

stimulating in a high degree and aesthetically grand.' I think I now understand the truth of that statement.

With these words our brief description of our climbs in Formosa must come to an end. The one thing that we can claim for them is that in some small measure we have been allowed to introduce these wonderful ranges to the Western world. But we left them with the feeling uppermost in our minds, not of what we had done, but of the vast amount to be accomplished. In the meantime, all success and honour to the redoubtable band of climbers belonging to the Formosan Mountaineering Club, who are gradually opening up these new territories.

[We are greatly in the writer's debt for his instructive article.—*Editor, 'A.J.'*]

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#### THE GLACIERS OF UPPER ISHKOMAN.

By REGINALD SCHOMBERG.

THE state of Ishkoman is the smallest and remotest of the Gilgit agency and lies between Hunza, Yasin, and Afgan Wakhan, and it is on the frontier of the last that the river Karambar rises, the chief tributary, if not indeed the main source, of the Gilgit river. At the head of the river is the so-called Karambar Pass, but the glacier itself lies much lower down and close to Bhort, the first cultivation in the valley and some three miles below. The Karambar Glacier flows almost due E. and W., and thrusts itself across the river until stopped by the wall of rock opposite. Sometimes it completely blocks the valley and causes a flood; at other times, as in 1933, it enables the river to flow past. But in the summer, from May till October, the Karambar valley is impassable above the glacier on account of the flood water from the melting snows and the perpendicular sides of the valley.

I had intended to descend this valley, but was dissuaded by the Governor of Ishkoman, Rajah Mir Bais Khan, who sent one of his men to meet me in Chitral and to tell me of the dangers. The messengers, two active Wakhis, came across country, that is over the precipices and rocks on the left of the river. They took five days to accomplish one day's normal march. They were unimpeded with anything, they had not even a blanket, and I felt that I should never manage a journey with my impedimenta, even were I lightly equipped.

The source of the glacier is a great mass of snow and ice which is one of the chief features of the extreme Western Karakoram, although, strictly speaking, these mountains may claim to be a part of the Hindu Kush.

The drainage of the right side of the lower Hunza river, as well as





*Photo, Reginald Schomberg.]*

PANORAMA OF MAIN GLACIER, BAD SWAT, ISHKOMAN, LOOKING S.E.

*[To face p. 345]*



all that on the left of the Gilgit and Karambar rivers, flow from this snowfield. The Karambar Glacier from its source to its end fills the entire floor of the valley.

In August 1933 we left the small village of Bhort, crossed the lower moraine of the glacier to the right of its valley and, passing a small moraine lake, 100 by 40 yards (which during the season had been twice as large), and a dry one of much the same extent, arrived, some five miles from the mouth of the valley (that is, from the snout of the glacier), at a remarkable summer pasturage. This was an old grass-covered moraine of considerable area, containing well-grown cedar trees and, in humid and sheltered places, groves of poplar, birch and willow. There were several dry lake basins and broad tracks of sward. It was indeed a most surprising place to find in such a situation. There were even fields of barley, while the more suitable ground was regularly cultivated.

Our camp looked down on the glacier, 150 ft. below. East and west lay a lovely prospect of ice, snow, and rock, and in this desolate yet impressive arena flourished this verdant tree-clad slope, clinging to the hill-sides, an oasis in an ice world.

The main Karambar Glacier receives during its course two tributary glaciers on its right and one on its left, in addition to several minor hanging glaciers on the sides of the valley, picturesque if not very important, but rather alarming from the rocks and fragments of ice continuously rattling down their steep sides.

The glacier flowed from three heads or branches and, for eight miles from the séracs which sprang up a mile below their junction, there was a black medial moraine of no great breadth or depth, a sprinkling of rock and débris, which I judged to come from the left or southern arm or branch. Here a mass of dirt and soil passed under the séracs in their steep fall, as an englacial moraine, and was vomited out when the gradient became easier, as the glacier below this point found a gentle level.

The second point that struck me was the purity of the glacier. It was singularly free from moraine or other deposits, seemingly an unusual circumstance when the constant breaking of the adjoining rocks is considered. But in reality this breaking was shown to be very insignificant when a careful examination was made. The fact was, that the rocky sides of the valley were so precipitous as to give little support to snow and ice, and consequently the supply of loose rock and shale was comparatively slight. The only considerable contributions came in fact from the lateral valleys. Hence the surface of the main glacier was free from large deposits, glacier tables, and the like, and indeed we wished it had been otherwise. We found that the moraines composed of all this small stuff were very wearisome to walk over and we made poor progress. The surface of the glacier itself, formed of smooth hummocks, shiny and slippery in the sun, was equally laborious. It took three hours to cross to the left of the valley.



There we found a mass of dense, entangling dwarf willow clothing the precipitous sides, below which was a drop of 30–40 ft. into the ice. The only way of proceeding was to scramble through the low jungle, hanging on by our hands like monkeys in a tropical forest. After two hours of struggling we regained the glacier, but had at once to climb up the side. Finally, after  $6\frac{1}{2}$  hours, we found ourselves at the point where the three arms of the valley united. To the S. was a mass of glacier, bergschrunds and séracs, and of mountain peaks forming the origin of the small Bhort Glacier which is described below. To our left was an insignificant glen. This was a surprise, for we all expected to find this northerly arm as a branch of some size from the apparent configuration of the valley. We saw a tongue of glacier shooting out and we never imagined it other than a high-way of some size. We were quite wrong, however, and also much disappointed. Immediately in front of us flowed the superb main glacier.

The great feature of the scene was the strange pyramid of black rock 23,500 ft. high, rising from a wall at the head of the glacier. From this strange, impressive and austere cone there plunged a slope of black rock bounding the eastern end of the Karambar valley. At first, I felt sure that the wall and westerly surface of the peak were one piece in one plane, but careful examination showed that this was not so. The whole of the peak was, in fact, behind the ridge. On the right, that is, to the N.E., lay the main massif, a central peak with a spur on either side, on which rose smaller pinnacles. This massif formed a basin and furnished the main supply of ice. Between this massif and the beginning of the valley proper, that is, where the glacier first becomes one compact coherent whole, were two pyramids of rock outcrop. Opposite the massif, to the W. and on the left, or Bhort, side of the main glacier, was a noble snow-cap. There were thus several sources in the subordinate glaciers forming one united icefall, breaking into séracs as they entered into the valley and subsiding a mile further on where the valley had flattened.

My description is, I am sadly aware, inadequate and does scant justice to the noble scene at the head of the glacier. It but faintly portrays the great circular icefields, with their tumbling séracs, their twin guarding massifs, and the remote pinnacle that rose, a black sentinel, over the glittering white scene.

We gazed long at this magnificent spectacle, and Daulat Shah, no mean judge of glaciers, adjudged it as belonging to the first class. In length, breadth and in dimensions generally, the Karambar Glacier is of course surpassed by many others, but not in beauty. Its nobility may be equalled but not exceeded.

Daulat and I flatly refused to return by the monkey path. At first we tried to descend on to the glacier, but there was an ablation corridor between the side of the valley and the ice which defied all our efforts and entailed dropping down a cliff of some height to reach the glacier's edge. Had we succeeded our progress would have been simple, even though the snow bridges had vanished and a tangled



mass of crevassed and broken ice remained to be surmounted. We did, however, in spite of a storm of opposition and wailing from the local experts, find a lower and easier path between the maquis-like willow and the valley edge. We were able to reach the glacier much sooner, although at the same point as where we had left it. I have always found Hunza men great adepts at short cuts, and wonderful in the mountains, whether on snow or ice. Of late I have read much abuse of them, and I do not understand it, but they require to be with travellers who are accustomed to them and who run a good show. A Hunza man will never accompany a Sahib he does not trust, and there he shows his sound sense. All this is by the way, but I have been in many nasty places from which I have been extricated by the skill and imperturbability of my Hunza followers. I dislike to see them defamed by those who do not understand them.<sup>1</sup>

The glacier itself was awash when we reached it lower down, and quite large streams had to be crossed. We fell into one of these, but otherwise made good progress, as the ice was not so slippery. I had intended further investigation of the glacier, but the weather unexpectedly played us false.

The advance of the Karambar Glacier must be noted. The local shepherds showed us places where they had formerly grazed their sheep but which the advancing ice had destroyed, cutting the sides of the valley sheer away. On the other hand, the two lateral valleys on the right, facing S., and consequently exposed to the sun, seemed to me to be drying up, and the more easterly one had but the remnants of a glacier in it. The main Karambar Glacier, although waxing and waning, certainly showed no signs whatever of retreating, and, as will be seen below, this is the case with its neighbours.

Running due S. of and parallel to the Karambar Glacier is the valley of Bhört, with the small village of that name at its head. It is a pleasant place with a good camping ground, a large amount of scrub jungle between the village and the river, and a grand view of the glaciers. Bhört means stone, and a more inept name would be difficult to conceive. Immediately below the village was an old, large and peculiarly difficult moraine, and below this, to the S., flowing down the left of the valley, was the Bhört stream—a most formidable torrent in the height of summer and usually quite impassable after midday. We crossed about that hour on yaks and their backs were just above water. A good bridge could be made, but the one in existence was remote, inconvenient and difficult.

The Bhört valley ran E. and W. As we ascended it, we passed over the old lower moraine only, then some cultivation belonging to the Wazir, and then went up the right of the valley, consisting at first of dreary, desiccated slopes with fantastic eroded pillars above them. About three miles from the village the valley divided in a remarkable fashion. The main glacier with its moraine and its

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<sup>1</sup> Cf. *A.J.* 44, 196 *et seq.*—*Editor.*



stream hugged the left side of the valley, which is thus split into two, the glacier trough on the left and a singular subsidiary valley on the right. Indeed, I at first thought that the latter was a large ablation valley, but its length and breadth led me to doubt it. Viewed independently and quite apart from its surroundings, it was a beautiful mountain glen, with a stream at its foot, and sides clothed with fine conifers—*Pinus excelsa*, pencil cedars and birch trees. This forest growth alone was remarkable in this bleak and rocky region. The right side of this glen was likewise the right of the main valley and rose to some height, a grassy slope covered with juniper; the left side of the glen, covered with pine trees, rose 150 or 200 ft.; high and beyond there was a precipitous fall to the moraine-covered glacier that filled the rest of the valley. Thus we found the Bhort valley divided into a glen on the right and a glacier on the left, with 150 to 200 ft. of ridge between the two. At the head of the glen we found a good level pasture, surrounded by trees and with the summer huts of the shepherds perched on this beautiful site.

A description of the glacier may elucidate the origin of this valley. The main glacier was fed on the left or S. side by five tributary glaciers of a moderate size. Beyond the lowest of these the main valley began and, just at this point, a glacier joined the combined ice-stream. This glacier was almost as large as the main one; below it again was a smaller one. The whole of the left of the Bhort valley was a splendid stretch of snow and hanging glaciers.

As the main Bhort Glacier entered the main valley-bed, it passed on its right a valley with a normal glacier dependent on a hanging one. This subsidiary valley was much exposed to the sun, and the glacier had shrunk very noticeably. From this mass of ice flowed the stream that watered the glen. It seemed to us that this diminished glacier once flowed conjointly with the main one and, co-extensively, to the end of the ridge that now divides the glen and the main glacier. This ridge would then be the medial moraine between the two. As the right glacier grew feebler, dwindled and finally dried up, its old bed was slowly transformed into the present glen: not as an ablation valley that grew longer, but as a glacier bed that no longer held a glacier. There was a small flow of water from the main glacier as it entered the head of the main valley and passed the head of the glen. But this was a mere seepage trickle, seeing that a great barrier of moraine defended the glen from and rendered it independent of the main glacier.

The main Bhort Glacier has only to break down this wall, turning its course to the right and not the left, to destroy the glen, which, however, is too small to have ever been the old channel of the main glacier. In its present size it could never contain it. The growth of the pine trees and the general appearance of the glen indicate that it is long since the tributary glacier has dried up and disappeared.

If this smaller valley were originally an ablation one, then many years have helped to change it both in appearance and form.



I have, however, rather laboured the features of the Bhort Glacier as they were somewhat unusual and deserve a little elaboration. We next visited the Bad Swat Glaciers, which lie parallel with and to the S. of the Bhort.

The village of Bad Swat is a small, prosperous place with abundant cultivation high above the river. The path led up the right of the valley, and here again we found the valley divided into two, in the same way as its neighbour but to a much less marked extent. The main valley here was on the left, with the subsidiary one on the right. In this case, however, the subsidiary valley continues to the end, turning N.W., flowing into the Karambar, but preserving its own identity throughout its course. Where these two parallel troughs reach the Karambar lies the spur of high land on which the cultivation of Bad Swat is placed. Its conglomerate cliffs, some 300 ft. high, face the river. As at Bhort, there is abundant forest in this smaller valley, but there are no conifers. Pencil cedar is particularly plentiful and well grown, so are birch trees and willows. The glen possesses good grazing and a summer camp for shepherds. At about one mile from where the glacier on the right of the valley joined the main glacier the glen terminated in the main valley, but unconnected with any glacier. The lower part of this same glen was badly damaged by an avalanche in the spring of 1933, trees were destroyed and a great mass of stone and grey mud was left behind, a real disaster where wood and grass are scarce. Thus it will be seen that the glen on the right of the Bad Swat begins about one mile below the head of the main glacier and flows independently to the Karambar.

The origin of this valley offered the same problem as that of Bhort. Its left side was a moraine wall 150 ft. high, beyond and below which flowed the main glacier. There was a defect in this wall, but no water entered it. Indeed, apart from several springs, there was no stream at all in the sub-valley. On the whole, however, I thought that this glacier was no more than a well-developed ablation valley, and the reported restlessness of the Bad Swat Glacier encouraged me in this conclusion.

The head of the Bad Swat valley was found to be a main glacier flowing from a conical ice-cap. The icefall was considerable, and the appearance striking. On the right of the main glacier was a massif and flowing from the N.E. were two glaciers which coalesced before reaching the main one.

Immediately, again, on the left of the main glacier was one almost as large, facing N. and flowing steep and straight down on the main ice-stream. Beyond again was a smaller glacier which failed to reach the main one at its foot. It possessed a stream of water, much débris and moraine, but was generally too feeble to reach the valley bed. It will thus be seen that Bad Swat contains two, almost three, major glaciers and a tributary one, apart from several insignificant hanging glaciers.



The right side of the valley is rugged, arid and remarkable for strange rock fingers rising from the tops of the ridges. The combined glacier in the main valley was beautifully white and broken up into séracs with pinnacles, ice débris and many crevasses. The stream from the glacier was as great as that in the neighbouring valley, and although the snow and ice deposits of Bhort are greater than those of Bad Swat, they are more widely distributed. Those of Bad Swat are more compact, and in point of scenery this valley far surpasses Bhort. The main glacier flowed from a particularly abundant névé, and the general appearance of the three glaciers at the valley head indicated a liberal supply of snow and ice. It was these triple glaciers that gave the grandeur to the scenery of Bad Swat, as well as such an unusually lovely prospect. The glacier in 1933 ended in a Chinese wall, but the villagers said that the ice sometimes advanced right up to the village and so alarmed them that they would prepare to leave. Then again the ice would recede. They were quite unanimous that the ebb and flow of the ice were regular and well marked. In 1933 we found the glacier almost on top of the village, though not threatening it. I think that the village will always be safe, although I know how unwise it is to prophesy about the behaviour of glaciers. The pass on which the Bad Swat is situated is an old one, and has clearly survived many years of glacial vagaries. There are troughs on both sides into which the glacier could and should flow, but all the same I quite understood that the inhabitants might well feel a little nervous at times.

The outstanding point about these three glaciers, Karambar, Bhort, and Bad Swat, which all depend on the same deposits of snow and ice, is that none of the main glaciers show symptoms of a diminished supply of ice. On the contrary, they are very vigorous. This is interesting because so many neighbouring glaciers are quite definitely retreating, and in the case of the Bar group likely to disappear altogether.

*Note :—*The meaning of Karambar is stony valley.

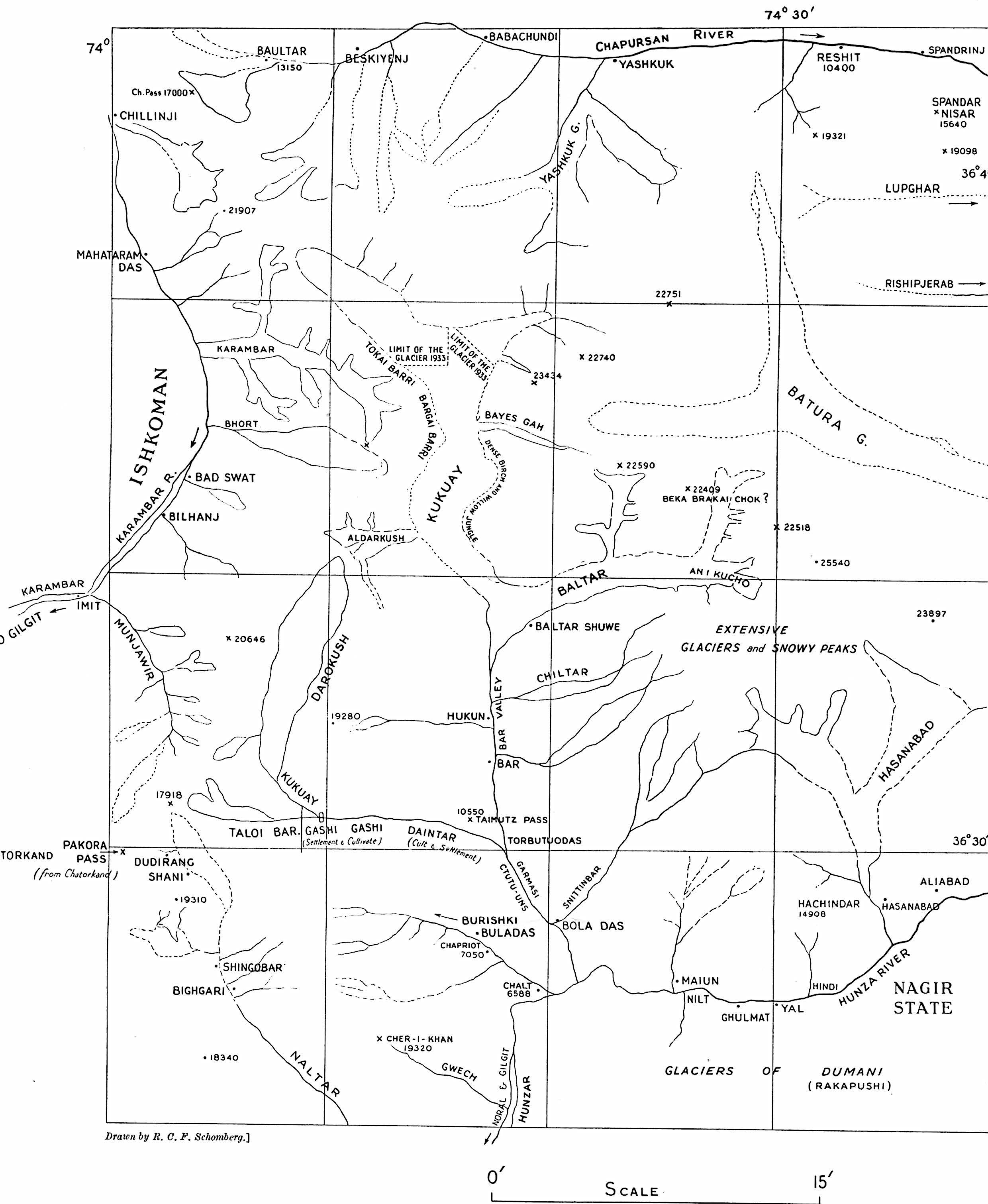
'Bar' is valley in Wakhi, and 'Karam' means stone, identical with Koram in Turki (*cf.* Kara Koram, black stone).

Koram is sometimes translated as gravel, rock, etc. It means stone, no more and no less.

The stones of the Karakoram Pass are black, and that is how the name has been given.

[A map illustrating this and the Bar and Daintar Glaciers' paper will be found at the end of the number.—*Editor.*]





MAP ILLUSTRATING BAR AND DAINITAR, ISHKOMAN AND OTHER GLACIERS.