THE GEOGRAPHICAL JOURNAL

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL
EDITED BY THE SECRETARY

VOL. LXVIII.—JULY TO DECEMBER 1926

LONDON
THE ROYAL GEOGRAPHICAL SOCIETY
KENSINGTON GORE S.W. 7
EDWARD STANFORD, LTD.
12 LONG ACRE W.C. 2 and 29 CHARING CROSS S.W. 1
1926

PRINTED BY
WILLIAM CLOWES AND SONS, LIMITED,
LONDON AND BECCLES, ENGLAND

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Map.

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regard to facilities and traffic at intermediate points: with a certain consideration for the comfort of the service, and a very strict avoidance of the places where weather is likely to be as bad as the *Norge* found it about Bering Strait.

FROM BURMA TO ASSAM BY THE KRONJONG PASS

ON May 5 Mr. Archibald Rose received a cablegram from Mr. D'Arcy Weatherbe, dated Sadiya, May 5, 2.50 p.m.: "Reached Ghalum River April 20, Sadiya May 5, from Hkamtilong across Kronjong Pass, completing my traverse Yangtse to Bramapatra," with the request that it should be communicated to the Secretary. Without previous news of Mr. Weatherbe's movements the message was a little mysterious, and the reference to the Yangtse is still obscure: but the details of a very interesting journey covering new ground are now available in a letter to Mr. Rose, dated "On train from Sadiya to Calcutta, March [evidently May] 8, 1926," from which the following passages are extracted:

After spending a fortnight in Ceylon I went up to Madras and then to Rangoon and on to Myitkyina. I left there on March 2 and walked up the road to Putao—twenty marches—but arrived there on March 17. I fished about Namghkai for a fortnight, and after a good deal of trouble in trying to get coolies, I left Fort Hertz (Putao) on April 8 with a Ghurka servant, a Shan Mishmi interpreter, and eighteen coolies—Hkunungs, Kachins, and Lisu. A Mr. Stevenson, who had come up the Myitkyina road with me, was so very keen on coming across to Assam that I took him with me; he proved a pleasant and useful companion, as he spoke a little Kachin, and Hindustani well.

We had an extremely hard journey up the Nam Yin and the Nam Kam-pi to the Krongjong Pass [spelled also Kronjawng and Kumjawng on Survey of India maps], which we reached only on April 20. On the third day seven of our Lisu coolies ran away, and we had to lie in camp for three days while we sent back to Hkamti and secured more coolies through Fisher, the D.S.O. there. After this we took their dahs and cross bows and arrows away from them every night, and thus effectively prevented them running away again, as they would not dare to move in the jungle without these weapons and implements.

It turned out that the old Mishmi path which was supposed to exist up this river had become entirely obliterated, and it was necessary to cut our way through thick jungle a large part of the way, and for the last five days we had to cross and recross the river waist-deep and icy cold from ten to twelve times daily. This proved very trying, and when we found 2 feet of snow on the Assam side, the coolies almost gave in. As a matter of fact, we were *all* in bad condition with colds and fever, and I had to lie one day in camp on the other side, and for the next five days had to wade eight to nine hours a day with a temperature of from 100° to 103°. This moving on was absolutely

necessary as the rice was getting low, and we had had to put the coolies on two-thirds to half rations for some days before.

We reached the sources of the Ghalum [or, if the S. of I. 1/M map is at all correct, of one of its tributaries] in the snow, just over the pass, on April 20, and the first Mishmi villages on April 25, where we were able to get a little rice and maize. We followed the Ghalum down to its junction with the Zayul Chu, which, though a much longer river, has not so very much more water in it than the Ghalum. The Zayul comes in at right angles from the north-west [? S. of I. Krawnaon, and read north-east for north-west]. These two rivers form the Tellu, which is the Lohit Bramaputra, changing its name only at the junction of the Tiding, 100 miles [difficult to reconcile with map] from Sadiya; and although we did not know it when we left Putao, it is a fact that the whole of the country from the pass to beyond the Tiding is "unadministered"; but we had no trouble whatever with the Mishmis, and found them quite a manly and certainly a reasonably friendly and hospitable people, previous and contrary reports notwithstanding. Though we did not get any great quantities of rice and maize, etc., at any one village they generally, on our request to the headman, gave what they could afford, for which of course we paid liberally, though they left the amount entirely to us. It would have been indeed a grave matter had we been without their assistance, as at one time we had about ten days to go and only three days' rice! It is quite possible that they may have saved the lives even of some of our coolies, who, as you may imagine, were (as we also) overjoyed to again reach the region of Dak bungalows. On reaching Sadiya on May 5 I had entirely recovered from cold and fever, though Stevenson was rather miserable with fever, and we both are suffering rather badly with many septic jungle sores on the legs. I had about 1½ stone to make up, but already have put on the half, thanks to the very kind hospitality of O'Callaghan, the Political Officer at Sadiya, with whom we stayed for several days.

The Krongjong Pass from Burma to Assam is in the extreme north of Burma, close to the Tibetan border, and some way north of the region recently described to the Society by Mr. Mills (*Geogr. Journ.*, April 1926). Its height is given as 10,000 feet on 1/250,000 92 E, and 9682 on 92 E/N.W. We believe that Mr. Weatherbe is right in thinking that he is the first European to cross the pass. In saying that he thus completes his traverse from the Yangtse to the Brahmaputra he is evidently referring to a traverse begun and carried to the Irrawaddy on a former journey.

MERZ AND THE "METEOR" EXPEDITION

Hugh Robert Mill, D.Sc., LL.D.

THE death of Prof. Alfred Merz at the outset of his great oceanographical expedition on the *Meteor*, which was referred to in the March number of the *Geographical Journal*, is from the point of view of the physical geographer a tragedy relieved only by the prospect of the ultimate success of a plan which provided against all contingencies.

wise.* If the University of Oxford again sends an expedition to Spitsbergen this subject should be carefully watched, and every effort made to make sure that any accession of cold with sunshine is not due simply to a change in the air supply, or shift of wind to a colder quarter. On the other hand, since a surface of snow is such a rapid radiator of long-wave energy, and since it reflects such a large proportion of the incident solar energy, it may well be that there are certain atmospheric conditions, especially at any altitude where the air is thin, with the sun circling round the heavens at a low angle, when the snow will emit a good deal more heat than it absorbs. If this is really the case the fact is clearly a potential source of spells of cold weather, below the normal temperature, at midsummer in the neighbourhood of the North Pole, such as appear to occur in the Arctic Ocean now and then, otherwise difficult to account for in a basin surrounded by snow-free lands except Greenland. The point is thus of practical importance in forming an estimate as to what degree of summer cold—below the seasonal mean temperature, which is only slightly below freezing-point in July—an expedition to the North Pole would be likely to encounter. And as bearing vitally on this question, it is to be observed that upper-air observations, made on the *Maud* expedition, support theoretical expectation that a temperature inversion, that is a rise with height above the glacial surface, exists at all seasons over the polar sea ; for an inversion would militate against the extent to which cold weather, locally engendered by radiation, could be transported by wind from one part of the polar basin to another, since in that case the air would be warmed by turbulent mixing. Hence another expedition to North-East Land, which appears to be an excellent experimental ground for problems in polar climate, should be well equipped for taking upper-air temperatures.

THE PROBLEM OF THE SHAKSGAM VALLEY

Colonel Sir Francis Younghusband, K.C.S.I., K.C.I.E.

Read at the Meeting of the Society, 8 *February* 1926. *Folding Map follows p.* 288.

THE title of my address this evening is "The Problem of the Shaksgam Valley"; but probably not a dozen persons here know where Shaksgam is. And little wonder; for it is a remote uninhabited valley at the back of the Karakoram Himalaya, and has been visited by only two Europeans, and by them thirty-seven years ago. It was discovered by me in 1887 on my journey from Peking to India; and it was again visited, first by me and then by the Russian (or rather Polish) traveller, Captain Grombchevski, in 1889.† Since then no European traveller,

* The *Fram* results (1893–96) indicate a slight excess of mean daily temperature with clear sky in comparison with overcast sky in July and August, a deficit in May and June, and a very marked deficit in winter.

† The name of this distinguished Polish soldier in Russian service has suffered in successive transliterations. The Polish name, as we are informed by the Secretary of the Polish Legation in London, is GRABCZEWSKI. When turned into Russian it acquired an M before the B, as pronounced, and being thence re-transliterated under a French influence, becomes GROMBTCHEVSKY very commonly in geographical

as far as I know, has actually entered it, though some have looked into it from the Indian side.

When I reached Yarkand, in September 1887 I found a letter from Colonel Mark Bell (the head of the Intelligence Department in India), who had preceded me by a month on the way from Peking to India, recommending me to explore the direct route from Central Asia to India which led by the Mustagh Pass into Baltistan and Kashmir. This route was formerly used by the natives; but nothing was known about it. And it was while exploring this route that I discovered the Shaksgam Valley. I had to cross it on the way to the Mustagh Pass.

I described it briefly in my lecture to this Society in May 1888; and in my lecture to this Society in 1895 I described my second visit to it, when I explored its upper part and its course till the river joined the Yarkand River. But ardent travellers are again seeking to go there, and perhaps some additional observations about it may interest you.

What is chiefly remarkable about Shaksgam is that it is a deep trough running immediately under the wonderful castellation of peaks which group themselves round K_2, the second highest mountain in the world. On the far side of Mount Everest there is a high plateau running up to 16,000 feet, and a well-inhabited plateau. And this is the rule with the other great peaks. On the far side (from India) the country lies at a considerable elevation and the valleys are wide. But immediately under the K_2 group of peaks there is this deep trough running down to only 12,000 feet above sea-level, quite uninhabited and devoid of vegetation except for a few patches of scrub, one of which is called Shaksgam and gives its name to the river which in its lower course is called Oprang by the Kirghiz.

When I left the Yarkand River in 1887 to work my way up to the Mustagh Pass I imagined that I should simply follow up one of its southern tributaries. It had so far been thought that these southern tributaries must all flow straight down from the main watersheds. But on ascending one of them, the Surukwat stream, I found that this was not the case. I found that an intermediate range—the Aghil range—had to be crossed, and that I had to descend into a deep valley, the Shaksgam valley, and then ascend a tributary from *that*—and not a direct tributary from the Yarkand River—in order to reach the Mustagh Pass.

And similarly, when in 1889 I was sent in search of the Shimshal Pass into Hunza, I had to do the same thing. In each case I had to cross the intermediate Aghil Range, dip down into the Shaksgam valley, and then ascend one of its tributaries—in 1887 to the Mustagh Pass, and in 1889 to the Shimshal Pass. It was thus only in a casual way that I discovered this valley. My main object on both occasions was

literature. In the *Journal* we have been accustomed to spell the name GROMBCHEVSKI, by direct transliteration from the Russian spelling, and it will be convenient to retain that spelling, at least for the present.—ED. *G.J.*

military—to explore the passes leading from the north towards India. But in this chance manner I did happen to discover one of the most remarkable regions in the whole Himalaya.

At this distance of time it is possible to gauge the chief impression it left upon me. What was it? No man can enter that region without enduring hardships. Was it these that made the most impression on me? Three weeks ago I had a chill. The doctor was called in. He applied his stethoscope. He issued his orders. I was not to think of getting up; there must be a fire in my bedroom; linseed poultices were to be applied; I was to inhale some infusion; I was to take certain medicines; I was to have hot soups, and so on. And taking advantage of this enforced rest I prepared this lecture. I looked up my old diaries, and in them I found recorded that on a certain day while I was exploring a glacier the ice on a glacier lake broke and I went through up to my waist, and then had to spend the night in my wet clothes sleeping on the floor of the tent, the floor being the glacier itself and the thermometer being nearly down to zero. As I now lay comfortably in bed with a fire near by and read this in my diary a shiver went through me. It was an experience which, I should have thought, I would have remembered all my life. As a matter of fact, I had completely forgotten it. Neither that nor any discomfort I may have had in my 1887 journey, when I slept in the open without any tent right up to and on the other side of the Mustagh Pass, has stuck in my memory.

The impression that *has* remained there and which has sunk deeper and deeper with the years is the impression of the sublimity and grandeur of the region. From the Aghil Range you look down into the deep trough of the Shaksgam River, and then across it to an array of peaks of unequalled mountain majesty. And on both occasions I saw them in dazzling sunshine showing sharp against a sky of purest azure. Here close together were peaks of 25,000, 26,000, 27,000 and in the supreme case 28,278 feet in height, rising above the valley in rugged cliffs and ridges, their summits mantled in glistening ice. It was a glorious sight, and I have often loved to dwell upon it.

And then, when one gets right in among the glaciers under the great peaks to a region where even rock is little seen—where nearly all is snow and ice, sparkling in the radiant sunshine, one has the sense of having reached a higher and a purer world raised far above the murky earth below. And this feeling of exaltation is the supreme impression left upon me by this region—the main impression which has remained with me for a lifetime and which, as experience has proved, has completely obliterated all those minor impressions so marked for the moment, but of such little real depth.

And perhaps contributing to this result were certain lesser causes. First there was the remoteness of this region. It is not particularly difficult to get at, but it is very far away. Enterprising inhabitants of

Chinese Turkestan might get at it fairly easily. But from either Russia or India it is very distant, and flooded rivers make it inaccessible except in the autumn, unless a way into it can be found from near its source.

Besides its remoteness its austerity also helps to produce the impress of exaltation. Not only are there no inhabitants, but there is scarcely a living thing. Here and there is some scrub in the valley bottom. But the flanks of the mountains are sheer rock. Austerity and purity are the characteristics of these mountains. And no one who is not himself at his fittest can win his way into them. They simply hurl from them all who are not fit to be among them.

On the other hand, to those who can stand their austerity and are not afraid to wrestle with them, they give this lifelong joy and exultation.

Such a region must obviously attract geographers. Grombchevski and I have made but a bare reconnaissance of it, and it must be examined more at leisure; for we had to explore it at a time when we were not only at rivalry with one another, but also when both of us had to beware of attack by raiders from Hunza. And I hope when it is thus explored the result will not be merely a map, but such a description of it as will enable that innumerable multitude who cannot go there to see and enjoy its incomparable beauty. All Grombchevski and I could do was to plod along the valley bottoms and ascend the passes. Future travellers should be able to clamber up the mountain-sides and climb the peaks and tell us of the glories that can be seen from them.

Some of the side valleys and glaciers I explored, but there are others, and especially the glaciers running down from the Gusherbrum Peaks, and K_2, which remain to be explored. And most important of all is the question of the source of the Shaksgam River. I roughly mapped the course of the river from the Urdok Glacier to its junction with the Yarkand River. But I had no time to explore the source: I had to press on to the Shimshal Pass, which was the main objective. I could therefore only conjecture where the source lay, and from what I find recorded in my diary I should suppose it must be at about the point "G" which Major Wood reached in 1914, when in charge of the Survey of India Detachment with the De Filippi Scientific Expedition to Central Asia. For, writing in my diary on 13 September 1889 in my camp on the Urdok Glacier, I say, "The Oprang [Shaksgam] river valley beyond the glacier which I am ascending is again level and open, and has a direction 150°, while at about 15 miles another valley branches off to the east with a direction 120°, and this latter must probably run very nearly up to the Karakoram Pass."

This passage, through an oversight on my part, was not published in my report, and the map-makers had accordingly placed the conjectured source of the Shaksgam River further west than this passage would have justified them in doing. I therefore agree with what Major Wood says on p. 9 of his report, that the valley "H" which he was

looking down from the low pass " G " drains into the Oprang, and " is probably the source of that river."

I should imagine that the valley I was looking up in 1889 was the valley that Wood was looking down in 1914. I was looking up a valley in a direction 120°, that is, a little east of south-east. Wood looked down a valley which extended as far as he could see " north-west to west." If it were not that mountain valleys have a pernicious habit of doing precisely the opposite of what you would expect of them, I should say that it was a foregone conclusion that Wood's valley " H " and my Oprang or Shaksgam valley were the same, and that Wood in 1914 had discovered the source of the Shaksgam—or at any rate one source, for perhaps the other branch mentioned in the passage from my diary may have a greater volume of water.

The whereabouts of a mysterious Saltoro Pass leading into Baltistan was another problem left over from my explorations in 1889. I was only able to satisfy myself—and it was all that was required of me—that there was no pass in that region of any value for military purposes. But the lie of the land between the Gusherbrum Peaks and the Karakoram Pass was exceedingly perplexing, and it was not till Dr. Longstaff discovered the Siachen Glacier and till Dr. and Mrs. Bullock Workman surveyed its upper part that we could be certain that anyhow this pass did not lie as I had supposed at the head of the Urdok Glacier. And I agree with Mr. Hinks' suggestion that the col from which the Workmans looked down into the Urdok Glacier was not the col which I rashly attempted to climb in a snowstorm, but the col of a side valley on the southern side.

The surveys of the Duke of the Abruzzi's Expedition of 1919 also showed that the peak which I had seen from Durbin Jangal was not K_2, as I had supposed. What that very prominent peak is remains then to be determined.

These, then, are some of the problems of the Shaksgam Valley. There is a field here for many years' intensive exploration. The exigencies of military service first brought it to our knowledge. The trained surveyer, the artist, and the climber can now take up the work.

But before concluding I would say a word about my rival but friend, Captain Grombchevski. After I had finished my exploration of the Shaksgam Valley and had discovered the Shimshal Pass I met him in another valley, a small tributary of the Yarkand River, on his way to Shaksgam. That meeting I have already described in 'The Heart of a Continent.' I also met him in 1890 in Yarkand, on my third journey —this time to the Pamirs. On both occasions he showed me the warmest cordiality. But I did not hear of him again—except that he was holding important posts in Manchuria—till last year, when he sent me a book he had written in Polish describing his journey, and from the Polish Legation I heard that he had had the saddest ending to a dis-

tinguished career. He had risen to high position in the Russian service, but in the revolution had been thrown into prison and robbed of all his goods. Through the assistance of the Japanese he had been able to get back to Warsaw. But he was completely broken down [and has since died]. I was at least able to assure him of the admiration we British had for him. For besides this journey to Shaksgam in 1889 he had made a much more important and daring journey to Hunza in 1888, to counteract the effects of which Colonel Durand was sent there from Gilgit in 1889, while I was sent to explore the passes into it from the north.

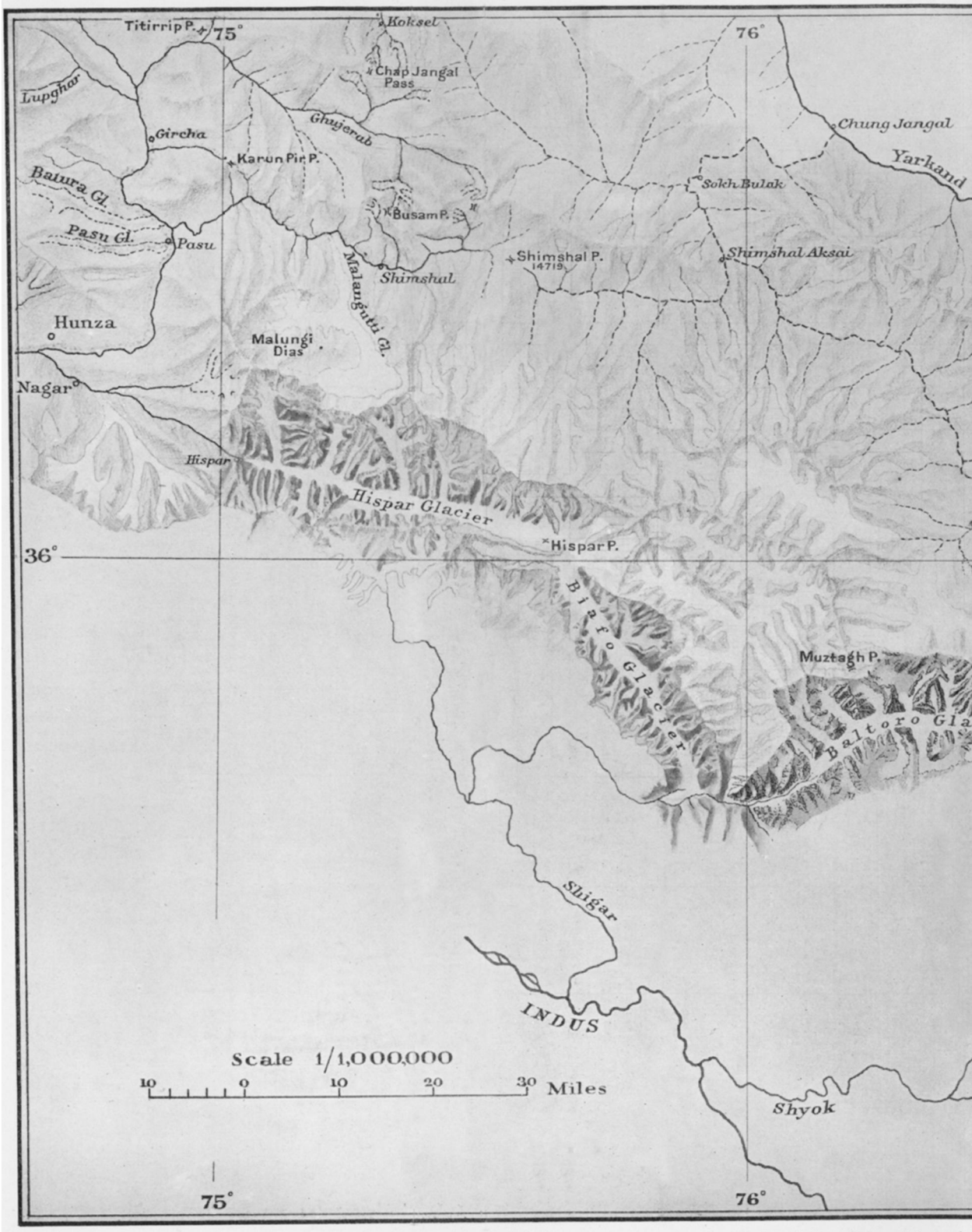
I would close my lecture with a tribute of admiration for the enterprise of this distinguished Pole.

Before the paper the PRESIDENT (Dr. D. G. HOGARTH) said: It would be not only superfluous but, I think, rather impertinent for me to attempt to introduce to you the lecturer this evening. Sir Francis Younghusband's name is written across the whole history of Himalayan exploration for the last forty years. He is almost, if not quite, the *doyen* of all Himalayan explorers in this country. You will find his name, for example, up and down the encyclopædic works which a President of this Society, the late Lord Curzon, wrote about Asia. In the course of those explorations a very long time ago—in the year 1889—Sir Francis Younghusband, then Captain Younghusband, found himself in what we now call the Shaksgam Valley. Since 1889 neither he nor anybody else has been in that valley. The country to the south of it has been explored by more than one party. A list has been given to me of those who have actually been in the south: Sir Martin Conway, who is here to-night; Dr. Longstaff, who is also present; the Duke of the Abruzzi; Dr. Hunter and Mrs. Bullock Workman. From the east it was seen by the expedition of Dr. De Filippi (I suppose in an English audience he ought to be given the full benefit of his K.C.I.E. and called Sir Filippo De Filippi), and Colonel Wood in 1913. But the actual Shaksgam Valley has not been visited again. It is about that that Sir Francis is going to speak to-night. I believe that what he saw in 1889 has been recorded, but practically shut away from the public ever since in official reports. I hope Sir Francis will be able to communicate some part of that to us in the course of the evening. He has very kindly undertaken to state the problems which still remain for solution in this very interesting country. There are a great many problems there of purely geographical interest; no political question is involved. But this particular region is beginning to attract attention as a part of the Himalayas which ought to be better known, and in which it is desirable that exploration should at some time be undertaken. I will now call upon Sir Francis to speak.

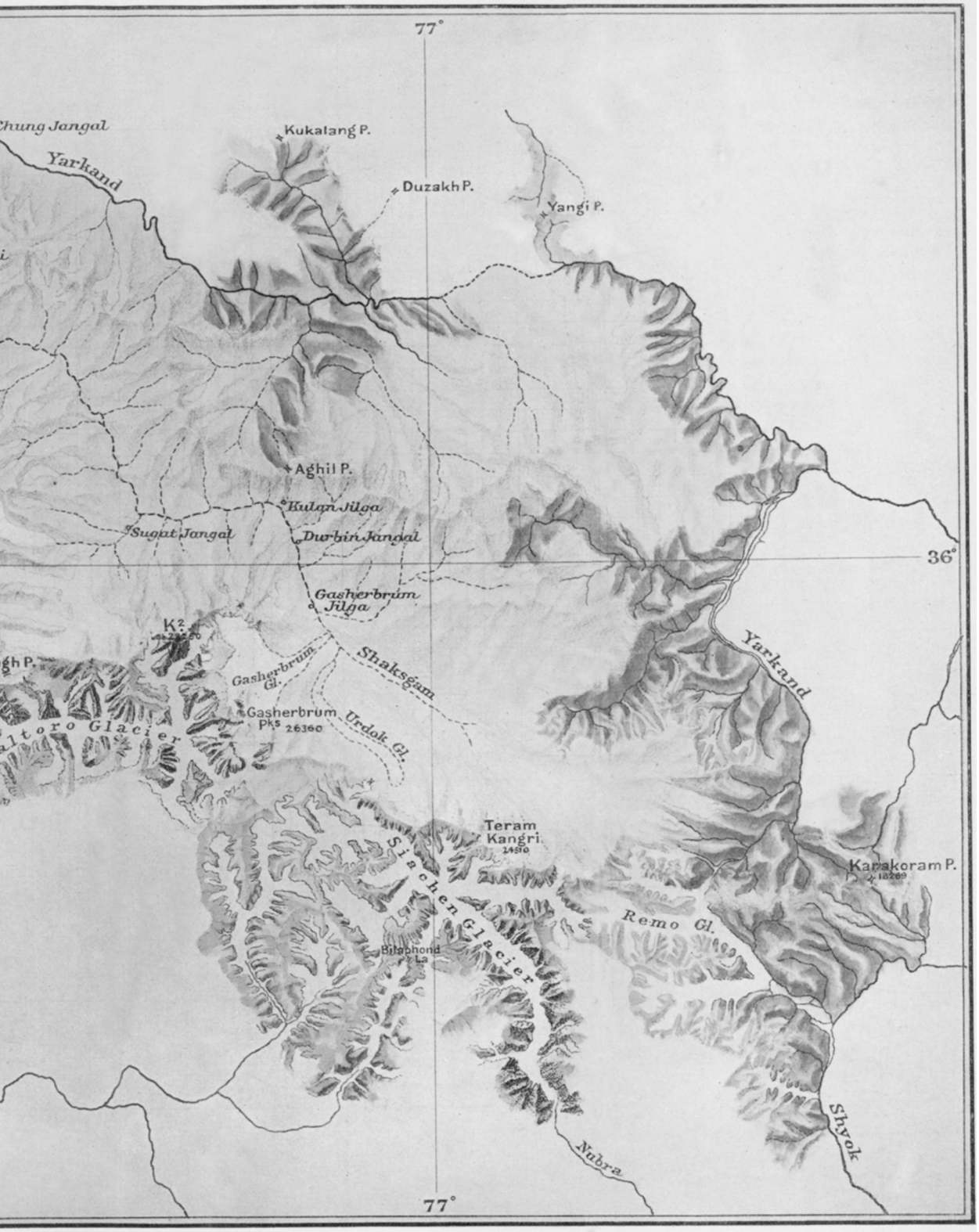
Sir Francis Younghusband then read the paper printed above, and a discussion followed.

General Sir EDMUND BARROW: I have been asked by the Chairman to give you some idea of the explorations with which I was fortunate enough to be associated in 1886, two or three years before Captain Grombchevski visited Hunza. My acquaintance with that region is limited to the adventurous journey of the Hindu Kush Commission from Gilgit through Hunza to Wakhan in the spring of that year. Our chief difficulties on the road were not its natural obstacles, but those we encountered in the person of Ghazan Khan, then Mir

Map to illustrate SIR FRANCIS YOUNGHUSBAND'S *paper*: THE PROBLEM OF THE S



The main range and glaciers from the Surveys of Sir Martin Conway (1892), *the Duke of the Abruzzi* (1909), *from the map of the Survey of India Detachment* (*Lt.-Col. H. Wood, R.E.*) *with the expedition of Dr. De F including the reconnaissances of Sir Francis Younghusband. The work of the Visser expedition in Hunza* (19



Abruzzi (1909), *Dr. T. G. Longstaff* (1909), *Dr. and Mrs. Workman* (1910); *the eastern and north-eastern areas n of Dr. De Filippi* (1913–14); *the lighter imperfectly surveyed areas from the maps of the Survey of India, n in Hunza* (1925) *was not available when the drawing was made.*

of Hunza. I do not think I ever met a greater ruffian than Ghazan Khan. He not only used every means short of force to obstruct our passage, such as preventing supplies reaching us, but threatened our liberty unless we handed over to him a fort called Chaprot, which of course we had no authority to do, Chaprot being in recognized Kashmir territory.

We were almost the first Europeans to travel right through his country, and when we reached Hunza—his capital and residence—we received a most inhospitable welcome from him. In fact, we were virtually his prisoners. He told us there were only three courses open to us: either to deliver Chaprot, or to go back to Gilgit, or to try to go on without his assistance. We naturally refused these alternatives, and insisted that he had got to help us, or at least to feed us. This annoyed him greatly, and he even considered whether it would not be simpler to kill us and report our death by avalanche. Eventually he let us go on, but gave us little help or supplies. However, by bribing his officials and buying direct from the villagers *en route* we successfully managed to make our way across the Hindu Kush by the Kilik Pass, which, though a snow pass over 15,000 feet, is not really difficult if crossed before sunrise while the snow is still fairly hard.

On the whole the Hunza route is not one to be recommended to ordinary tourists, but most young and active Englishmen feel an immense attraction to countries or places which have been little visited, and there is no greater satisfaction than that which they experience in the successful accomplishment of such explorations. I at least always look back on my visit to Hunza and Kanjut with the most lively pleasure.

Dr. T. G. LONGSTAFF: It has been a very great pleasure to me to hear Sir Francis Younghusband and Sir Edmund Barrow speaking of Hunza and of the Kanjuti raiders; the result of these first visits and of subsequent contact with other British officers has been to turn those raiders into some of the best frontier militia we have. I think the most interesting of all my visits to the Himalaya was that which fell to my lot, when I was being paid to do what I formerly had to pay to do, while I was serving with those same raiders of Hunza and Nagar in the Gilgit Frontier Militia during 1916 and 1917.

Sir Francis Younghusband has raised a very intriguing problem in connection with the Shaksgam, and there are one or two points that I think should be put on record at such a meeting as this, which is a sort of official *résumé* of our knowledge of that particular bit of country, and to which I feel that he has not quite done full justice—needless to say, to himself!

Sir Francis is the only European who has been in the upper part of the Shaksgam Valley, but the problem of the Saltoro Pass is by no means a new one. There is an obscure reference to it in the 'Tarikh-i-Rashidi' of Mirza Muhammad Haidar, written in the sixteenth century, and I think there is also a reference to it by Mir Izzet Ullah. Those references however are not illuminating, and it is to that accomplished and rather neglected traveller, G. T. Vigne, that we owe our first definite information. In 1835 he approached the problem from the south side, while in 1889 Sir Francis attacked it from the north. You will see from the old Survey of India map that before Sir Francis went to that region the country to the north of the Karakoram range was unsurveyed—it is just left as a white blank space; and the main axis of the range is projected southwards in a great angular bastion which projects down to below Vigne's Saltoro Pass at the head of the Bilafond glacier. When Sir Francis' work came to be plotted it was brought down to fill up that great blank wedge beyond the (hypothetical) water-parting. But in 1909, before

I started off to follow Vigne's footsteps, I spent a most delightful week with Sir Francis in the Residency at Srinagar, when he was kind enough to get out his maps and notebooks of 1889 and go through them with me. According to his route-book it was impossible to be certain of the longitudes, for these depended on the correctness of his identification of K_2 from the north, but as regards his latitudes there was no earthly reason for doubt, and yet on the official map his route had been stretched far down to the south of his observed position to fill up that awkward gap. Now I want to show you a slide: Sir Francis will no doubt recognize his own handwriting. You will see on the sketch the dotted line which represents the outline of the main axis of the Karakoram as laid down on the Indian Atlas sheet. Sir Francis drew this on the day when we had really come to grips with the problem, finally saying in effect, "I was right and it is the map which is wrong; the main axis of the Karakoram is not that shown on the maps, it is here." The man who had been there himself was right: if his original notes and maps had been accepted the mistake that was made of extending the Karakoram axis so far to the south would never have been made, and I should never have had the credit for the little discovery I made in 1909.

Following up Vigne's route, with the late Arthur Neve of Srinagar and with Captain Morris Slingsby of the Frontier Force, who so gallantly laid down his life in 1916, we crossed the pass at the head of the Saltoro Valley, which Vigne had been to the foot of, now called the Bilafond La, and saw the remains of stone shelters used by former native travellers on this route; after another day's march we got out on the north side on to a great glacier which nobody knew anything about. The lower part of that glacier was not unknown, for Colonel Henry Strachey ascended its foot in 1848, but no one imagined that it was 45 miles in length. We followed it up just far enough to see the end of it, and at its head saw a gap in the ridge, which I called "Younghusband's Saddle" on my sketch-map because it corresponded in latitude with his observed position. In Khapalu Rajah Shir Ali Khan had told me that there were two routes through the Saltoro Valley, one to Yarkand and one to Nubra: the same tale was told to Vigne in 1835. The finding by the Workmans in 1912 of an old bivouac farther on beside the main Siachen glacier convinces me that the tradition is correct, and that the main range was formerly crossed just about here. I want you to appreciate the accuracy of Sir Francis' original work and to realize that our chief discovery in 1909 was that the water-parting was just where he said it was! There on his sketch is K_2; here is Broad Peak and the Gusherbrums; here is the latitude of the Urdok glacier; then the axis runs east through Teram Kangri and on into the Rimu peaks explored by Sir F. De Filippi in 1914, and thus on nearly due east to the Karakoram Pass, all just as the lecturer predicted. There is one omission: for though the Aghil range, which he alone has crossed, is correctly shown articulating with the Karakoram axis on the north, yet at the actual junction there is an easy pass, which you saw in the last photograph which Sir Francis exhibited. This is the pass discovered by Major Wood* and Mr. Spranger, which you will realize is really beyond and to the north of the main Karakoram range, and which must lead directly to the headwaters of the Shaksgam River, into

* May I here record my belief that Major Wood is quite correct ('Survey of India Report on the De Filippi Expedition, 1914' (Dehra Dun, 1922), p. 5) in concluding that the plate opposite p. 640 of my paper in the *Geographical Journal* for June 1910 is *not* Teram Kangri but De Filippi's 7391–7388-metre group at the head of the southern branch of the Rimu glacier.—T. G. L.

which the Urdok glacier drains. Incidentally Major Wood found another pass over the tail of the Aghil range a few miles farther to the north-west, with traces of recent travellers. As yet we do not know exactly where these trails crossed the main range: but soon the riddle will be solved, and when it is, then I am willing to bet that the rough sketch which Sir Francis Younghusband drew on a bit of paper in the Residency at Srinagar in 1909 will correspond very well with the reality as revealed by the most modern theodolite in 1926.

The PRESIDENT: The hour is late. I do not know whether Sir Francis would like to say anything in reply to what has been said. You will agree with me that he, Sir Edmund Barrow, and Dr. Longstaff have succeeded in showing that there is still a very considerable deal to do in the Shaksgam country. There lies a problem of extraordinary perplexity and interest which awaits any future explorer fortunate enough to be able to get into that particular part of the Himalaya. You will, I am sure, join with me in giving cordial thanks not only to Sir Francis Younghusband (though chiefly to him) but also to those who have followed him.

NOTE BY THE SECRETARY ON THE POSITION OF THE URDOK GLACIER

Some years ago Sir Francis Younghusband presented to the Society his original field book containing all his astronomical observations made on the journey in 1889 when he crossed the Aghil Pass into the Shaksgam Valley and ascended the Urdok glacier, but was unable to reach the col at its head. His observations include pairs for latitude by north and south stars, altitudes for local time, and an observation for azimuth on a peak which he took to be K_2. His orderly kept a compass traverse. All these observations were turned over to the Survey of India at Dehra Dun, and were worked up by a computer in the Survey.

When the Duke of the Abruzzi was preparing his expedition to the Karakorum the Survey of India plotted for him a diagram showing the route of Sir Francis in the Shaksgam as deduced from his observations, placed with reference to the outline copied from the map of Dr. J. Jacot Guillarmod in 'Six mois dans l'Himalaya.' The following are the latitudes and heights from the observations of Sir Francis:

Kulan Jilga	Lat. 36° 7′ 22″,	Height	—
Durbin Jangal	,, 36° 2′ 0″	,,	12329 feet.
Gusherbrum Jilga	,, 35° 56′ 5″	,,	12962 ,,
Urdok glacier, Camp II. ..	,, 35° 48′ 5″	,,	13880 ,,
,, ,, III. ..	,, 35° 45′ 45″	,,	14144 ,,
,, ,, IV. ..	,, 35° 41′ 20″	,,	15355 ,,

The computer at Dehra Dun seems to have concluded that nothing could be made of the observations for azimuth and longitude.

The Duke of the Abruzzi's mapping showed that the Guillarmod map was seriously wrong in the position of Staircase Peak in relation to K_2: it was placed too far east: and this affected the plotted position of the Shaksgam–Urdok route in longitude. But the latitudes seemed entitled to every confidence: they showed that the col above the head of the Urdok glacier must be close to latitude 35° 40′.

When therefore Mrs. Bullock Workman's surveyor Mr. Peterkin deter-

mined the latitude of what she called the Turkestan La as 35° 40′, she wrote a passage which has often been taken to mean that she believed the Turkestan La was the head of the Urdok glacier. I was under this impression myself when I remarked to Sir Francis about the time of the Meeting reported above, that it seemed clear from the Workman photographs that the glacier they looked down from the Turkestan La was not the main Urdok but a western affluent.

A recent re-reading of Mrs. Bullock Workman's passage seems to me to show that we had misinterpreted it. The passage is as follows:

"The col we stood on forms a semicircle and ends in the bergschrund-festooned wall visible in the foreground. Directly below the col a sharp drop occurs, say of 2000 feet (it is difficult to estimate height from above a wall). Below, this wall shades off into a short crevassed glacier, which, as an affluent, joins a wide trunk-glacier flowing north-west towards its tongue. We saw well only the upper part rising south-east towards its source behind the group of peaks above mentioned. From the edge of the col the end of the triangular mountain-mass discovered from the Indira col was seen, and the main glacier appeared to take its downward direction along the base of these mountains.

"It is probable that this large glacier flowing north-west joins the Gusherbrum stream seen from the Indira col beyond the triangular mountain-range, or that both end in the same valley near together. The latitude, 35° 41′ 20″, of the point reached by Sir Francis Younghusband on the Urdok glacier would about correspond to that of this col. After consultation with him there appears to be but one conclusion possible—that this is the glacier he ascended in 1889 when in search of the Saltoro pass, and named the Urdok. The col he saw culminating the Urdok is probably a ridge of the mountain-group seen by us from the east Siachen col [Turkestan La]."*

The ambiguous words are in the middle of the second paragraph: ". . . that of this col." The reference cannot be to the Indira: it has been taken as to the Turkestan La: the last sentence makes it probable that "this col" does not refer to either of the cols visited by Mrs. Bullock Workman; and that her interpretation of the photographs was really the same as ours, but that she had obscured the argument by quoting the latitudes unnecessarily.

Some months ago, with the permission of Sir Francis, I tried to see if I could deduce anything from his observations for longitude, which had been rejected by the Survey of India; and as a preliminary I re-computed the latitudes, mostly meridian altitudes of Altair south, and extra-meridian altitudes of Polaris north. The latter required of course the sidereal time, to be derived from the altitudes of the Sun, and a deduced rate for the one watch which had survived to that date. At Shahidulla Sir Francis had recorded that the index error of his sextant was zero. It soon became apparent that in the Shaksgam it was about 3′. There was a discordance of 5′ or 6′ between the latitudes from north and south stars, pretty constant; and the means of the pairs agreed within a few seconds with those derived by the Survey of India. The agreement was as close as could be expected, considering the uncertainty of the sidereal time.

A recomputation of the local times with the deduced index-error did little,

* *Two Summers in the Ice-wilds of Eastern Karakoram*, by Fanny Bullock Workman, pp. 186 *et seq.*

however, to improve the concluded rates of the watch; the Sun-observations for time were all in the morning; the index-error was uncertain; and I was compelled to agree with the computer of the Survey of India, that no differences of longitude could be deduced with any advantage. But the observations for latitude seem unassailable, and it will be surprising if they are not confirmed some day by precise survey.

The Survey of India plotting shows the snout of the Urdok glacier a little away from the Shaksgam river, as described by Sir Francis. But it makes the route up the glacier run south-westerly to Camp II., thence a little south of south-easterly to Camp IV., and thence south. The authority for this curve in the glacier must be the compass-traverse of the orderly, which cannot now be found in the records of the Survey of India or in the Intelligence Department. The triangulation chart compiled by the Survey of India in 1922 gives a different outline of the glacier, which is evidently influenced by the misinterpretation of the Bullock-Workman narrative mentioned above.

A. R. H.

'AIDHAB

G. W. Murray, Survey of Egypt

THE hackneyed comparison of desert life with seafaring still holds good—long periods of monotony are broken by events as surprising as a shipwreck or a fire at sea. Last December on the Red Sea coast of the Sudan, I came across the jetsam of a great catastrophe of this sort. On a flat and waterless mound, in wet weather almost an island, separated by 10 miles of flat desert from the majestic wooded peaks of Jebel Erba, lie the ruins of 'Aidhab, a mediæval city of some importance.

It is perhaps mentioned by the tenth-century geographer, Ibn Haukal,* who says that the produce of the gold-mines in the Wadi 'Alaqi was carried to a certain castle on the sea-coast called "Assab," or "Assat." (The reading is corrupt.)

Certainly during the period of the Crusades the land route to Mecca through Sinai and Northern Arabia became unsafe for pilgrims from Spain and North Africa, and they preferred to ascend the Nile as far as Sus or Aswan, from both of which places roads could be followed through the desert to 'Aidhab, a port on the African coast of the Red Sea opposite Jidda. Makrīzi indeed says † that for 215 years from A.H. 450 (A.D. 1058) the Mecca caravans followed this route, and that "it counted formerly among the most important ports of the world, because the ships of India and Yemen disembarked their merchandise there."

The Mecca pilgrims were not, however, safe even at 'Aidhab, for in 1182 Renaud de Chatillon, amongst other piratical exploits, sacked the town, massacred an entire caravan, and destroyed sixteen ships

* Ouseley's translation, p. 13.

† Ed. Bouriant, pp. 588–9.

and expensive. The details of the projection and the principles of compilation were pretty fully described in the paper "Notes on the Construction of a General Map of Africa, 1/Two Million," published in *G.J.*, **52**, 218, October 1918.

A. R. H.

RESULTS FROM THE DE FILIPPI EXPEDITION TO THE KARAKORUM

1. **Paesi e Genti del Caracorùm—Vita di Carovana nel Tibet Occidentale.** (Pubblicato sotto gli auspici della R. Società Geografica Italiana.)— **Giotto Dainelli.** 2 Vols. $10\frac{1}{2} \times 7\frac{1}{2}$. Firenze: Luigi Pampaloni. 1924. Vol. 1: Pp. viii. + 291, *Portrait of Author (frontispiece)*, *LXXIII. Plates of Photographs.* Vol. 2: Pp. 323, *LXXXXV. Plates of Photographs. Map (a new map, specially compiled, in 4 Sheets, 1 : 750,000)*; *2 Sheets in Pocket at end of each volume.*

2. **Spedizione Italiana De Filippi nell Himàlaia, Caracorùm e Turchestàn Cinese** (1913–14).* Series II. Risultate geologici e geografici, Nicola Zanichelli, Bologna. Vol. **8**, Le condizioni delle Genti.— **Giotto Dainelli.** 4to. Pp. vii. + 418, 38 *Illustrations in Text, Statistical Appendix*, 10 *Maps*, 87 *Plates of Photographs.* Vol. **9**, I Tipi Umani.— **Giotto Dainelli** e **Renato Biasutti.** 4to. Pp. 332, 14 *Illustrations in Text, Statistical Appendix*, 6 *Maps*, 87 *Plates of Photographs.*

THE scientific aims of the De Filippi Expedition (1913–14) were far-reaching; no scheme of regional exploration has ever been planned more carefully and more completely carried out. An enormous field of work fell to Sig. Giotto Dainelli, Professor of Geography at Pisa University, a well-known naturalist, geologist, and glaciologist, with experience of exploration in Eritrea. Wide reading of authorities, and the observations made by Dr. De Filippi during the Abruzzi Expedition, convinced Professor Dainelli that certain ethnological problems required detailed investigation, and therefore he made a special study of anthropometry.

While the members of the main party were occupied in geodetic and meteorological observations at various selected stations, Dainelli spent most of that autumn, winter, and spring in travelling hither and thither in Central Kashmir, and later in Eastern Kashmir. 'Paesi e Genti' is a delightful narrative of the author's experiences from his departure in August 1913 to his return in October 1914. Originally written for his friends and relations, this personal record has been printed for the benefit of a much wider circle. It would be impossible in a short review to reflect even a gleam of the charm of these two volumes. Part of the charm lies in the simplicity, directness, and humour of the writing; part, in the light-hearted accounts of the great hardships of those winter and spring journeys, often without any European companion, at elevations varying between 15,000 and 20,000 feet and arctic conditions; part, too, in his ungrudging admiration of his native attendants. But perhaps the most striking

* The scientific results of the expedition will eventually consist of fourteen volumes. Series I.: Geodesy, Geophysics, Meteorology (3 vols.). Series II.: Geology and Morphology, Glaciology, Anthropogeography, Ethnology, Botany (10 vols.), and the "Storia" or General Report. Reviews have appeared in the *Geographical Journal* of Series II., vol. **3**, Glaciology (Dainelli) (**43**, p. 243) and of the "Storia" (De Filippi) (**46**, p. 254); and in *Nature* (Feb. 1926), Series I. vol. **1**, Geodesy (Alessio).

feature is the unconscious revelation of the author's insight, of his intense devotion to his scientific work, and of his attention to accuracy and detail. The excellent new orographical map, and the splendid panoramas and photographs, enable the reader not only to follow every stage of the journeys but to visualize the nature of the country and therefore to appreciate fully the vivid word-pictures, many of them gems of description.

The narrative should be read for itself, and again as an introduction to the two volumes of severe scientific results. The maps and illustrations in these two volumes are so numerous and so excellent that it seems ungracious to ask for more! Yet it is undeniable that an orographical map of Central Kashmir, such as that in the narrative volume, is essential to ease of following the detailed descriptions.

The first part of Vol. 8 deals with characteristics of the dwellings, centres, and oases. About 100 pages, §§ 2–15, are devoted to an almost too elaborate technical account of the external and internal features of the dwellings in the whole area, including the tents of the nomadic Changpa. Plans are given of a considerable number of various types of houses, small and great, and some seventy-five admirable photographs. The author claims that in each of the six groups into which he divides the population, viz. Balti, Brokpa, Puriki, Maknopa, Ladakhi, Changpa (see Map III., vol. 9) the dwellings are quite distinguishable one from the other, though the type is essentially Tibetan; the Ladakh type is nearest to that of Lhasa, while the Balti type shows a "modification or degeneration," possibly due to climatic or economic differences. In the mixed belt, near the Srinagar–Leh caravan route, the Puriki houses exhibit intermediate forms. The Maknopa and Brokpa houses differ more widely from their neighbours, and the names given to the parts of their dwellings and outbuildings are Dard, not Tibetan. Contact with the Ladakhi has led the Changpa, here and there, to abandon their nomadic life, but their houses, in their internal arrangements, show unmistakably that they were built round an original tent as nucleus.

The next eighty pages, §§ 16–24, are more or less directly concerned with the character and position of the centres of population. The descriptions of individual centres are most illuminating, but the discussion enters into great detail, and the reader is often tempted to ask whether the extreme attention to logical order does not entail too much repetition. A distinction is drawn between *centri minori*, purely agricultural, and *centri majori*, where there is a certain amount of commercial exchange shown by a bazar, very rudimentary except at Leh. An extremely interesting account of the economic life on the oasis of Tolti, one of the *centri minori*—illustrated by a large-scale map (Plate VI.) is given on pp. 150 *et seq.* The six *centri majori*—Dras, Kargil, and Leh, on the caravan route; Skardo, on the branch route to Gilgit; Shigar and Kapalu, off the main routes—are described in detail and illustrated by many photographs and two large-scale maps—Skardo and Shigar, Plate II.; Dras, Plate III. The relative aggregation of groups of houses forming a centre, or their relative isolation, depends on geological conditions, modified by the possibility of irrigating the relatively small areas where alluvial or morainic deposits offer suitable soil. Obviously these conditions, as a rule but by no means always, are to be found in the *lower* parts of valleys. Many examples are, however, given of centres on terraces of dejection at a considerable height above the river. Here as elsewhere water, the prime necessity, is obtained from springs or from streams by means of small but ingenious gravitation canals and primitive aqueducts, or even by "artificial glaciers," described on p. 143. The majority

of the centres are placed at the mouths of lateral valleys, mostly on alluvial fans. Ignorance of raising water by mechanical means and the extreme variations between flood- and low-water level prevent the utilization of possible areas of cultivation in the lowest parts, near the great rivers. Interesting descriptions are given, §§ 22 and 23, of abandoned and of temporary settlements, and of the winter and summer quarters of the nomads. These are followed by a valuable discussion (§ 24) on the maximum elevation of permanent habitation, with a sketch-map, p. 177, embodying the general conclusions and showing the much higher maxima of the south-east.

The last fifty pages turn to other matters: § 25 deals with (*a*) *means of transport* and describes in detail the porters, horses, yaks, etc.; (*b*) *means of communication*, the rudimentary roads, rock paths and galleries, bridges and other means of crossing the rivers. In the last sections, §§ 26–31, the ancient routes across the Karakorum glaciers (Map VIII.) are carefully analyzed. In the author's opinion, their abandonment was due to fear of Hunza marauders, and not to any increase in glaciation.

Part II. deals with Population; Distribution and Density; Economic Products. After a useful discussion on the value of early estimates, the Census figures of the total population for 1891, 1901, 1911 are quoted in Table I., p. 237, and reasons are suggested for the curious variations in the rates of increase.

The next forty pages, §§ 33–36, are devoted to an analysis of the data required for a reasonably true understanding of the relative density and concentration (*addensamento*) of the population in regions like Central Kashmir, where there is a vast preponderance of land which cannot be permanently inhabited. In such cases, density maps based on large administrative divisions are worse than useless. Unfortunately, the Census and the Assessment Reports give no information on the exact limits or areas of the minor administrative divisions. In order to obtain a basis for further calculations, Professor Dainelli worked on an original 1 : 500,000 map, from which the 1 : 750,000 was reduced. He divided Central Kashmir into twenty-five "geographical regions" by river basins and their subdivisions, which he could limit accurately on his map and whose area he could measure with a planimeter. The results are given in Table II., p. 245,* Table III., p. 246, and Map IX., and are followed by certain general inferences on the density of population. A valuable Appendix, giving the number of houses, inhabitants, sex, religions in the 466 centres of the three *Tessils*, leads to the next step. This detailed information, hitherto unpublished, was communicated to the author by his friend Hashmatullah Khan, *Wazir Wazirat* of the Trans-Himalayan provinces of Kashmir. Although the Census and Assessment Reports state the total areas of land actually cultivated in each *Tessil*, and hence calculate the relative concentration of the population in each, details are given only for the *Skardo Tessil*, and even these are too vague to be useful. But even if full details had been available, Professor Dainelli is of opinion that other matters should be taken into consideration besides mere areas of cultivation. Some weight must be given to paths and roads, to alluvial terraces with soil suitable but not utilized, and to

* (1) It may be useful to remark that 1 kmq. = 0·386 sq. mile, and that therefore a density of 10 per kmq. = 25·9 per sq. mile. Obviously the author used some other factor in converting the Census results (Table II., line 5), but the slight difference does not affect the argument.

(2) Dainelli's total area is considerably less than that given in the Census Report. He remarks that he cannot discover how the Census figures have been obtained.

areas of pasture, however thin, used for summer grazing. As the result of his extensive observations, he considers that a much truer view of the real density is obtained by allowing a 1-kilometre strip along each minor valley, and a 2-kilometre strip in each major valley, giving however the actual width in the parts which he had specially surveyed. This device, and the information given in the Appendix, enabled him to subdivide each of his "geographical regions" into small groups of centres, ninety-eight in all, and to calculate the area of the land utilized, and hence the true density of each group. The results appear in Table IX., pp. 263–266, and in Map X. (with obvious exaggeration of the strips). A full discussion of the results follows the Table.

The next groups of subjects are various and most interesting: § 37, Number and distribution of dwellings; § 38, Number and distribution of centres; § 39, Various proportions of the sexes; § 40, Phenomena of present-day emigration; § 41, Religions and languages; § 42, Classes and professions.

These are followed by seventy pages of closely packed information on economic conditions—agricultural methods and manure; crops raised and times of harvest; fruit trees and other trees; limits of cultivation and of tree and shrub-growth, etc. The thread running throughout is a comparison between the conditions in the three *Tessils* of Baltistan, Purik, and Ladakh. No short summary could do justice to this detailed investigation; it deserves careful study: yet one conclusion should be noticed. The Assessment Reports give the yield of the harvest of each product, and also the totals of the domestic animals in each *Tessil*. Professor Dainelli had made notes on the current prices of all these, and thus was able to assess the comparative wealth per head of population in terms of Italian *lire* (Tables XXXI., p. 341, and XXXIV., p. 382).

	Baltistan.	*Purik.*	*Ladakh.*
Harvest value per head (*lire*)	100	71	132
Animals ,, ,, ,, ...	89	103	209

Thus Ladakh, the least favourably situated owing to its greater elevation, enjoys a greater degree of prosperity (or should one say less poverty?) than either of the others. This fact the author attributes to the effects of Buddhism and polyandry, which prevent a subdivision of landed property and a rapid increase in population.

The first part of Vol. 9 treats of cultural conditions in Central Kashmir (Dainelli). Races, languages, and dialects are fully discussed in §§ 1 and 2, and the author's views are summarized in Map I. Some fifty pages, §§ 3–11, are devoted to an exhaustive description of the distinctive dress, ornaments, and general physical appearance of each of the author's six racial groups. These are profusely illustrated by photographs (Plates VI.–XIII. and LXVI.–XCII.), while the distribution of the groups is shown on Maps II. and III.

The next sixty pages, §§ 12–20, deal with the three main religions: Hindu Buddhism, Tibetan Buddhism, and Muhammadanism—their distribution in Maps IV. and V.; their introduction and origin, as indicated by many rock-sculptures and other remains, in Plates XIV.–XIX.; their influence on customs and dialects, as well as on religious and secular architecture, in Plates XIX.–XLVII. Many authorities have stated that the population is divided into castes, but Dainelli combats this statement and maintains that classes is the more correct term. He mentions specially (§ 22) the two lowest classes, *mon* (musicians) and *argon* (half-breeds), because of the theory propounded by A. H. Francke, in his 'History of Kashmir,' that these are the aborigines enslaved by their conquerors. The author proves conclusively that the *mon*

do not differ in any respect, except in poverty and occupation, from the particular racial group amongst which they live.

The last thirty pages, §§ 24–27, contain a general summary of the various arguments. After a careful review of earlier theories on the ethnical affinities of the inhabitants of Central Kashmir, Dainelli states, and seems to justify, his opinion that the whole area, including Ladakh, was originally peopled by Dards, *i.e.* Iranian. The early history is very obscure, but it seems certain that about the tenth century Ladakh was occupied by Tibetan conquerors who settled down as agriculturists, imposing their religion and language without destroying or absorbing their predecessors. The Mongolian element, thus introduced, not nearly so marked as previous observers have asserted, steadily decreases from south-east to north-west, and is quite exceptional in Baltistan. The Chang-pa are far more Mongolian than the Ladakhi, but even they show traces of Iranian blood.

Part II.—Somatic types of the inhabitants of the Upper Indus—is by Signor Biasutti. This section, pp. 181–299, is of special importance to anthropologists, for it contains a detailed technical investigation by Professor Biasutti of the usual ten anthropometric measurements and seventeen observations of each of the 408 individuals examined by Professor Dainelli at various places which he visited. A full record of all the details and of the calculated indices is given (pp. 269–299), and in the preceding text Professor Biasutti discusses at length the racial elements of each of Dainelli's groups and defines them ethnically. There seems to be no doubt that Professor Dainelli's main contentions, based on general characteristics, appearance, dress, buildings, dialects, customs, etc., are fully upheld by anthropometric considerations.

The last thirteen pages of the text (Part III.) give the results of the measurements of a Balti cranium (Plate XCIII.) obtained by Professor Dainelli at Parcutta, nor far from Skardo. These measurements are compared with those of the Nagar cranium (Plate XCIV.), described by Duckworth, and also with a considerable number of others obtained from neighbouring parts of Asia, viz. Hindu Kush, Tibet, and India. The details are too technical for the general reader, but should be of particular interest to craniologists.

B. B. D.

TECTONIC GEOLOGY AND GEOPHYSICS

Grundfragen der vergleichenden Tektonik.— H. Stille. Borntraeger, Berlin. 1924. Pp. viii. + 443. *With* 14 *Text Figures. Mk.* 24.75 *bound.*

Geotektonische Hypothesen.— F. Nölke. Borntraeger, Berlin. 1924. Pp. viii. + 128.

Gestaltungsgeschichte der Erde.— L. Kober. Borntraeger, Berlin. 1925. Pp. viii. + 200. *With* 60 *Text Figures and a Folded Chart. Mk.* 7.50 *bound.*

Der Aufbau der Erde.— B. Gutenberg. Borntraeger, Berlin. 1925. Pp. viii. + 168. *With* 23 *Text Figures. Mk.* 11.10 *bound.*

THE problems associated with earth-movements are the most difficult and baffling that geology as a physical science has to face. The great work of Suess contained a first world-synthesis, and attempted a comprehensive interpretation of all the data then available. We know to-day that his attempt was premature; but we recognize the genius that grasped the problems as a whole, laid the foundations of their growing solution, and stimulated younger men to press forward with renewed enthusiasm. The war interrupted the

Modern Europe and its Beginnings.— E. H. McNeal. New York: Charles Scribner's Sons. 1925. 7½ × 5, pp. xviii. + 514. *Sketch-maps and Illustrations.* 10*s.* 6*d. net.*

It would be ungrateful to Professor McNeal to commence a notice of his work without a reference to the success of his attempt to reduce the history of Europe into a small compass. How widely he has interpreted his task is seen when it is realized that for him the beginnings of modern Europe are to be found in the valleys of the Euphrates and Nile. Yet he has succeeded in sketching history from those beginnings to the French Revolution within the first half of his book. As his scope includes art, literature, and science in so far as they bear upon historical developments, he could not be expected to satisfy all interests. In these circumstances it is something that geographical factors have not been entirely ignored, *e.g.* there are brief remarks upon the *rôle* played by the Alps, on the influence of trade routes, and on the great age of geographical discovery. In his sketch of British constitutional history, exception might perhaps be taken to the statements that the rights of Parliament were founded upon custom and law reaching back to the thirteenth century, and that the Governor-General of a Dominion exercises no constitutional powers; but these are probably the results of condensation. The United Provinces are referred to throughout as the United Netherlands. The sketch-maps in the text seem unnecessarily crude, and the physical map at the end is hardly adequate. It is a hopeful sign that text-books dealing so sympathetically and informingly with European history should be appearing in the United States. G. R. C.

ASIA

Courts and Camps in India: Impressions of Viceregal Tours, 1921–1924.— Yvonne Fitzroy. London: Methuen & Co. 1926. 9 × 5½, pp. xi. + 243. *Twenty-seven Illustrations.* 16*s. net.*

This book presents a record of experiences and impressions during four crowded years of life as a member of the viceregal household in India. We have picturesque sketches of Kashmir and of the lands of Rajput chivalry; of Delhi, Agra, Mandu, Lucknow, Calcutta, and the marvels of Ellora and Ajanta; of progressive Mysore, with a graphic description of an elephant khedda; and last, but by no means least, a shrewd and just picture of life in the summer capital. It must not be regarded as a handbook for tourists; and the historian will question certain items of information, no doubt supplied by local guides. Things are not ordinarily seen in their true perspective from the Viceroy's *entourage;* but Miss Fitzroy is no ordinary observer: she reveals not only a truly artistic temperament that can revel in the charms of nature's wide canvases, and a refined humour that can be diverted by the comedies of life in a narrow and essentially official *milieu*, but also a clearness of intellectual vision that can pick out the salient features as well of a building or landscape as of the political and administrative problems of that absorbingly interesting land. Certain paragraphs in Miss Fitzroy's book show more sagacity than many volumes written by touring politicians. Indeed, many who have spent their lives in India will close it with a sense of regret that more Englishwomen of this type, so well fitted to appreciate "the little matters of courtesy to the greater matters of sympathy and understanding" (p. 213), had not devoted themselves to that country. C. E. A. W. O.

products are maintained for the use of scientific and technical visitors. The educational side of the Institute's work has also been reorganized. The galleries are at present closed for redecoration and rearrangement of exhibits on a plan designed to attract public attention and utilize fully their educational value. This scheme has been drawn up in co-operation with educational authorities, teaching bodies, and chambers of commerce. Special features are the attraction of attention by realistic dioramas and models, supplemented by photographs, diagrams, etc., and the arrangement of the exhibits systematically, starting with world position and geographical features, and coming later to the economic products and the life of the people. Through the support of the New Zealand Government, the New Zealand Gallery has been practically completed on these lines. The publication of a monthly Bulletin to assist teachers is under consideration. A further development is the holding of exhibitions of the work of the British School of Rome Scholars, and also of artists of the Empire.

The Hydroplane of the Hamilton Rice Expedition, 1924–25.

We have been informed by Colonel Sir Henry Lyons, F.R.S., Director of the Science Museum, South Kensington, that the Curtiss Sea-gull hydroplane, used on Dr. Hamilton Rice's last expedition to the Amazon valley, and presented by him to the Museum, is now on view in Gallery VIII. A full account of the work of the hydroplane was given in the *Journal* for July last (pp. 27–43).

CORRESPONDENCE

Houses in Eastern Tibet

WHEN reading back numbers of the *Journal* I noticed some remarks by a former President on Tibetan houses which do not in every case apply to the architecture in regions between 28° to 34° N. and Long. 98° to 104° E.

The houses in the above districts are not all of the Egyptian type, although flat roofs are the rule. The structures in the Min and Wi valleys show indications of being an exception. The higher buildings, palaces, temples, and towers are here, as in western Tibet, of the Egyptian pattern mentioned, but in the ordinary dwellings the walls are built up with little if any difference in the thickness. In Chantui both types may be seen side by side. I suspect that the former may withstand the awful earthquakes better than the latter. Certainly, in Hor Drangu, during the earthquake in 1923, when almost every building collapsed, very high walls of mud, broad at the base and tapering towards the top, remained standing.

The earthquakes in this region occur about every ten or twenty years and practically level all buildings. The epicentres seem to be moving north-west in the Kanzè direction. The first serious one within thirty years was at T'ai Ning, 60 English miles from Tatsienlu; then about twenty years ago a similarly serious one shook Dawo, 35 miles from T'ai Ning; and in 1923 another disastrous shock destroyed Hor Drangu and all the settlements to within 5 miles of Dawo. Hor Drangu is 40 miles from Dawo. In this last earthquake a French priest in a Mission station near the former settlement was killed in the ruins, with about 50 of his converts and adherents.

The houses are built of clay or stone. The inside mass of roofs, etc., rests on wooden pillars with stone blocks and foundations, and are easily shaken into a confused heap—that is, they collapse inside the stone or earth-work walls. But the strength of the "shake" of 1923 may be indicated by the fact that small shrubs were in places thrown out of position. In such places the earth was broken up into large squares and resembled a gigantic draught-board.

The use of clay and earth is very common along both the west and the north-west roads. The palaces of the princes in Litang, Batang, Hor Drangu, Chuwo, and Kanzè, if not Derge, are, if I remember correctly, built of clay or material other than stones. In some regions the clay is preferred, and it is not uncommon to see large squares or oblongs of this material in walls of stone. The clay seems to last as long as the stone. At Weichow the ruins of an imposing wall dates, according to tradition, as far back as 250 A.D.; but taking a hint from Du Halde, we might look upon it as the Eastern palace of the Tu Fan kings, and (approximately) refer it to 700 A.D. In this region also we find high slender towers—perhaps 100 feet—built of clay or a material resembling loess. A similar material abounds between Dawo and Kanzè.*

I very much doubt if the flat-roofed stone or clay dwellings originated on the Tibetan steppes. A tent-like ridge and not a walled quadrangle would accord better with climatic conditions. The flat-roofed house seems to have been in use for thousands of years in the contiguous valleys; and to-day the wall and house builders are natives of Mao Chow and the low Min regions which at the dawn of Chinese history composed the "Kingdom of the Ti." Judging also from numerous chipped stone implements found in the Tibetan valleys and on passes and plateaus up to 14,000 feet, we should conclude that the house builders came from the valleys.

Although these structures differ much in detail, a land with a scanty rainfall, without timber, but with abundance of clay and stone, may be suggested as the original control. Certain architectural peculiarities, as well as details in the dress of Tibetans and frontier tribes, would suggest a Han Dynasty influence. A comparison of Tibetan architecture, also, with imitation pillars, etc., on the Kia Ling caves might tend to confirm it. But while the Tibetans credit China and Nii Uyag † with giving them works of art and mathematics, laws and specimens of workmanship came from the north *viâ* "Hor and Yugera." The Hor still exist, vigorous and numerous, to-day around Kanzè and Drangu (see 'Jaeschke,' p. 511). The Hor may be the remains of the Yüeh Chī, who in their historic flight from the Huns disappeared in a southerly direction, instead of overrunning the kingdom of Græco-Bactria (Ta Hsia or Ta Ha) like their more enterprising compatriots.‡

The limit of house dwelling by Tibetans may be about 12,500 feet, which is the limit also of any but the hardiest of cereals. On the Litang plain, apart from the lamaseries and castles of the former princes, there are a few score of well-built dwellings of the non-Egyptian type. But we must explain the owners as retainers and other agents of the princes who came from much lower altitudes. The nomads who swarm over the Litang plain are tent dwellers. In June last year these were in sufficient numbers to control 60,000 sheep, 40,000 yaks, and

* Kanzè may be 180 English miles in a north-westerly direction from Tatsienlu.

† The region half circling Tatsienlu is now known as Minyag.

‡ Mentioned in Szema Chien's History of Ta Wau or Khōqand.

2000 horses. The number of savage dogs was not stated, and my vividly impressed imagination refrained from guessing.

J. HUSTON EDGAR.

"Jhuming"

With reference to Mr. Mill's paper in the April number of the Royal Geographical Society's *Journal*, I gather that he attributes the system of "Jhuming" to the fact that the soil is too poor to produce yearly crops; but is this the case? This system of cultivation extends eastward from Assam across northern Burma to the borders of China and northward to the edge of Tibet. In the Kachin and Black Maru countries of the 'Nmai Kha (eastern branch of the river Irrawaddy) the land is cultivated once only in five to eight years, the explanation given to me being that after one crop has been reaped, the ground becomes so choked with weeds, chiefly sedges and grasses, that it is easier to prepare a new piece of ground than to clear the old piece. As the jungle grows the trees and bushes gradually kill out the weeds, and when this is accomplished the ground is again ready for "jhuming," or, as it is called on the Burma side, for "Toungyah" clearing.

It would be interesting to have a sketch-map showing over what area of country this system of cultivation is in vogue; to the best of my recollection, it extends from the mountains forming the boundary of Burma and Assam as far as the valley of the Salween. I do not remember having met with it in the hills between Assam and Bhutan, nor in China or the Shan States.

Then, again, regarding the ethnography of these people. According to Kachin legends, the original home of man was Tibet. When the country became overpopulated the Creator sent for the headmen of the various tribes and told them they must migrate down the valleys of the following rivers, viz. Brahmaputra, Mali Kha, 'Nmai Kha, Salween, Mekong, Red River, and Yangtze Kiang, and to each headman he gave a separate language written on strips of parchment. The Kachins maintain that their forefathers lost their way in the snows, and dying of hunger boiled their strips of parchment to make soup. Hence they lost the art of writing and have never been able to regain it.

The main lines of migration down the above-mentioned rivers have been cut across by other migrations, such as that of the Shans to the Hukong Valley and the Chinpaw Kachins as far west as Sadiya in Assam, where they call themselves Singphos. I could make myself perfectly understood by the latter tribe, though they remarked from my accent that I must have learnt the language in Burma.

ELDRED POTTINGER,
Lieut.-Colonel (retired).

The Geographical Journal

Vol. LXVIII No. 6 December 1926

EXPLORATIONS IN THE KARAKORAM

Ph. C. Visser

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° 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 thoe 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 ½ 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.

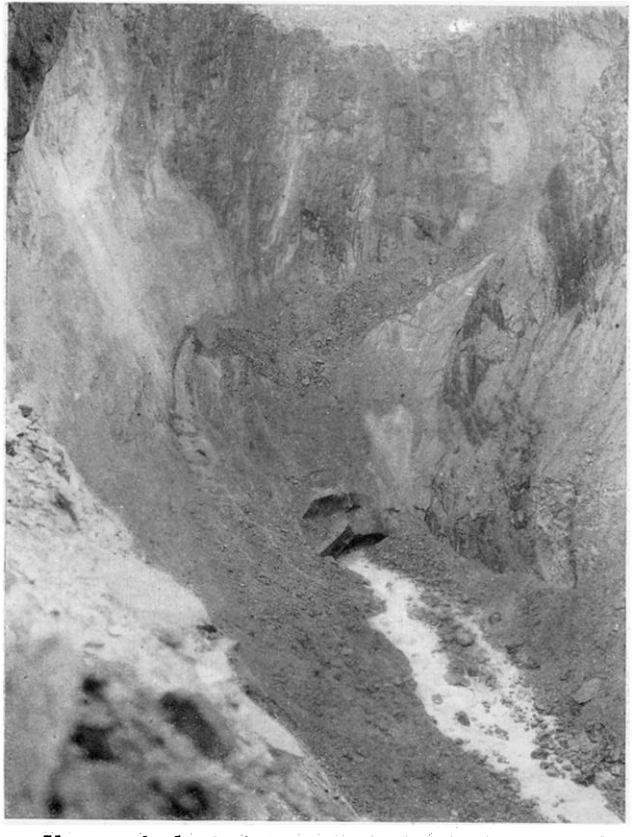
At intervals we found groves of trees and shrubs; higher up there was a plentiful Alpine flora.

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 1½ 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.

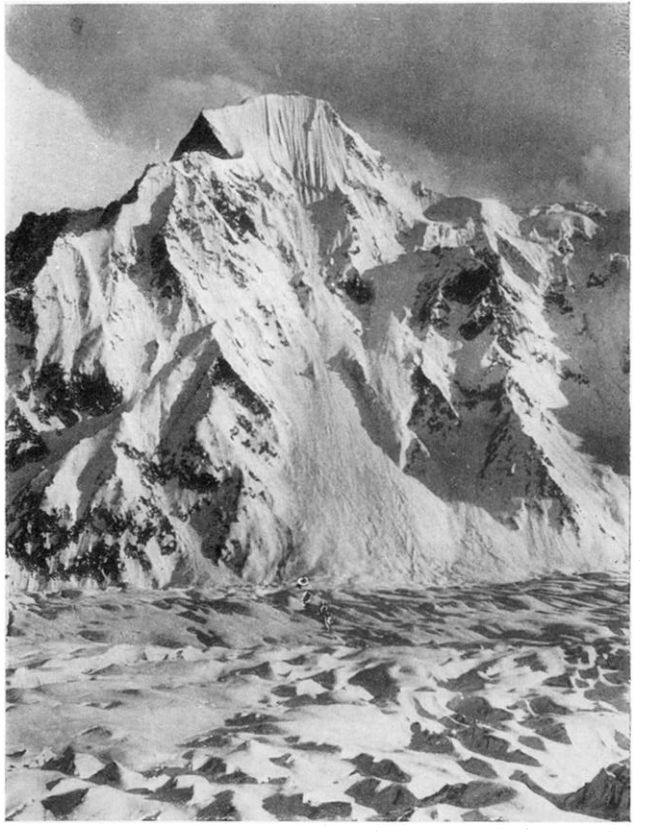
The height of the pass was, according to our aneroid, about 18,000 feet. There probably is a pass between the Bara Khun valley and the Karachukor valley. One of the northern side valleys of the Bara Khun led by an easy way up to the ridge. In this valley we had seen camp fires in the evening, which showed 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.

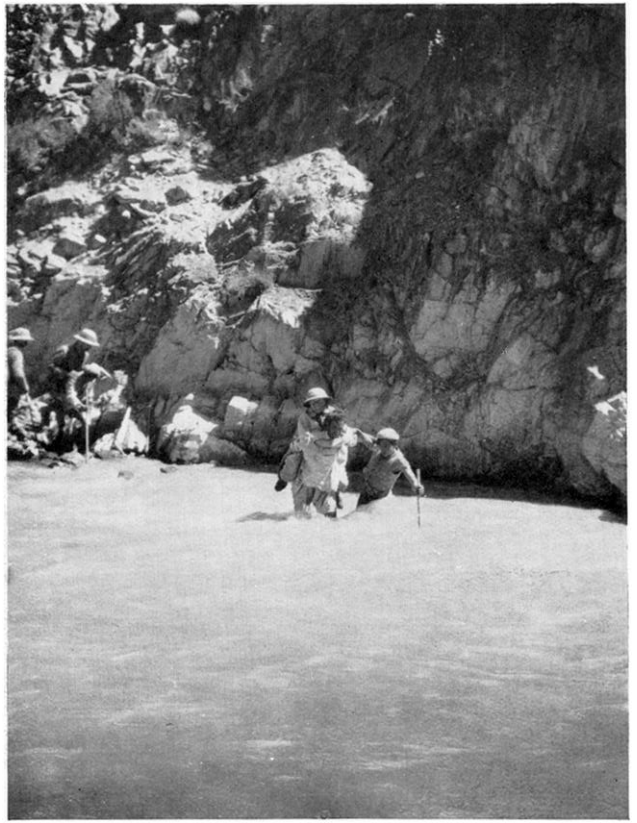
A Shingshali who accompanied us said that he knew of a way to the



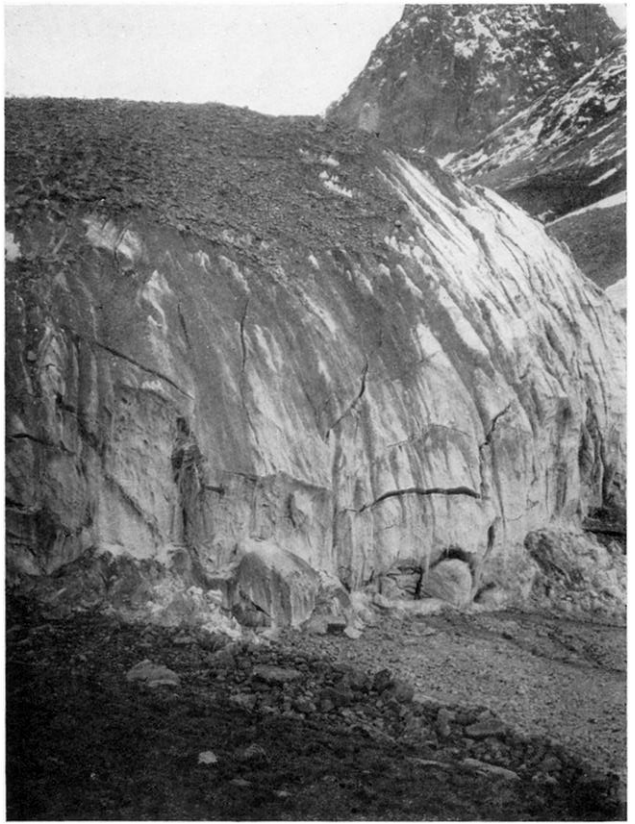
1. *Hassanabad glacier, from a point recently covered by the ice*



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



3. *One of the twenty crossings of the Khunjerab 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.

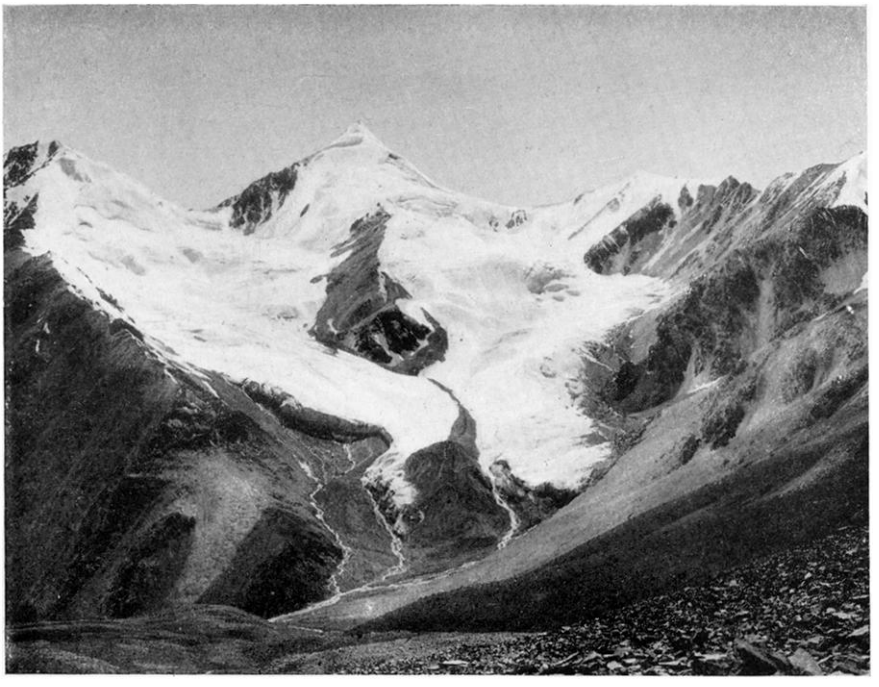
On the first march beyond Shingshal we crossed a great glacier which the natives called the Yazghil, flowing from the south and reaching right across the Shingshal valley. The head of the valley was entirely filled by another great glacier, the Khurdopin.

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.

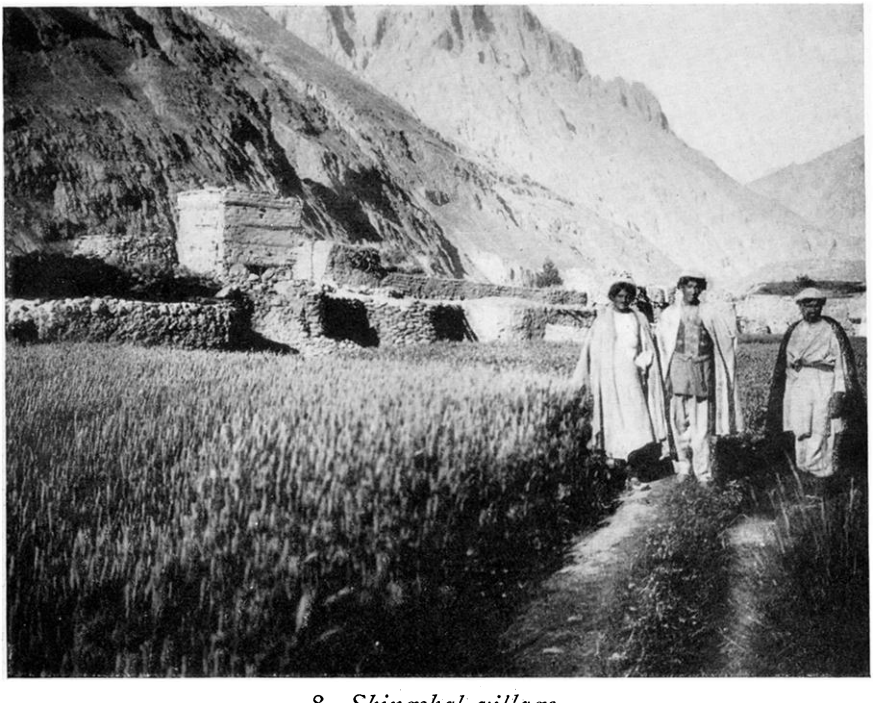
Very typical of the Khurdopin was the series of beautiful little glacier lakes, which, although extremely picturesque, are a source of great danger. We were also struck by the curious little valleys between the glacier and the mountain side, to which I have given the name of moraine valleys. We had already 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 1½ 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.

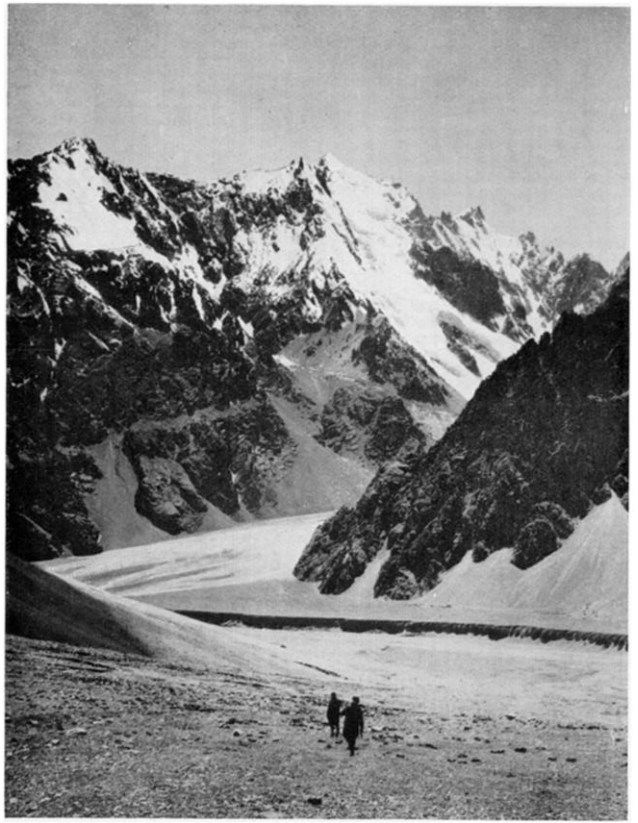
This lake might be compared, although on a larger scale, to the well-known Märjelen See in Switzerland. The inhabitants of Shingshal appeared to be aware of the danger which thus threatens them, and the flood which years ago almost completely destroyed the entire village, nearly certainly found its origin 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.

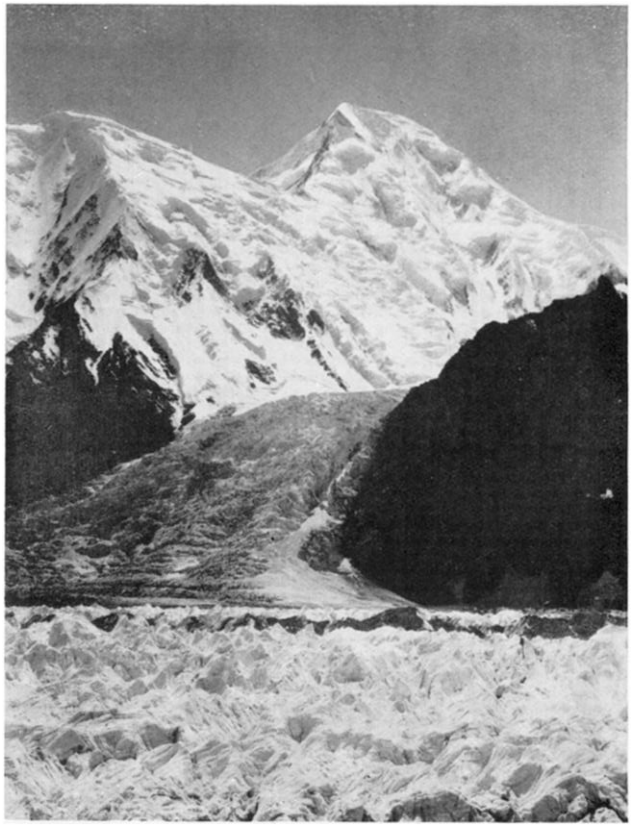
It is unnecessary to point to the fact that the question of food supplies for a comparatively big caravan in these uninhabited desert regions of the high mountains, where all progress is extremely difficult and dangerous, is a problem which causes considerable anxiety. Nevertheless we had been able to 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.

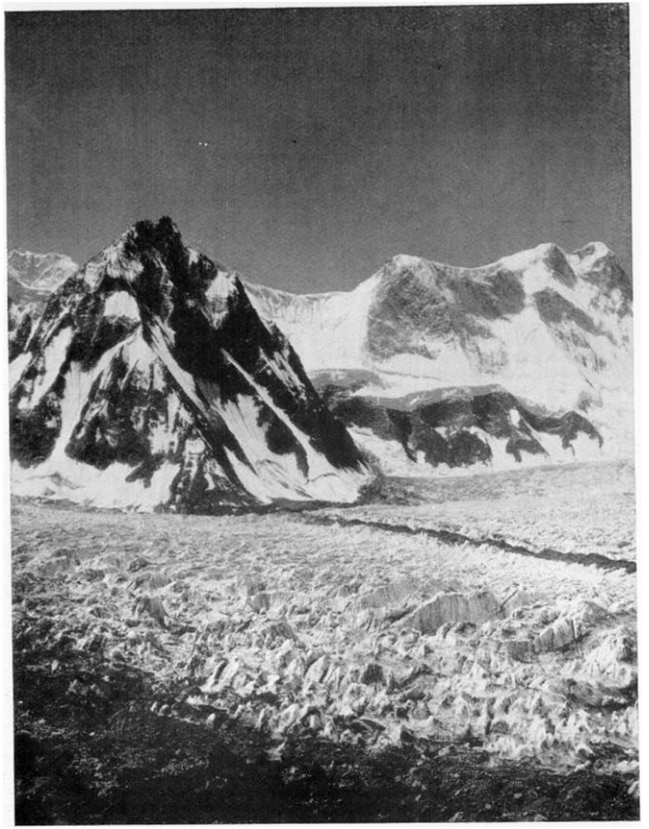
We penetrated three marches up the glacier in the immediate vicinity of the great peak, but owing to bad weather were forced to return to the



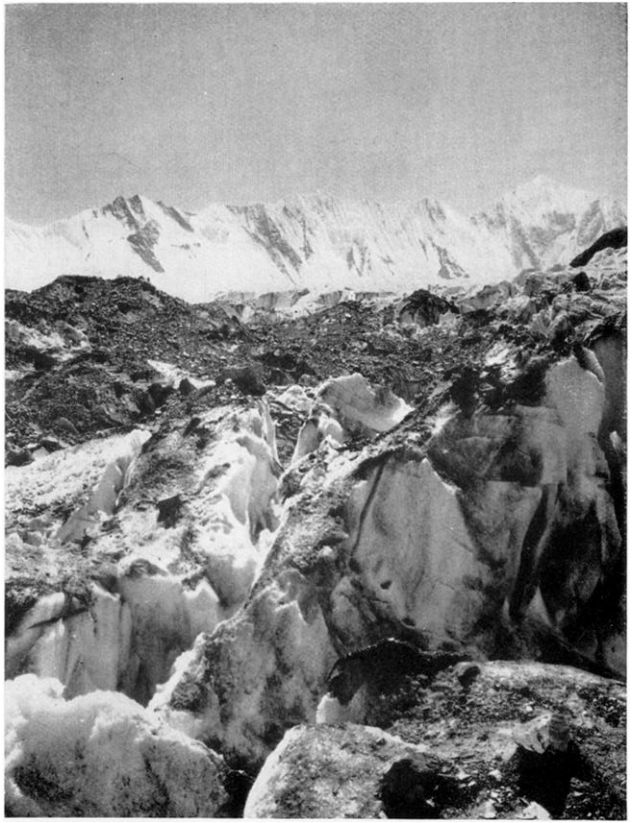
9. *Zardigarbin valley, northern tributary to Shingshal valley*



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



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.

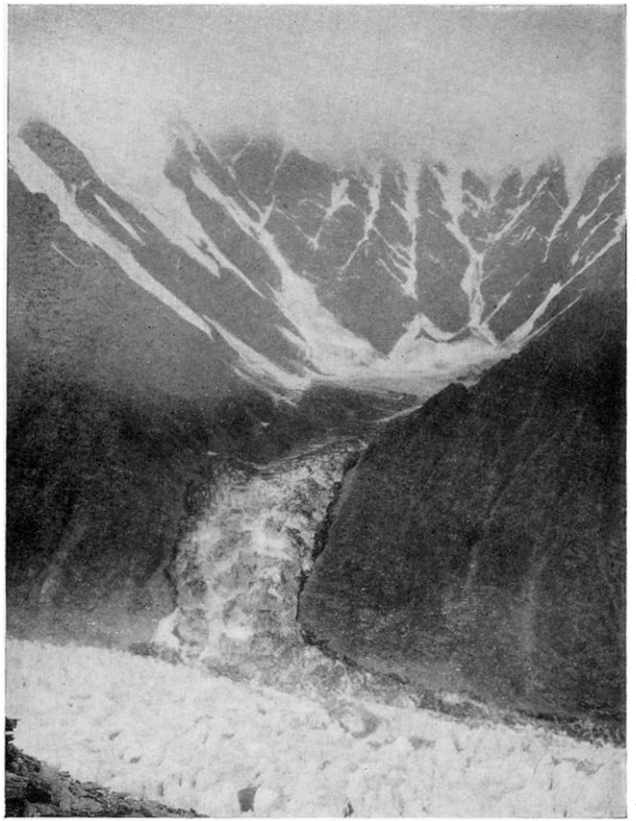
The Survey of India places the Batura in the Hindu Kush, but it is more accurate to consider this southern boundary, geographically as well as geologically, as belonging to the continuation of the Karakoram, through which the Hunza river has forced a way. It is as yet impossible to know exactly how far 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.

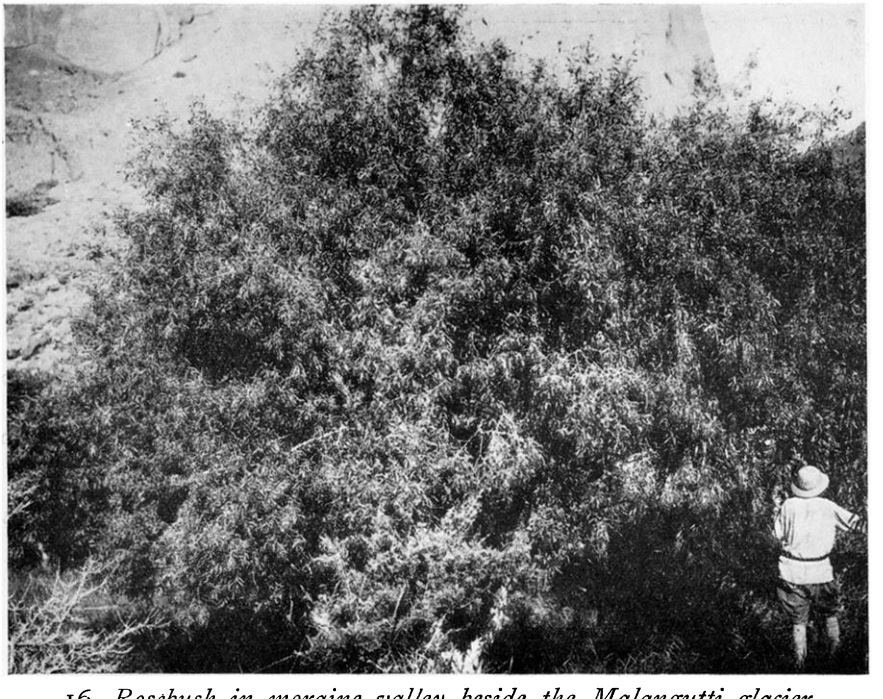
If such should prove to be the case one can only be more impressed than ever by the enormous volume of these masses of ice, that withstand the burning heat of the summer in the valleys to such a degree that the ice descends right into the Hunza gorge, which is as low as 8000 feet, blocking the entire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



13. *Yazghil 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.

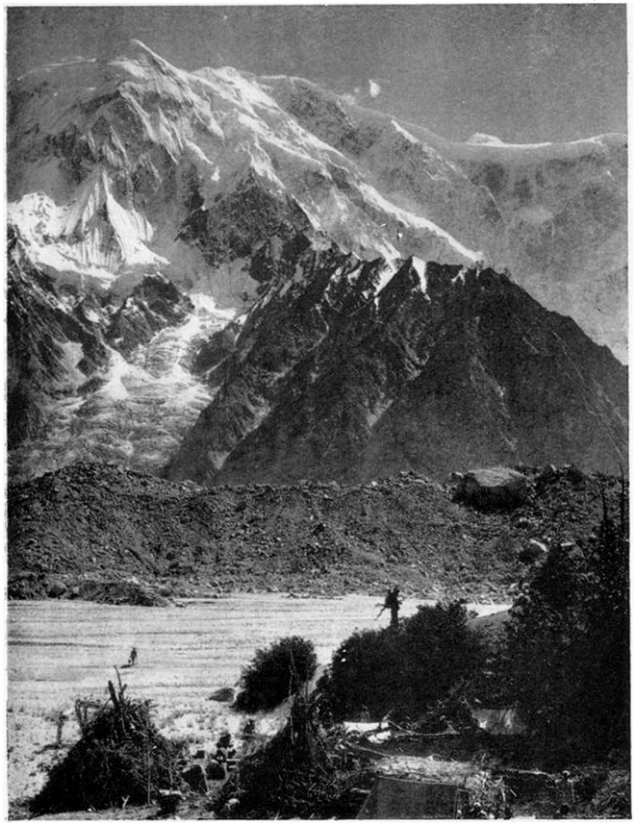
According to the practice of the Royal Geographical Society and the Survey of India, the names indicated on the map are those used by the inhabitants, and the local names are the only ones which have been given. For important unnamed peaks, passes, etc., we propose that such names should be given as 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."

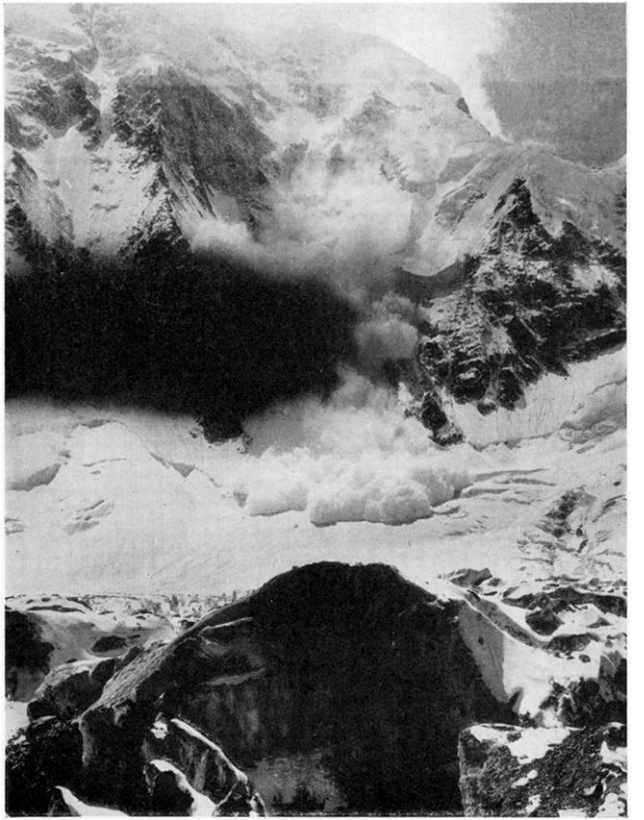
Before the paper the PRESIDENT (Dr. D. G. HOGARTH) said: We now proceed to the main business of the evening, the interesting and exciting experience of hearing an account from Mr. Visser of the remarkable expedition from which he and Mrs. Visser have just returned. At the same time, we assist at the 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*

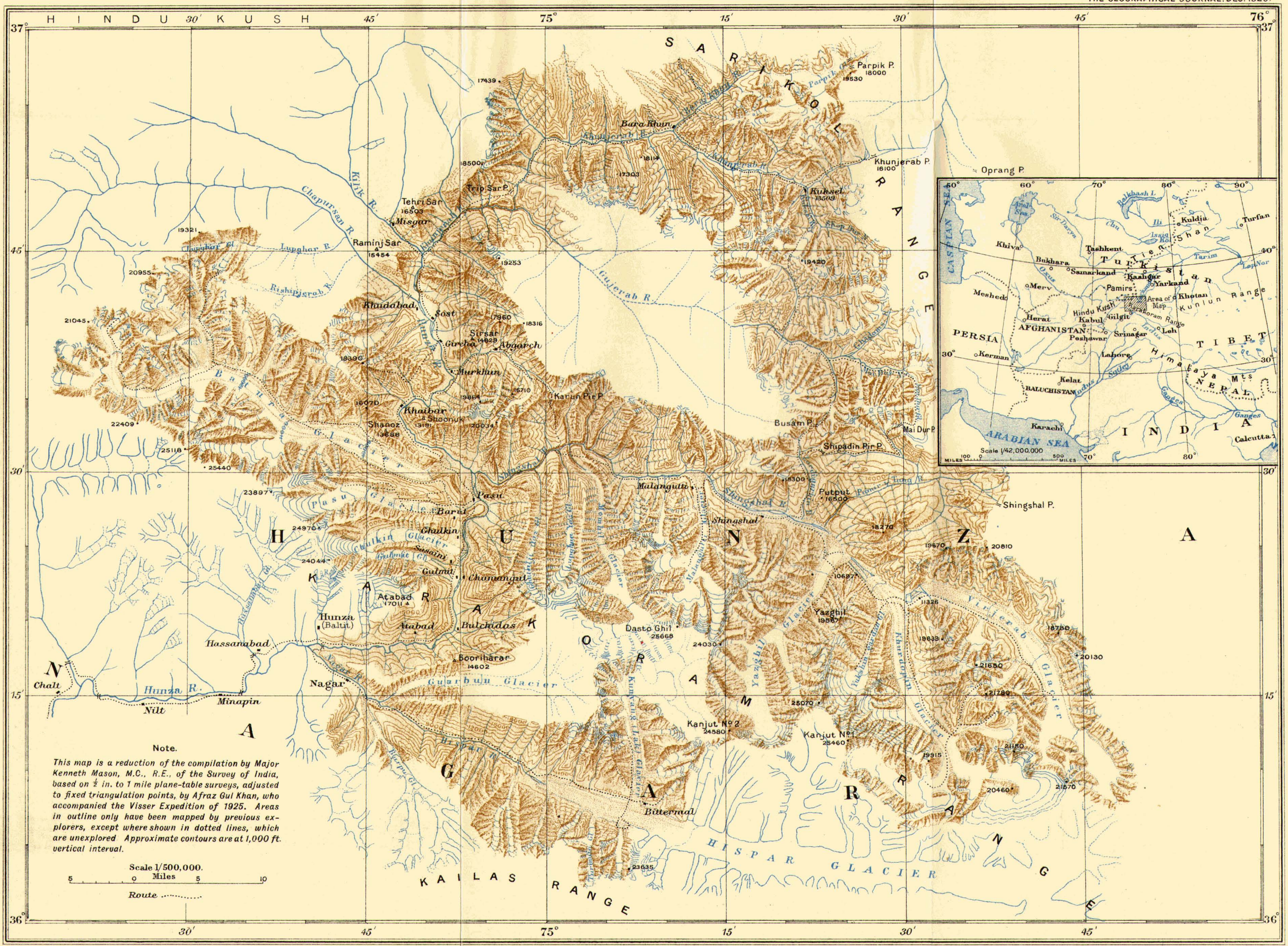


20. *Snow avalanche, Batura glacier*

Map to illustrate the paper on

EXPLORATIONS IN THE KARAKORAM

By Ph. C. VISSER



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THE KARAKORAM
Visser

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EXPLORATIONS

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Note.

This map is a reduction of the compilation by Major Kenneth Mason, M.C., R.E., of the Survey of India, based on ½ 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.

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Map to illustrate the paper on

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5 0 Miles 5 10

Route .....

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THE KARAKORAM
Visser

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, Gujerab, 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 Younghusband 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 Younghusband, 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 Younghusband, 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.

meetings, and often brought his wide experiences and ripe judgment to bear on the subject under discussion. He was elected to the Geological Society in 1890, served on the Council several times, and was President in 1918–20. He was made a Fellow of the Royal Society in 1905, and served on the Council in 1914–16. He was President of Section C of the British Association in 1906, Past-President of the Yorkshire Naturalists' Union, of the Hull Geological Society, and of the Hertfordshire Natural History Society, and honorary member of several other societies. He received from the Geological Society a part of the Lyell Fund in 1891, the Bigsby Medal in 1901, and the Society's highest honour, the Woollaston Medal, in 1925. A. S.

CORRESPONDENCE

Ukhaidir

THE sympathetic and interesting obituary notice of Gertrude Lowthian Bell in the October number of the *Journal* contains a serious mistake. It was not "one of the German excavators of Babylon" but a French archæologist, M. Massignon, who anticipated by so short a time her examination of the palace of Ukhaidir, as will be found by referring to her own note on the subject in 'Amurath to Amurath,' p. 148.

H. DEVONSHIRE.

Maadi, Egypt,
22 October 1926.

[I am grateful for this correction of my confusion of the German excavators, who anticipated a *second* visit of Miss Bell's to Ukhaidir in 1911, with M. Massignon, who anticipated her *first* visit. I take this opportunity to correct another mistake of mine. Miss Bell took her First Class at Oxford in 1888, not 1887.—D. G. H.]

"Jhuming"

Mr. Mills will no doubt reply himself to Lieut.-Col. Pottinger's letter on "Jhuming" in the September number of the *Journal*, but I think it can hardly be the case that the system is attributable to a soil too poor to produce yearly crops.

The explanation given to Lieut.-Col. Pottinger that the soil becomes choked with weeds, rendering it easier to prepare a new piece of ground than to clean the old piece, is certainly correct, but it does not go the whole way. I have seen it demonstrated in "Jhums" on the borders of which I have lived for several years, that where the hillside is at all steep, if the weeds and grasses are eradicated in the second year, a soil wash from the heavy rains commences when the binding effect of the weed-roots has disappeared. This soon becomes so formidable that the top soil is carried down to the streams.

Where the soil is contour-terraced as by the Angami Nagas, in the middle of a "Jhuming" country, it proves itself very far from being poor.

The Mikirs of Assam maintain that fifteen years is the optimum period between jhums; but in actual practice the length of time depends on the pressure of population and on the area of land abandoned for "Jhuming" owing to the depredations of tigers. Mikirs will not readily "jhum" an area again in which a village headman has been killed, even where land is scarce.

Yours faithfully,

H. S. L. DEWAR.

New Tining, Catcott, Somerset,
10 October 1926.

I have read with interest Col. Pottinger's remarks on "Jhuming." He remarks that "he has not met with it in the hills between Assam and Bhutan." I may state that it is practised among almost all the hill tribes of the Frontier of Assam. The Lushais, Mishmis, Abors, Galong Abors, and Dufflas.

The Lushais, as Col. Pottinger states, carry out the idea of "rotation" in Jhuming. Their main object however is to convert the forest to bamboo jungle, as easy to fell and easy to burn after being jhumed, and I have seen whole hillsides of bamboo jungle in consequence.

The Abors in British territory confine themselves to rotation, but I believe those outside British influence have been so wasteful in their methods that land is growing scarce and economic pressure is driving them down into the borders of British rule. Hillsides once clothed in jungle are now bare wastes of weeds in Abor country.

I think I may say that Jhuming is practised everywhere in the more uncivilized hill tracts of Assam.

As the hill people become educated to less wasteful methods they begin to turn to the idea of "wet" rice cultivation, largely practised by the Angami Nagas of Assam as described by Dr. Hutton. Demonstrators of this method were sent up to the Abor Hills to teach, but with poor results.

H. I. HALLIDAY.

Laminhuri P.O., N. E. Frontier, Assam.
2 October 1926.

With reference to Col. Pottinger's letter in the September number of the *Geographical Journal*, the system of "Jhuming" or "Taungya" cultivation extends over a very much wider area than that mentioned by him.

It extends throughout the whole length of Burma down into the Malay Peninsula and as far east as Annam.

With regard to the Shan States, the subject has been discussed in the August and September numbers of the *Indian Forester* for 1913. The developments in the Shan States of this system of cultivation are extremely interesting as they exhibit all stages from the purely migratory methods of the Lahü (Mühsö) in Trans-Salween territory, through the almost scientifically regulated rotations of the Padaung and Bre in Bawlake and Möng Pai states, up to the permanent settled methods of the Taungthu and Taungyo in the Myelat, which have become a system of open field cultivation with a long fallow period.

While the growth of weeds as the reason for the abandonment of the land after taking one or two crops is undoubtedly correct for many areas, the need of manure in the shape of wood ash and the aeration and flocculation of the soil by the actual burning which necessitate the accumulation of a woody crop to burn are equally important reasons.

So well is "taungya" cultivation in Burma established as an agricultural system that it has been adopted there and elsewhere as one of the most useful methods of forming forest plantations by following the lines of the German method of Wald-Feldbau.

W. A. ROBERTSON,
Indian Forest Service.

Lake House, Maymyo, Burma,
4 October 1926.