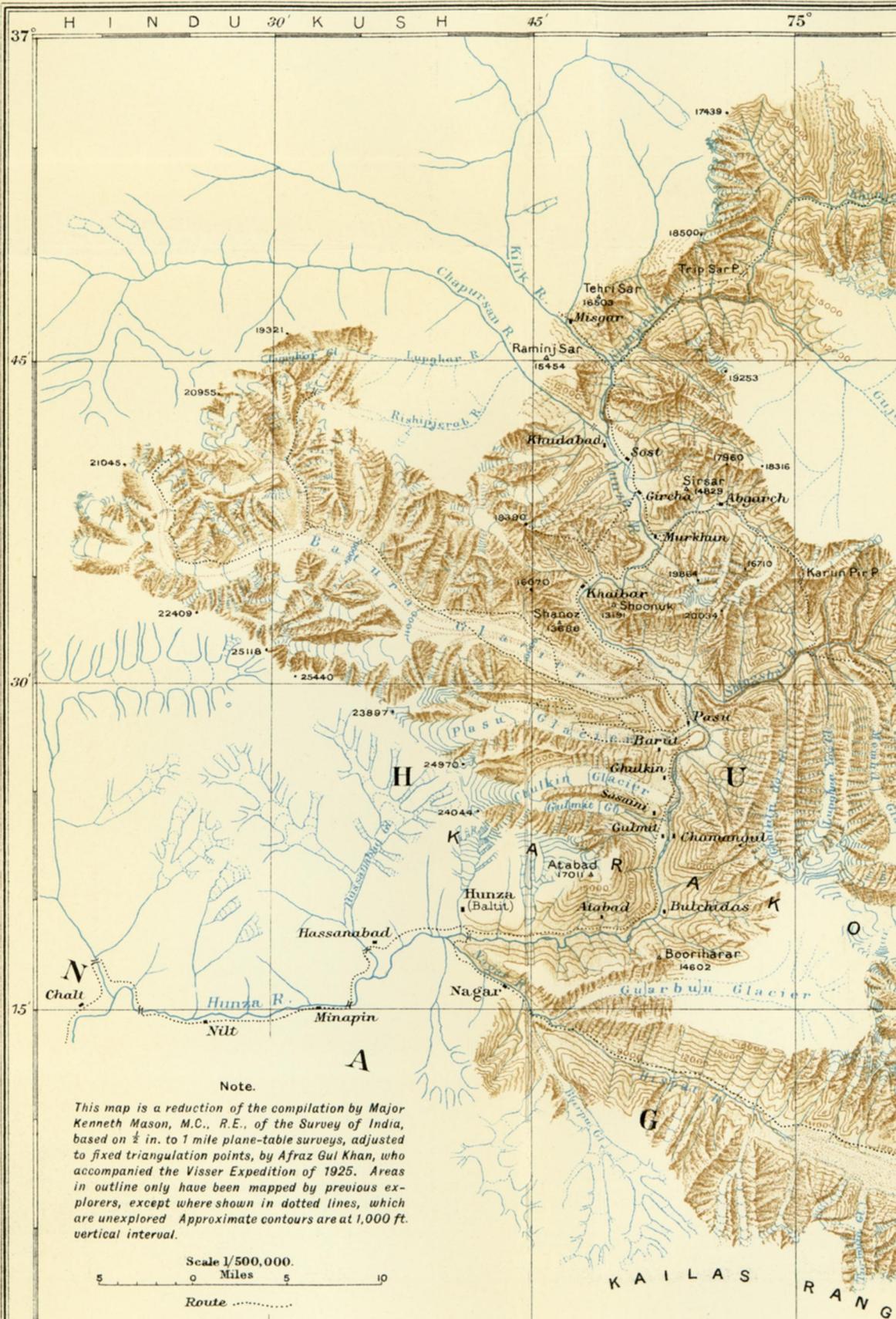
THE GEOGRAPHICAL JOURNAL, DEC. 1926.



Note.
 This map is a reduction of the compilation by Major Kenneth Mason, M.C., R.E., of the Survey of India, based on 2 in. to 1 mile plane-table surveys, adjusted to fixed triangulation points, by Afraz Gul Khan, who accompanied the Visser Expedition of 1925. Areas in outline only have been mapped by previous explorers, except where shown in dotted lines, which are unexplored. Approximate contours are at 1,000 ft. vertical interval.

Scale 1/500,000.
 0 Miles 5 10
 Route

Map to illustrate
EXPLORATIONS
 BY PHILIP



Note.

This map is a reduction of the compilation by Major Kenneth Mason, M.C., R.E., of the Survey of India, based on $\frac{1}{2}$ in. to 1 mile plane-table surveys, adjusted to fixed triangulation points, by Afraz Gul Khan, who accompanied the Visser Expedition of 1925. Areas in outline only have been mapped by previous explorers, except where shown in dotted lines, which are unexplored. Approximate contours are at 1,000 ft. vertical interval.

Scale 1/500,000.

5 0 Miles 5 10

Route

KAILAS RANG

the paper on
THE KARAKORAM
 SSSER

THE GEOGRAPHICAL JOURNAL, DEC. 1926.



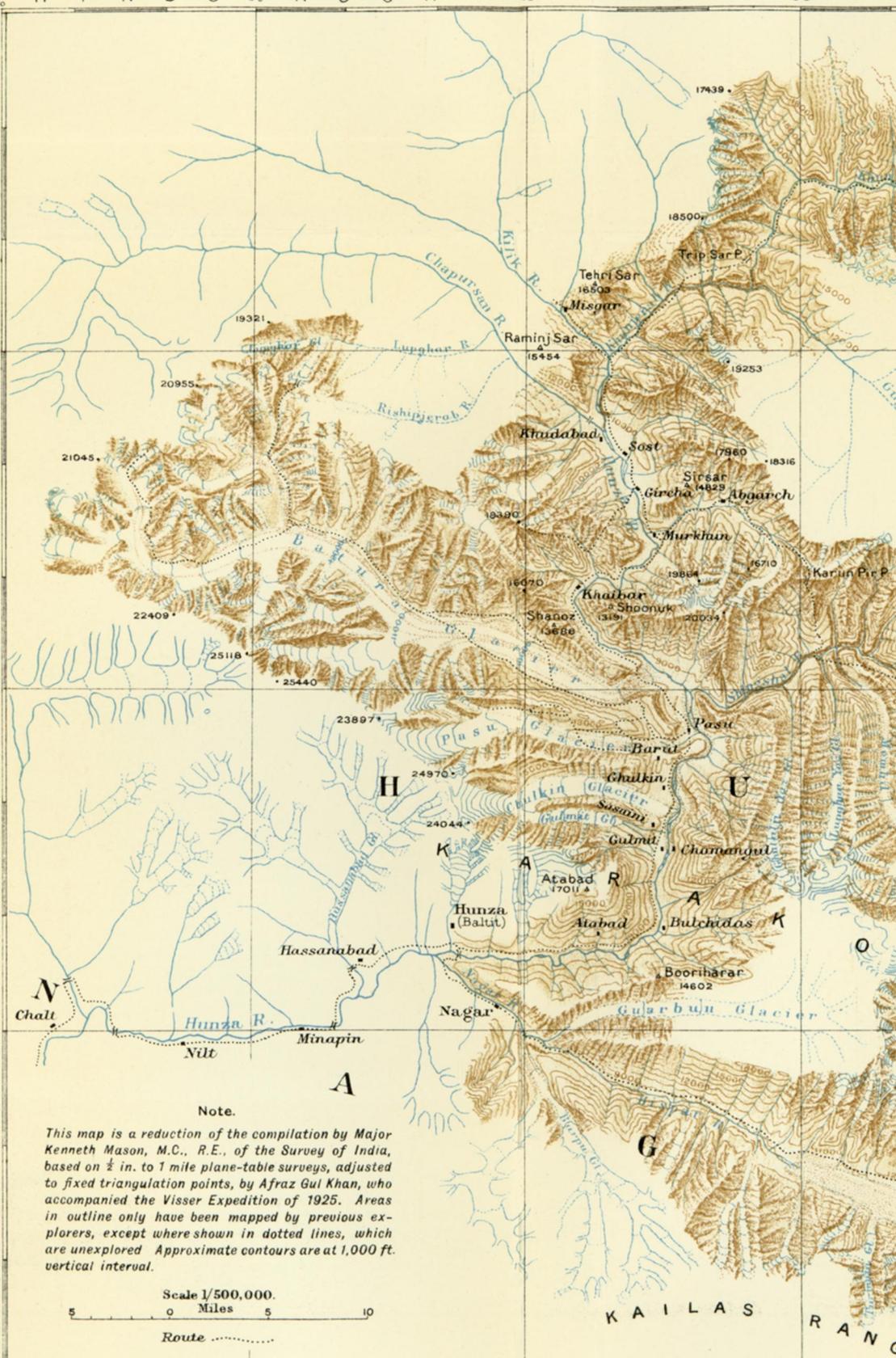
37

45

30

15

36



Note.

This map is a reduction of the compilation by Major Kenneth Mason, M.C., R.E., of the Survey of India, based on $\frac{1}{2}$ in. to 1 mile plane-table surveys, adjusted to fixed triangulation points, by Afraz Gul Khan, who accompanied the Visser Expedition of 1925. Areas in outline only have been mapped by previous explorers, except where shown in dotted lines, which are unexplored. Approximate contours are at 1,000 ft. vertical interval.

Scale 1/500,000.

5 0 Miles 5 10

Route

KAILAS RANG

30'

45'

75°





to those who have succeeded him in the same region. It had to wait thirty years ! I now call upon Mr. Visser to address the Society.

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

Brig.-General G. K. COCKERILL : I imagine that every one of you in this hall has, as I have, greatly enjoyed this trip through the Karakoram with the intrepid explorers who are with us to-night. I do not suppose, however, that I can succeed in conveying to them my pleasure and gratitude on being taken back thirty years and seeing, upon this screen, mountains and valleys the memories of which are so deeply impressed upon my mind. In the days when I travelled through this region of the Karakoram Himalaya I had still in front of me the task of reconnoitring the northern frontiers of Hunza and Chitral. I was not able to carry out an exploration on the scale described to us to-night, but had to rest content with a hurried traverse of the main valleys. This region, then, when Mr. and Mrs. Visser entered it, comprised a great extent of country in which no white man had ever set foot. Sir Francis Younghusband, coming from the east, had looked into it at one point from the top of the Khunjerab pass and at another, crossing the Shingshal pass, had penetrated a few miles west of the Mustagh or Northern Karakoram range, into the valley of the Tang river, a tributary of the Shingshal river. I came from the west through the gorges of the Shingshal and Tang rivers to the same point near the Shingshal pass, where I linked up with the work done by Sir Francis Younghusband. Returning down the valley, I had a wonderful view south-east towards its head near the Hispar pass. I then crossed by the Karun Pir pass to the Hunza valley and pushed on towards the Khunjerab pass. It was November, and a heavy fall of snow forced me to turn back. The following spring, however, I reached the Khunjerab pass, and from near the Titirrip pass had a good view up the Gujerab valley. I formed the opinion that at its head was the main source of the Hunza river.

The region, then, between the Khunjerab and Shingshal valleys was, when Mr. and Mrs. Visser began their work, entirely unmapped, the head of the Gujerab valley unseen, and the actual alignment of the Northern Karakoram range between the two passes unknown. By the time they entered the Shingshal valley from the north they had discovered a new pass at the head of the Bara Khun valley and thoroughly explored the Khunjerab and Gujerab valleys. They had traced the source of the Hunza river to a glacier at the head of the latter valley, and they had left nothing behind them unmapped. They then turned their attention to the glacial region lying in the angle between the Mustagh (or Northern Karakoram) and Karakoram ranges. Here they were treading wholly virgin soil. The three v. t glaciers—Yazghil, Khurdopin, and Virjerab—had never been explored and no white man had even seen the Virjerab. There was, moreover, great mystery prevailing in regard to the trend of the glaciers around the great peak which I had discovered and the position of which I had fixed on my visit to the Shingshal valley, and which was subsequently ascertained by the triangulators of the Indo-Russian Link to be 25,868 feet in height. Its name, I was told, is Malungutti, but Major Mason heard it called Dumata, and Mr. Visser was given Dasto Ghil as its name. The mapwork north of the Hispar glacier was doubtful. The authorities differed considerably regarding the proper position both of Hispar village and of the lateral valleys. I suspected that the surveyors of the Bullock-Workman expedition had placed them considerably to the west of their true position. I had seen photographs taken by them

near the head of the Lak glacier, and I had seemed to see, in the shape of mountain masses at its head, a very strong resemblance to the Malungutti peak.* Mr. and Mrs. Visser's expedition has now lifted the veil and shown clearly that the Lak glacier turns eastward at its head, and does in fact spring from the south-western slopes of this mountain. Malungutti is therefore as I suspected, on the main Hispar-Shingshal watershed, and is apparently the highest point on the Karakoram range west of K_2 .

To sum up the results of the expedition, of which, in my opinion, Mr. Visser has spoken with undue modesty, the Bara Khun, Gujrab, and Shingshal valleys have been completely mapped, the sources of the Hunza river discovered, and two vast glacier systems—the Batura and the Khurdopin—explored. In addition, he has given us for the first time the true alignment both of the Mustagh and Karakoram ranges north of the great Hispar trough. These results, I need not say, are of the highest geographical value. Mrs. Visser also, by her collection of butterflies and of plants, has added greatly to our knowledge.

Having seen the Hindu Kush region from Kafiristan to the Shingshal, read all that Sir Aurel Stein and others have written of it, and discussed it with Sir Martin Conway, Sir Francis Younghusband, and many others who have seen it, I have had some opportunity of estimating the comparative difficulties of the various valleys. I feel sure all will agree with me that nowhere in the world is there a country at once so forbidding and so alluring as is Hunza. It is not merely the stupendous nature of its mountains and gorges—of which we have seen something to-night in the magnificent photographs shown to us—but also the dangers and difficulties that have to be surmounted at every turn, which bear witness to the courage, resolution, perseverance, and enterprise of the two explorers to whose achievement I am so proud to pay this small and inadequate tribute.

Sir MARTIN CONWAY : I need not say that I have listened to this paper with extraordinary interest, because it brings back to me the memories of thirty odd years ago in a most vivid manner. You may have noticed across the bottom of the map slide the end of the long Hispar glacier, which would have extended further to the right along the bottom of that map. That was the valley up which I commenced my work in those parts. You know how it is with a little boy who grows up in a back yard surrounded by walls, and who wants to see what is on the other side, but never can? That was my position. I was going up a trough between enormous ranges of mountains, wondering all the time what was on the other side. At the same time General Cockerill was going up the Shingshal valley, and we neither knew anything of what the other was doing, and we of course could not see each other's territory. Naturally, when going up a deep trough, or any of the valley troughs, one does not see very much of the ranges of mountains shutting one in on either hand, because there are side valleys going up to them, and the knees of the mountains, if you compare them to seated figures, get in the way and hide the peaks from those who are walking along at their feet. The result was that any kind of sketch-map which I was able to make of that journey did not show, and could not show, the arrangement of side glaciers and so forth back against the central range. For instance, that great mountain which General Cockerill first discovered was never visible from the Hispar glacier.

Mr. Visser has spoken a great deal about avalanches, falling stones, floods,

* *The Geographical Journal*, vol. 60, No. 2, p. 111.

and all the rest. That part of the world is filled with mountains in what I may call a dramatic stage of their existence ; they are relatively new mountains, and therefore they are so big and so rotten ; they tumble to pieces and they crash about all the time, slowly being denuded down to what may ultimately, in a million years, be a reasonable rounded shape, like the Alps, and thus climbable. At present most of the mountains in that region are utterly unclimbable, being, as I say, in a crude and unfinished condition. Mr. Visser referred to snow avalanches ; he showed you a magnificent photograph of one falling, and, at the same time, spoke of the frequency with which they fall. I can confirm that in every respect. When I was in that part of the world great snow avalanches were booming down the mountain side, to right and left, all the time. In the Alps, when there is an avalanche from Monte Rosa or Mont Blanc it is, generally speaking, the sort of thing that happens once a month, except in spring, of course. On the other hand, I remember one particular spot in the Karakoram when no less than eighteen enormous avalanches came down within half an hour, following one another almost like minute-guns ; tremendous falls of ice and snow in each case. Falling rocks, too, are buzzing and humming all the time. Those are the concomitants of travel in those parts, and so is the crossing of rivers. I remember one river crossing which took us four hours. We had to carry not only the dogs but our sheep, our baggage, and everything else. After stretching the rope across and getting the last load over at the end of four hours, something happened and the river ran dry ! That is one of the pleasures of exploration in that district.

H.E. the NETHERLANDS MINISTER, in proposing a vote of thanks to Mr. and Mrs. Visser, said : I assure you that I have ascended this platform with a heavier conscience than any high mountain-top has been climbed by the distinguished lecturer of to-night, because during dinner Dr. Hogarth agreed with me that there would be no need for me to speak to you, but at the same time he said, " I am sure, Mr. Minister, that you will be so impressed by the charm of the lecturer that you will not be able to resist." Dr. Hogarth has once more proved that he is the most far-seeing President any society can have. I congratulate him. And after all it would be a crime if I, having the honour of representing the country from which these two distinguished travellers come, kept myself quite silent to-night.

I have to greet you, my dear Mr. Visser, as perhaps many of the audience do not know, in a double capacity : in the capacity first as a member, an honorary member, of our Netherlands Diplomatic Corps, attached to our Legation in Stockholm. In the second place, of course, as one of our most distinguished explorers, whom we have known for many years. In both those capacities I can give you unlimited praise. As a diplomat you have shown to-night that you can live up to what is one of the traditions of our caste. A well-known British statesman in the time of James I. once said : " A diplomat is a man who is sent abroad to lie for the benefit of his country." Absurd as those words may seem to you at this moment, I want to add just a little detail. I had this morning the privilege of a visit from Mr. Visser, and when he spoke of the pleasure which he had in reserve for us to-night, he said to me in the most serious way, " You know, I am not only handicapped, but I am in an awful position, as I never have succeeded to master sufficiently the English language." Ladies and gentlemen, I ask you whether that was true.

As for the explorer, certainly no profane words of mine, after what we have heard from the experts who have spoken, would add anything to the praise and the admiration which have been expressed. I have asked myself, how is

it possible that a Dutchman, a man coming from the Low Countries, found the inspiration to climb so high? I did not find the answer until this morning, when I read in one of the Dutch papers that Mr. Visser is a native of the city of Schiedam. That accounted for the spirit in which he had climbed to the highest mountain-top of the Karakoram.

Mr. Visser, I congratulate you and thank you most sincerely in the name of our country, whose praise you have already received, that you have been able to again add to the glory of the whole country. I am sure that none of those present would be satisfied if I limited this praise only to the male member of the partnership.

I have the greatest pleasure in proposing a vote of thanks to the distinguished lecturer of to-night and to his wife, who, as scions of the lowest country in the world, have proved themselves to be pioneers of civilization in the highest regions of the globe.

Sir FRANCIS YOUNGHUSBAND: It is with the greatest pleasure that I second the vote which has been proposed so very eloquently by His Excellency the Netherlands Minister, and I should like to support not only all that he has said but what has been said by General Cockerill, who knows more than anybody else what the difficulties must have been which Mr. and Mrs. Visser have so successfully overcome. I also support what Sir Martin Conway said, because he too has explored in that neighbourhood and knows what the difficulties are.

I merely looked into the Shingshal valley in the year 1889, but the difficulties that I saw ahead of me afforded me an excuse for going round and exploring some other parts—the Khunjerab and the Mintaka passes, and eventually coming down into the Hunza valley through the Mintaka Pass. To-night we can visualize to ourselves the tremendous mountains. I have hitherto before the Society belittled photographs because they seem to me to bring down the mountains and make them seem lower than they really are. Nevertheless, those that we have seen to-night do give an idea of the rugged grandeur and stupendous height of the magnificent gorges in that region. I suppose in the whole of the Himalaya there are no finer gorges than there are in Hunza, and Mr. Visser's photographs are some of the best ever taken in the Himalaya.

There was one photograph which especially interested me, that of an immense lake which had been formed and which Mr. Visser thought about forty years ago had swept away the Shingshal village. As a matter of fact, I think it was thirty-three years ago. I was then in Gilgit, and I remember we had news of an obstruction in the Shingshal valley and of a lake being formed and getting higher and higher. We knew that there would come a time when that lake would get so high that it would burst through, and that there would be frightful floods all the way down the valley. The lake was watched and warning given. Disaster was thus prevented. But that was an instance of the way in which these mountains tumble down, or glaciers advance and make a great blockage in the steep valleys, so that the time comes when the water bursts through and immense floods occur even as far down as the plains of India. It was of special interest to see, thirty-three years afterwards, a photograph of the actual place where the lake had been made.

There is one observation which I should like to make in conclusion, and it is this: I remember (when General Cockerill gave us a most vivid account of his journey in the Shingshal valley) observing that it was surprising that the officers of the Gilgit garrison close by did not themselves go and do what Mr. and Mrs. Visser have done this summer. A few months ago I met an officer

from Gilgit who said he had read General Cockerill's lecture and my observations thereon and had asked leave to make an exploration of the Shingshal valley, but for some reason or other had been refused leave by the authorities. The only conclusion one can draw from that is that the officers up there are kept so hard at the grindstone of their military duties that they are unable to get away from it. But it is a great pity, seeing that there is this extraordinary region so close at hand, that they should not be able to explore it. It is all the more creditable to the citizens of a country so very distant from the Himalayas that they should have had the enterprise to go all the way to India and explore a country so different to their own. So I most heartily second the vote of thanks which has been proposed by His Excellency the Netherlands Minister, and I should like to add my tribute to those which have already been paid to Mr. and Mrs. Visser. It was a magnificent expedition. We congratulate them not only upon their determination and resolution in carrying it through, but also upon those beautiful photographs and, no doubt, the magnificent botanical collections which they have made. I congratulate you, Mr. Visser, and thank you very much indeed for having given us a lecture in such vivid English on your valuable explorations.

Dr. T. G. LONGSTAFF: I should like to congratulate Mr. and Mrs. Visser on the successful accomplishment of a very valuable piece of work, and to assure this audience that Mr. Visser has underrated the dangers of avalanches in that country as well as the danger of crossing its rivers. If diplomacy is what we have been told it is to-night, then Mr. Visser is a true diplomatist, for he has very skilfully concealed the truth from us: the difficulties he has overcome are much greater than he has allowed himself to tell us.

The PRESIDENT: We have had a remarkable experience which has, I think, expanded our horizon. I should very much like to know some of the secrets of Mr. Visser's photography and, among other things, who is his lens-maker. I have certainly never seen photographs, as Sir Francis Young-husband said, which preserved the height of the mountains as did the photographs we have seen. I am sure you have all listened to Mr. Visser not only with immense interest but with very great admiration for the qualities which have gone to make a success of the expedition; admiration which, perhaps, is only equalled by the sympathy which you must have felt for the coolies! In your name I put the vote of thanks, which has already been moved by His Excellency the Netherlands Minister and seconded by Sir Francis Young-husband, to Mr. and Mrs. Visser.

The vote of thanks having been carried with applause,

Mr. VISSER said: I have only to record my thanks to General Cockerill, Sir Martin Conway, the Minister of the Netherlands, Sir Francis Young-husband, Dr. Longstaff and the President for the very kind words they have used. May I add a few words in reply to Sir Martin Conway? I believe that the glaciers he discovered on the upper end of the Shingshal valley found their source in the snow-lake he discovered thirty years ago, because they go to the snow range. I cannot think it would be possible to find in that region such a tremendous glacial complex if it did not come from that snow range. And a few words with regard to the movement of the glaciers. On every glacier that we found in Hunza and other regions we took observations, and the strange thing was that one glacier would go back and the other go on. I hope to say something more on that subject in the *Journal* of the Royal Geographical Society. Thank you very much.