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EXPLORATION IN THE MUSTAGH MOUNTAINS.

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THE long accounts of our passage of the Hispar Pass and ascent of Pioneer Peak, which appeared in the monthly publications of this Society in November and February last, render it unnecessary for me on this occasion to deal with those features of our journey with the minuteness which they might otherwise demand. I shall, therefore, devote the time at my disposal rather to a few of the more general results of our observations than to a chronological narrative of our travels.

Before, however, entering upon this task, there are three matters with which it is as much my duty as my pleasure to deal. I refer to the admirable support which I received from my companions, to the potent helpfulness of the Indian Government and its representatives in the regions we visited, and to the work already at earlier periods done in those regions by Colonel Godwin-Austen and Captain Younghusband. My acknowledgments under each of these headings must of necessity be brief; I will ask you to understand that they are by no means merely formal.

The companions with whom I started were Lieut. the Hon. C. G. Bruce, of the 1st battalion of the 5th Gurkha Regiment, Mr. A. D. M'Cormick, the artist, and Mattias Zurbriggen, the Alpine guide. Mr. J. H. Roudeshush and Mr. Eckenstein went with those portions of our party which crossed the Nushik La, but they were prevented by ill-health or other hindrances from continuing with us. Colonel Lloyd Dickin accompanied us to Hunza, but was likewise rendered unable to continue the journey owing to ill-health. I wish to acknowledge very warmly the value of Mr. Bruce's energetic co-operation, and that of the

* Paper read at the Royal Geographical Society, May 8th, 1893. The map embodying the results of the surveys and observations made by Mr. Conway will be published separately at a later date.

four admirable Gurkha sepoy whom he brought with him. The sketches painted by Mr. M'Cormick (a few of which are now exhibited) speak for themselves. He worked with greatest constancy under the worst conditions, and was throughout my most loyal friend. Zurbriggen acquitted himself well of the task he undertook, and proved to be the only really satisfactory travelling guide yet discovered. To Mr. J. H. Roubush's energy whilst he was with us we were also not a little indebted.

The Government of India by giving us permission to visit the Hunza district made our journey possible; by allowing Mr. Bruce and the four Gurkhas to accompany me they gave me notable help. Alike at Abbottabad, Srinagar, Gilgit, Hunza, and Leh we were warmly received by the authorities, English and native. Where all were so kind it is almost invidious to mention names; but I cannot in this connection avoid returning especial thanks to Colonel Durand, Dr. Robertson, and Surgeon-Captain Roberts of the Gilgit Residency.

The only previous explorers of the Mustagh Range to whom I need refer are the two I have mentioned. Colonel Godwin-Austen spent the summers of the years 1860 and 1861 in making the Government map of the southern side of the main range. That was at a time before the Matterhorn had been ascended and before the difficult craft of mountaineering had been fully developed. Indifferently equipped (from a mountaineer's point of view), he penetrated these regions, previously almost unknown, discovered the third of the three great glaciers, and set down the form of their watersheds and the nature of their basins. Had he been permitted to advance to the upper levels of the Baltoro and Biafo Glaciers he would no doubt have rendered my journey unnecessary. I am selfishly glad he did not do so; but, at the same time, I cannot help calling upon you to remember the admirable work that he accomplished, in the face of great difficulties and at a time when the moral repulsion and terror of high mountain regions was incomparably greater than it is now.*

Captain Younghusband's famous passage of the Mustagh Pass, which bears to the Baltoro Glacier the relation borne by the Nushik La to the Hispar Glacier, is fresher in the memory of you all.† It likewise was a great feat, considering the circumstances under which it was performed. The purely mountaineering difficulties encountered were few, but they had to be overcome by a caravan of untrained coolies, who look upon snow not as the natural highway it appears to us, but much as a landsman regards the sea.

I need not delay over any of the earlier stages of our journey. We left Srinagar on the evening of April 13th, 1892, and, following the

* *Journal*, R.G.S., 1864.

† *Proceedings*, R.G.S., 1888.

new Gilgit road, which was almost everywhere buried under snow or avalanches, we crossed the Tragbal Pass. The Burzil Pass delayed us for a few days, as the weather became bad and snow fell almost continuously. Ultimately on April 24th we crossed it in sufficiently evil weather, and thus passed over to the north side of the main Himalayan Range and entered the basin of the Indus. We descended past Astor to the river's banks at Bunji. South of the Himalayan Range the valleys are, on the whole, fertile and the scenery rich. North of it the country is a mere crumpled Sahara. The Indus in its upper course flows through a desert, walled about by barren cliffs of appalling altitude and steepness. Almost the only fertile spots are the oases, few and far between, where the waters of minor streamlets, fed from the snows far aloft, are caught and distributed by artificial canals over a small area of levelled fields. I must ask you to bear this general character of the scenery in mind. The sun beats down into these barren and enclosed valleys with great power. The ground, whether of soft sand or broken stones, is painful and wearisome to the feet. It is a laborious region to march through.

We crossed the Indus near Bunji, and then, following the right bank of a tributary which enters it from the west, we reached Gilgit. The Gilgit Valley may be taken as an example of the action of an agent which I think has not received from geographers and geologists the attention it demands—I refer to the “mud avalanche.” The form of the valley at most points is as follows:—Its sides consist of bare rocky slopes and cliffs, the lower parts of which are buried beneath accumulations of *débris* consisting of stones, as often rounded as angular, embedded in mud. This accumulation of *débris* fills up the valley to a depth of probably from 500 to 1000 feet or more. The Gilgit River flows in a gorge, like a cañon, not so much cut through as built up by this accumulation. The surface of the *débris* has a gentle slope of about 3°. If the valley were filled up in this fashion to a depth of 2000 or 3000 feet more, it would resemble the Pamirs and all the deeply-filled valleys which are characteristic of the Central Asian plateau, from the middle of Tibet on the east to the upper regions of the Oxus on the west. Mud avalanches, I maintain, have done all this work of filling up the valleys, and done it too with great rapidity. The day before we reached the foot of the Hispar Glacier I was fortunate enough to see one of these avalanches falling. I will read you an extract from my journal written on the spot (July 8th): “We were just approaching the mouth of a deep, narrow nala that crossed our path when we heard a noise as of continuous thunder, and beheld a vast black wave advancing down it at a rapid pace. Some accumulation of water had got loose high aloft, and the flood was bringing the hill down with it. When we reached the edge of the nala the main mass of the stuff had gone by and only a thick, black stream of mud was rushing swiftly past. This became by

degrees more liquid until it was no longer mud but black water. We waited for some time till the waters subsided. At length Harkbir found a way across the torrent by leaping from stone to stone. We had begun to follow him when Karbir, who was looking up the nala, shouted to us to come back, which we did with the nimblest feet. We were not more than out of the ditch before another huge mud avalanche came sweeping down. It was a horrid sight. The weight of the mud carried huge masses of rock down the gully, rolling them over and over like so many pebbles, and they in turn dammed back the muddy torrent and kept it moving slowly with accumulating volume. Each of the big rocks that formed the vanguard of this avalanche weighed many tons; the largest were about 10 foot cubes. The stuff that followed them filled the nala to a width of about 40 feet and a depth of about 15 feet. The thing moved down at a rate of about 5 miles an hour. When the front of the avalanche was gone, and the mass of stuff became shallower, the mixture was about half mud, half rocks, and flowed faster. Now and again a bigger rock than the average would bar the way; the mud would pile up behind it and presently sweep it on. Looking up the nala we could see the sides of it constantly falling in and their ruins carried down. Three times did the nala yield a frightful offspring of this kind, and each time it found a new exit into the main river below, and entirely changed the shape of the fan. The third avalanche was the largest of all, and fortunately left a massive causeway of stones, reaching almost across the nala at our very feet. Some big fall must presently have taken place higher up and dammed back the waters, for the stream ran almost dry, and we were enabled to cross the gully without difficulty, coolies and all."

It must be remembered that this fall took place into a gorge. Had it happened in an opener part of the valley the avalanches would have spread about all over the floor. Every gully we crossed, about that time of year, showed the clear signs of having been swept by a similar discharge, and the same was the case later on, where we came upon dried-up traces of mud avalanches in all the gullies that feed the Braldu River near Askole.

Mountaineers know that, early in every year, all the main gullies of every region of snow-mountains discharge, each one, a snow avalanche into the depths below. Similarly, in the desert ranges of Asia, mud avalanches appear to be annually discharged by all the gullies which reach up to the snow region and traverse the barren levels beneath. Rapid aerial denudation, the extraordinary activity of which has been observed by all travellers in the desert belt of the world, annually provides the materials for these discharges. Assuming that one of the avalanches we saw travelled at the rate of only 7 miles an hour (= say 200 yards a minute), and took only seven minutes to pass any point, it would be 1400 yards long. Call its average width

only 8 yards, and its average greatest depth only 2 yards, it would consist of over 10,000 cubic yards of stuff. Suppose three-fourths of this to have been water, you get 2500 cubic yards of *débris* discharged by one of these avalanches, and we saw three come down a single gully, where others had fallen before we arrived and others fell after we left; 15,000 cubic yards is a low estimate (I believe 50,000 would not be an over-estimate) for the fall of that one day down that single and relatively small gully. One gully of this sort to every mile of a valley is a minimum computation, taking both sides into account. You will see, therefore, what a powerful element mud avalanches must be in determining the physical features of this region of the Earth.

Arrived at Gilgit we found the condition of the mountains, from a climber's point of view, too backward for our purposes. We therefore spent a month in mapping and exploring the fine Bagrot Valley, which slopes southwards from Rakipushi and his immediate neighbours along the main ridge. We hoped to be able to force a passage over this ridge into Nagyr; but persistent bad weather balked our efforts when they were on the point of succeeding. I shall not further linger over this portion of our journey except to say that, for richness of wooded foreground and pleasant grassy slopes, the Bagrot Valley was the only one we visited which can compare—not in dignity, but in charm—with the rich valleys of the Alps.

We returned to Gilgit and set forward on June 8th for the secluded and rock-bound valley of Hunza-Nagyr, which had been effectively brought within the boundaries of the British Empire by the gallant expedition of the preceding December. Hunza is the name of the principality on the north bank of the Hunza River, Nagyr the name of that which faces it from the south bank up to the parting of the streams, where Nagyr has a river of its own, fed by the melting of the Hispar and other great glaciers of the region surveyed by me. These little principalities have been so admirably described by Mr. E. F. Knight in his recently-published book, entitled, 'Where Three Empires Meet,' that I am absolved from doing more than referring you to the pages of that work for information. I can assure you it is well worth reading. Mr. Knight, however, only saw this remarkable valley in the winter; it is imperative, therefore, that I at least allude to its astounding magnificence in kinder seasons of the year. When the traveller has emerged from the inhospitable defiles which sunder it from Gilgit, and has climbed the vast ancient moraines near Tashot, which form the final rampart of the fertile basin (fertile, of course, only by reason of artificial irrigation of admirable complexity and completeness), he stands surrounded by an astonishing view. The bottom of the valley is, as usual, deeply filled by *débris*, whose surface is covered by terraced fields, faced with cyclopean masonry, and rich with growing crops and countless fruit-trees. The mountains fling themselves aloft on either

hand with astounding precipitancy, as it were, into the uttermost heights of heaven; so steeply, in fact, that a spring avalanche falling from the summit of Rakipushi on the south must almost reach the bottom of the valley, whilst I myself saw within a short distance of the houses of Hunza town (Baltit) the snowy dust of a great avalanche, which descended grandly from near the top of the noble peak that rises close behind the place. Rakipushi is 25,500 feet high; the Hunza peak is about 24,000 feet high. Their summits are separated by a distance of 19 miles. Both mountains are visible from base to summit at one and the same time from the level floor of the valley between them, which is not more than 7000 feet above the sea. No mountain view that I saw in the Mustagh surpasses this for grim wonder of colossal scale, combined with savage grandeur of form and contrast of smiling foreground.

I have not yet been able to discover exactly what area of the Hindu Kush is covered by the name Karakoram or Mustagh. The name is generally written on maps in a more or less northerly and southerly direction, but there is no range that lies in that line. All the ranges of this region of the world lie in parallel lines one behind another, running from somewhat south of east to somewhat north of west. One such range stretches from Rakipushi all along the south side of the Hispar Valley as far as the Hispar Pass; a second, north of it, forms the north bank of the Hispar Valley, and includes the great Hunza Peak. Yet a third further north is unsurveyed; it separates the upper region of Hunza, called Gujal, from the Taghdumbash Pamir. The Hunza River rises in this range and flows at first southwards. It cuts through what I may call the Hunza Range, and then joining the Nagyr River, the two flow westwards in a united stream, which, after passing Rakipushi, turns south again, cuts through the Rakipushi Range, and joins the Gilgit River near Gilgit. The Gilgit River flows about east till it joins the Indus, which in its turn, now flowing somewhat west of south, cuts through the main Himalaya Range in the recently-pacified country of Chilas. It is a remarkable fact that each of these rivers cuts through its range close to one of the very highest elevations and apparently at one of the most unpromising points—the Hunza River, near the Hunza Peak, the united Hunza-Nagyr River near Rakipushi, the Indus River near mighty Nanga Parbat. These successive cuttings, forming a continuous series of valleys, and leading ultimately to a group of relatively low passes, point to the Hunza route as the natural line of communication, in the possibly distant future, between the Central Asian plateau and the southern seas.

We spent the month from June 10th to July 10th in either Hunza or Nagyr, at points between Chalt and Hispar. During that time we were only able to make two at all considerable climbs, for the weather was continually bad, and frustrated all my attempts. This evil condition of

the weather was my greatest disappointment, for though the mountains about the Baltoro Glacier were famous for frequent storms, we had been led to believe that the neighbourhood of Gilgit was a centre of almost unvarying fine weather during the hot season. The commonly-received theory is that the south-west monsoon drops all its moisture upon the southern slopes and main crest of the Himalayas, and passes dry over the desert area beyond. This is far from being the case, at all events at the west end of the range. The average altitude of the Himalayas in Kashmir, is, I believe, not above 19,000 feet. It is probably the case that the lower levels of the air current are dried up to a considerable altitude; but there is plenty of aqueous vapour left higher up. It is a common experience in the Alps that mountaineers are found complaining of continuous bad weather, whilst valley travellers are boasting of their good luck. The damp air only discharges its moisture in the immediate neighbourhood of snowy peaks. When drifting over valleys the clouds melt away and the blue sky appears. Thus, too, it is all over the Upper Indus Valley and its tributaries. The sun pours down into their depths through a cloudless heaven, but the snowy mountains are all the time draped in heavy clouds, and deep falls of snow are constantly taking place upon them. For seven days out of eight during the summer season there was a steady aerial drift passing over our heads from the south-west or south-south-west. Now and again for a day, or possibly two days, a strong gale would blow from the north and make the sky perfectly clear, but the south-westerly drift would soon return. It was not always snowing when the south-west wind blew; two or three days would now and again be clear; then a faint fleck of cirrus would appear; it would not long remain solitary: bright battalions of tiny cloudlets would soon be passing overhead. Gradually they melted together into a flat roof of mist lying at an altitude of from 20,000 to 24,000 feet, through which the sun would shine with an added venom of heat. This film would in time condense into clouds, and others would simultaneously form upon the upper crests, and the conditions would gradually worsen till snow was falling heavily, down to a comparatively low level. After two or three days, or perhaps a week, there would set in a leisurely improvement, and a brief spell of fine weather would again intervene. This kind of thing lasted throughout the months of May, June, July and August. The first part of September brought the worst weather of all, after which the sky permanently cleared, but too late to be of any service to mountaineers, for with the fine weather terrible cold reigned aloft, coupled with strong winds and short days.

Having been beaten back on June 24th from an attempt to reach the Bagrot Pass from the north, we returned to Nagyr, and started inwards towards the wholly-unknown region. We heard that there was a large cultivated basin, called Hopar, that lay on our way; but we could not understand how it was situated. We left Nagyr behind on June 27th,

and in a mile or two came to the foot of the Hopar Glacier. This glacier was once joined by the Hispar Glacier, and their united moraines were deposited at Nagyr, the town being actually built upon their crest. Now the foot of the Hispar Glacier has retreated some 20 miles into the mountains. The Hopar Glacier is greatly shrunken in width, and in its shrinkage it has left a fine, almost level area beside its left bank, which is covered by the fields of Hopar. Hopar consists of six flourishing little villages. It is surrounded on two sides by glacier, and on the third by steep hills. Close to it the glacier divides into two considerable branches, one flowing from the south, the other from the east. We advanced up the latter, which is called the Barpu Glacier, and made a camp at the picturesque alp of Barpu, whither the Raja of Nagyr sends his horses to graze.

We were delighted to find an enormous and almost unsuspected series of glacier basins above Barpu. In order to get some idea of them, we spent a day mounting to the crest of the ridge north of our camp which divides Barpu from the Hispar Valley. From the crest of this ridge we looked southwards, straight up a noble stream of ice, descending from the 24,000 feet peak, which stands on the main watershed. This branch of the Barpu Glacier is called Shallihuru Glacier. Another main branch descended towards us from a set of great peaks to the east, situated at the head of the Chogo Loomba Glacier. One of the peaks at the head of the Shallihuru Glacier invited attack, and so we mounted towards it during two days. For a long distance the ice descends in a continuous ice-fall. We fought our way almost to the top of this, but were at last beaten by a narrow belt of shattered ice, over which we could throw a stone, but through which we could not force a way. We worked at this detail for six hours without success, and then had to give it up, and content ourselves with ascending a minor peak on our right hand. The following day we retraced our steps to the foot of the ridge that divides the Barpu and Hispar valleys. Next day (July 7th) we crossed this ridge, sending the coolies in charge of Mr. Roudebush by a lower pass, whilst the rest of us crossed higher up by a col that just reached the snow-level at a height of about 16,000 feet. On this occasion we were blessed with superb weather, and we were in the midst of superb scenery. As we mounted the view developed; the great glacier basins below revealed their distant recesses, and the cirque of giant peaks behind, all white with *nevé*, reared themselves aloft against the blue sky and showed the smallness of their outlying satellites, which had seemed to rise so high above us from our camps. The sun blazed upon us with unusual fury, and when we reached the col, near which there was a frozen lake, caught in the lap of the ridge, we were glad to hurry under the shadow of a great rock. The view on the other side was of peculiar interest to us, for we looked for the first time into the Hispar Valley and beheld the long avenue of peaks that

lined the way up the Hispar Glacier towards the unknown snowy regions through which lay our intended route into Baltistan. Turning to our left and looking down the valley the Hunza Mountain and his neighbours still saluted us, majestic in form as ever. When the sun began lowering in the west all the sky was filled with mellow light, wherein the snowy ranges seemed almost to hang suspended. We turned unwillingly to descend. The form of the hillside fortunately drove us down westwards towards the sunset, and, just as night came on and one bright star looked out over the shoulder of the Hunza Peak, we came to a level grassy alp where our tents were awaiting us ready pitched. That was the most beautiful day we had in the mountains—the most beautiful, and for scenery the most varied. The following was our worst.

We had to descend into the depths of the Hispar Valley and mount along the side of its raging torrent. There was again no cloud in the sky, and the power of the sun was greater than ever. The precipices seemed to gather the heat and concentrate it upon us. The path, where there was any, was the very worst possible. Often there was no path, and we had to traverse dangerous cliffs overhanging the boiling torrent. The valley was utterly barren, there was seldom a rock to cast a moment's shade. Sometimes we had to stumble over dreary slopes of fallen stones, sometimes to plod through soft beds of sand, sometimes to scramble across rotten *parris*. The only water to drink was the black filth that the river was hurrying along, and that was seldom accessible. When we could get at it we drank it by hatsful, and filled ourselves up with mud. We had no food with us, and could get none till we reached the village of Hispar. An hour's march below the village we were stopped by the series of mud avalanches previously referred to. They delayed us for nearly three hours. At last the hateful sun went behind the hill, flies ceased from troubling, and with the peaceful evening came our well-earned repose. Two days later (July 11th) we started to cross the Hispar Pass. Bruce and Eckenstein were already over the Nushik La. Roudebush in his turn, conveying all our spare baggage, followed the same (or, rather, a similar) route. M'Cormick, Zurbriggen, and I reached the summit of the Hispar Pass on July 18th, and Askole on the 26th, our slow progress being caused by the exigencies of the survey in weather that was oftener bad than fair.

We left Askole on July 31st and returned to it again on Sept. 5th, the intervening time having been spent over our expedition up the Baltoro Glacier and the ascent of Crystal and Pioneer Peaks. On Sept. 7th we crossed the Braldu River at Askole, and began the ascent of the opposite hillside. On looking across the river to the path from the foot of the Biafo Glacier we saw an immense column of dust rising into the air. A great thundering arose from within it, and we soon per-

ceived that it was caused by the fall of a mass of rock, which was bringing down with it a dry avalanche of chips. The great rock came to a halt close to the path, in the neighbourhood of a number of other rocks, which had attracted our attention as we passed. They averaged about the size of a cottage, and the newcomer was as big as most of its predecessors. We camped for the night at a bleak alp, and crossed the Skoro Pass next day in abominable weather. I thought it evident that the pass must be over 17,000 feet high, and the estimate was confirmed when we set up the barometer (15·91 in. Air T. 36°). From my observation the altitude comes out 17,400 feet: 17,000 feet is the mean of Col. Godwin-Austen's boiling-point and my barometric determinations. From the amount and condition of the snow we passed over I think that this is below the truth. The north side of the pass affords a steep but easy scramble. We lunched at the foot of the cliffs, and the remainder of the way led us down a series of gorges, where we had constantly to be wading across the stream from one side to the other. At sunset we emerged into the fertile Shigar Valley, and encamped within the boundaries of the village of Askoro. The next day we strolled to Shigar along pleasant paths, with fields recently harvested all around, village succeeding village at brief intervals, all embowered in well-grown trees.

To our eyes, accustomed as they had been for months to the wildness of barren rocks and the chastity of snow, the smiling landscape into which we had so suddenly emerged seemed beyond measure luxuriant. The air, too, was full of colour, and bathed all nature in its tender glow. Busy peasants, driving oxen to tread out the corn, and singing as they drove, made the fields animated and musical. Birds twittered among the trees, butterflies flitted about in countless numbers, and we walked along as in a dream. The picturesque architecture of the group of mosques in the principal village of Shigar showed that we had returned to regions where men have leisure for art. Next morning (September 10th) we embarked on a skin raft, which carried us down the Shigar River to the Indus. We landed, and in half-an-hour reached the scattered villages of Skardo, capital of Baltistan. Of our journey from Skardo to Leh to verify our instruments, and from Leh back to Srinagar, it is unnecessary to speak. We reached Abbottabad on October 28th, exactly seven months from the day on which we left it.

I have been warned that, in addressing the Royal Geographical Society, I should avoid descriptions of mountaineering and too much reference even to mountain exploration. I have endeavoured, as far as possible, to follow this advice. Before concluding, however, I make bold to transgress into the region of prophecy, and to affirm that it is the destiny of this Society to hear much more of mountains in the future than it has heard in the past. The great bulk of the habitable parts of the world and even of the traversable deserts have

now been explored. There are few flat areas of any great extent that remain to attract the adventurous. The abodes of snow, polar and mountainous, alone stand forth to challenge exploration. It is not in the nature of man to decline that challenge. Nor is it likely that you will refuse to listen to the reports of the travellers who accept it. Your destiny is, I think, assured. The world's great mountain ranges are the workshops where continents are formed and renewed. There nature's forces are beheld in grandest activity. Few indeed of these workshops have been investigated by man with any approach to completeness. Most mountain ranges are not even mapped. The Alps, indeed, are now well known. Mr. Freshfield and his successors have done much towards the investigation of the Caucasus. In the Andes of Ecuador Mr. Whymper showed how to organise and carry out with completeness of success a journey of exploration in a distant and (Humboldt and others notwithstanding) practically uninvestigated mountain range. My desire and attempt was to follow Mr. Whymper's example and to work on the lines he had laid down. Future travellers will be able to do much more in the same length of time than was accomplished by our party.

The question of equipment is all-important for mountain travel, where everything carried must be the lightest possible. Our equipment was good as far as it went, but it can be much improved; and with improved equipment greater efficiency can be and will be attained. In due season the ranges of Central Asia will receive the attention they demand. They will be mapped—which at present none of them are from a mountain student's point of view, just as an ocean is not mapped when you have fixed its shores, but only when you have sounded its depths. Their glaciers will be explored, their peaks will be climbed—peaks far loftier than any whose summits we were able to reach; and when this has been done, and a knowledge of the nature of the foldings and wrinklings of the Earth's crust has been attained, it will be found that the work was, from a scientific and geographical standpoint, just as well worth doing as the work of exploring any region of the world suited to be the home of man.

Before the reading of the paper, the President, the Right Hon. Sir M. E. GRANT DUFF, made the following remarks: Many of you have become well acquainted with the recent journeys of Mr. Conway through the very interesting papers which have appeared in our *Proceedings* and in our *Journal*, but before Mr. Conway went to India, he had made a very considerable reputation amongst mountaineers by his travels in the Alps, and by the works he has written upon them. He has also travelled in many other parts of the world, especially in Egypt, studying the artistic side of archæology, and was for some time Professor of Art in the Liverpool branch of the Victoria University. You will perceive accordingly that Mr. Conway is a person who has had a very varied training and is acquainted with many different subjects, and you will expect, what I am perfectly sure you will obtain, a very interesting paper from him.

After the reading of the paper the following discussion ensued :—

Colonel GODWIN-AUSTEN: I have listened with extreme interest to the lecture. Mr. Conway has brought vividly to my mind scenes of many years ago. I must first thank him for so kindly alluding to my services at that time. I think, however, he has rather given me credit for more than I did. I was not really the discoverer of these glaciers. Previous to my visiting that part of the Himalayas, the great glacier at Arundu had been seen by Mr. Vigne, at the time before we had taken the Punjab (1835). Then Dr. Falconer (1841), and Dr. Thompson also (1847-48), saw the ends of two of the glaciers, and they were followed again in 1856 by one of the Schlagintweits—Adolf, I think—who was afterwards murdered in Yarkand. When I went there in 1860 my first season's work was to survey up to the Masherbrum Ridge and the glaciers descending towards the Shyokh River. In 1861 from Askole I crossed the end of the Biafo Glacier, and went on to the Mustagh Pass and surveyed the Punmar Glacier, which came down from that direction, and I then had on my plane-table a large gap between the Masherbrum Ridge and the Punmar Glacier, of which I knew nothing. I did not at that time know that a glacier so large existed there, and my surprise was therefore extreme when proceeding up the Biafo Valley I came suddenly on the great breadth of ice, which stretched in front of me, marking the end of the Baltoro Glacier. I then saw the valley was much longer than I imagined, and continued on that glacier for about five days; but did not get anywhere near the point Mr. Conway was able to reach. I only reached on that occasion the long glacier which came down from Masherbrum on the south, but from other points I had fixed by plane-table surveying I was able to get a rough sketch of the upper portion. It is most satisfactory to me and everyone in this room to think that these glaciers have now been visited by such a good mountaineer as Mr. Conway; he went to this part of the Himalayas with the great advantage of knowing and having ascended a great many peaks in the Alps, and I hope we shall hereafter hear from Mr. Conway a fuller account of what he has seen, his impressions of this portion of the Himalayas, and the differences between it and the Alps of Europe. The vastness of the country there, and its desolate appearance, cannot be described in words, and we have been most fortunate this evening in seeing the photographs which he was able to take, because it has given you some sort of idea of the country. It is the most striking country that anyone can possibly visit, but I cannot say it is all pleasure to travel through it, because the extremes of heat and cold are very great, and Mr. Conway describes very well the dreadful march up the Hispar Valley towards the great glacier. He was very fortunate in seeing one of the great rushes of mud and rock, which he described, for this reason, that although they occur almost daily, yet although you may arrive on the brink of any one of these nullahs where they occur, and see that one has gone by, it is not often one is there at the time to actually observe the phenomenon. I had the good fortune myself to see one which passed my camp under the Skoro La; had I not seen the way in which the enormous blocks were transported and thrown up on to the sides of the ravine I should have attributed it to glacial action in the winter months. Mr. Conway is of opinion that the accumulations of detritus in the valley of the Indus River have been brought about by this action. I think it has been a means to an end, but I do not think it has been the sole cause in that part of the world. You find every sort of action has gone on, as witness the lakes which have been formed along the course of the Indus very far back in time. The accumulation round Skardo is very interesting, because you have beds with enormous blocks which may have been brought down by these "Swa," as the natives call them, with great thicknesses of extremely fine silt formed in still water. The extreme cold of the period is indicated

in these finer silts by pieces of a similar silt being imbedded in it, which have retained their form and must have been in a frozen state when carried along by the stream and deposited. The whole region has passed through a long period of glacial action. I was also interested in what Mr. Conway said about the movement of these glaciers since the time when I was there, and I rather think in reference to the Baltoro and the remarkable rock which I noticed in my journal at the time, that the glacier has advanced, it is somewhat nearer to the terminal cliff than when I saw it. The glacier at Arundu, which is on the south of the Nushik La, was advancing rapidly when I was there, and the rocks from the ice were rolling into the fields of ripe corn, which was being torn up by the ice. I will not detain you by further remarks; the ground traversed by Mr. Conway is so extensive that it is difficult to seize upon, and treat all points that might be of interest. On one point, the nomenclature of the ranges of the Mustagh and Karakoram, both names are those of passes as known by the natives, and I should call that portion of the range to the west of K2 the Mustagh, as far as the Hunza Nagyr Valley, while the portion to the eastward I should call the Karakoram up to the Chang Chenmo plain. The Hindu Kush could be retained for that portion north of Gilgit, and further to the westward. I thank Mr. Conway for giving us so interesting an account; both he and his companions deserve the highest praise for what they have done.

Sir MICHAEL BIDDULPH: I am sorry I have nothing ready prepared to tell you, and I cannot emulate my friend Mr. Conway in his description. I can only say a few words about those parts which I have visited and which are accessible to anyone. From my earliest youth I felt the greatest passion for mountain scenery, and fortunately, in every part of my life, I had the opportunity of visiting hills which have gradually grown greater and greater until I got to the Himalayas. In 1865, after four years' heat in the plains, which was shared by my wife and family, I found myself on the confines of Kashmir; and, having a little spare time from my duties, I thought I should like to see something really big in the way of mountains, and consulted my friend Major Strutt, and asked him what in the neighbourhood of Kashmir was really worth seeing. He pointed out a circle on the map with the figures 26,629. I said I think that will do. So having comfortably placed my family in Kashmir, I took leave and got on the trail. I had had the good fortune to read Vigne's Travels. He had described in most vivid terms his impressions of Nunga Parbat as he saw it from the first elevation north of the valley of Kashmir. When I crossed the same ridge it was hazy to the north-westward, and I saw nothing but a blank beyond the range which bounded the valley of the Kanchanjanga. So I contented myself with the flowers growing breast-high on the slopes around, and then I passed into the deep valley at my feet. Having stayed two days by the Kanchanjanga I ascended the western slopes and slept at an elevation of 16,000 feet, on the top of a pass, with a keen north wind blowing. On the following morning I thought I would console myself by trying to shoot ibex, and the Shikaris soon put me on their tracks; but while looking north-westward for what I was really in quest of, I suddenly thought I saw a glimpse of something glittering through a cloud. It is impossible to describe to you what the sensation was of seeing that glitter in the cloud far above any land. By-and-by the shining increased, and what proved to be a snowy mountain came out of the heavens; and this magnificent mountain was laid bare against the blue sky. After feasting my eyes upon this surpassing spectacle I thought no more of following ibex, but proceeded to sketch Nunga Parbat, and secured one of the views, now exhibited in the tea-room. I afterwards passed some delightful days exploring the base of the mountain. I must now describe to you what may be seen from the

plains. You will understand that plains extend from the Indian Ocean, at Karachi, right round to the Bay of Bengal, always bounded by the vast ranges of the Himalaya and its offshoots. The mountains are only visible in certain states of the atmosphere; one may be close under the hills without even a glimpse of them; and again one may be 150 miles distant and yet see them floating in the haze of the horizon.

It was my good fortune to be travelling with Lord Napier, of Magdala, on a tour of inspection to Darjiling in the month of December. I had had frequent opportunity of enjoying views of many portions of the main range, but as yet had not seen Kanchanjanga, reputed to be the second highest of the whole chain, and said to be a magnificent spectacle as seen from Darjiling. Journeying over those vast plains, diversified by groups of trees and watered by winding rivers, we at first looked in vain over fold after fold of park-like scenery to a horizon melted into the sky. It was early morning and we were 100 miles from the outer hills. By-and-by we see the loom of the range, a huge formless mass fading into space. Again a little further on our way, and there seems to be a shining in the warm mists which join plain to sky, but far above the loom of the hills. Again further on our way and the undefined assumes form, and we saw the head of Kanchanjanga floating in the sky. No words can describe the fascinating beauty of a mountain thus coming into view, where before nothing was visible. The circumstances of the transformation, the aerial character of the horizon, the situation and want of form of the low hills, all combine to give a supernatural appearance, which must be seen to be appreciated.

Having done my best to convey to you impressions of these scenes, let me hope that some of you may be able to tear yourselves away from this busy town and go to India, and for yourselves judge what the Himalaya Range is like. We all are, I am sure, exceedingly obliged to Mr. Conway for the admirable account he has given of his most interesting and arduous journey, and only hope he may have further adventures to tell us of at some future day.

Mr. DOUGLAS FRESHFIELD: I will say only two words. I am sure you will be much better occupied in going to see the beautiful exhibition of sketches and photographs which Mr. McCormick and Mr. Conway have to show in the next room. I will only say that in the mass of topographical details which only imperfectly represent one side of a story that I hope will take two volumes to tell—which I hope also we shall not have to wait nine years for, as in the case of Mr. Whympers' book—we have perhaps lost sight of two main facts. First, Mr. Conway has been the first person to cross the greatest glacier pass that exists in the temperate regions of the world. Next, Mr. Conway has, with only one exception (Mr. Graham), and that not absolutely certain, reached the greatest height of anyone on this globe. He has certainly beaten the Schlagintweits and Johnson. Moreover, Mr. Conway has measured his height, taken photographs and observations of several kinds at the top. To that I attach most importance of all. Somebody—a member of the Council—said to me the other day: "But I thought Conway was going up K2?" Mr. Conway was sent to that region not to attempt any desperate feat, but to give such a picture of the mountains as a man familiar with the European Alps could give—cross the great pass, attempt the easiest peak, and get as near the top as he could—and I think he did his work most admirably, and I am quite sure the Geographical Society have sent out few travellers who have brought back more fruitful results. I say fruitful because I think that his travels, when fully published, will interest Anglo-Indians in mountaineering, and that Mr. Bruce's Ghurkhas will solve the mountaineering problem. If you can teach these soldiers to act as good mountain guides, then you have solved the problem of the exploration of the snowy

Himalayas. These Ghurkhas, I am glad to say, are going to receive from the Alpine Club special rewards, which will mark them in the estimation of their comrades and in their own, and will encourage others to undertake, with the assent of their officers, similar work.

The PRESIDENT: We have had a great many pleasant evenings and excellent papers this year—better than any year since I have occupied this Chair—but none better than the one we have listened to this evening. You will instruct me, I am certain, to give your very warmest thanks to Mr. Conway, and unite with Mr. Conway all those gentlemen who have addressed us.

LIEUTENANT PEARY'S ARCTIC WORK.*

By CYRUS C. ADAMS.

CIVIL ENGINEER R. E. PEARY, lieutenant in the United States Navy, was compelled to return to his field of Arctic work, in July last, without publishing a detailed record of his labours in the region of Inglefield Gulf, North-west Greenland, and of his journey on the inland ice to Independence Bay on the north-east coast ($81^{\circ} 37' 5''$ N. lat.), all of which occupied him from July 27th, 1891, to August 6th, 1892. The reason can be briefly told.

He arrived home in September 1892. He had only nine months in which to raise funds and make preparations for his next expedition. He desired, if possible, to earn, by his own efforts, the money he needed. The lecture platform seemed to offer the best opportunity. For six months he addressed audiences nearly every week-day and often twice a day. He augmented his receipts by well-paid articles for the periodical press and in other ways. In nine months he accumulated about £6000, and he had asked no man for a shilling.

Meanwhile he had devoted all the time he could spare to the preparation of his book. The manuscript was about four-fifths completed when, on July 2nd last, his vessel, the steam sealer *Falcon*, started north from New York with the second expedition. He had some thought of leaving the completion and publication of the book in competent hands, but he finally decided to defer the work until his return. He was also unable to visit England and address the Royal Geographical Society in compliance with their invitation, an opportunity he had hoped to improve, until two months before his departure.

Soon after he returned home he addressed the Academy of Natural Sciences, Philadelphia, on the geographical and scientific results of his work. This address has not been published. He prepared a fuller

* Map, p. 384.