

rise to express my admiration of the paper which Mr. Markham has just read to us. You should know that he served under my command as a midshipman on board H.M.S. *Assistance*, in search of Franklin's missing expedition in the Arctic regions, when I discovered the first traces ever found of those ill-fated ships; therefore it is especially interesting to me to be present on this occasion, when he is recounting the discovery of America by Columbus, because we have travelled together over lands in the extreme north of America never before trod by any European. Our expedition and discoveries occurred during 1850-51. Markham was then a youth of great promise and intelligence, combined with a taste for following literary pursuits. I therefore beg to congratulate him on his excellent paper, and the Society on thus obtaining so much fresh information respecting the illustrious discoverer of the so-called New World.

The PRESIDENT: It would have been a very great omission on the part of the Royal Geographical Society if some friendly and sympathetic words had not been said before we parted this summer with reference to the greatest of navigators, the fourth centenary of whose great discovery will be celebrated this year in two allied and friendly countries; and it is most fortunate that the post of protagonist upon this occasion should have fallen to Mr. Markham. During a long life he has in many places and in many ways proved himself to be a firm friend of Geography. Everything that he has done he has done well, and you will, I am persuaded, lay upon me your commands to give to Mr. Markham your most sincere and grateful thanks.

Exploration in Sikkim: to the North-East of Kanchinjinga.

A VERY interesting expedition to the north-eastern base of Kanchinjinga was made in July, 1891, by Mr. C. White, British Resident at the Court of Sikkim, and Mr. Hoffman, of the firm of Johnston and Hoffman whose Himalayan photographs are well known in India.

The travellers followed as far as Tumlong the established pony track, made by the British troops at the time of the late war. Thence five days' march on foot over execrable mountain paths brought the party to the Talung monastery, lying in a valley, which is connected with Jongri, south of Kanchinjinga, by the Guicha La.

Turning north up a tributary valley, the travellers proceeded over the Yeumtso La * to the Zemu Valley, the head of which is closed by the north-eastern, and probably the greatest, glacier of the Kanchinjinga group. Sir J. D. Hooker visited the lower portion of this valley, but failed to reach its glacier.† At the head of the Thlonok, a stream which

* According to information given to Sir J. Hooker in 1849, this route to Tibet had for many years previously been abandoned, from being so much more snowy and otherwise difficult than the routes by the Kongra Lama and Donkia Passes to the eastward.

† According to the information received by Sir J. Hooker in 1849, this Zemu River is his Thlonok, and *vice versa*. The point reached by Sir J. Hooker was a few miles short of the end of the glacier, which he was prevented from reaching by the valley being blocked with the preceding winter's snow, which in the month of June, when he was there, had not as yet melted. The sketch of the upper part of the valley (with Kanchinjinga at its head), given as the frontispiece to vol. ii. of Sir J. Hooker's 'Himalayan Journals,' represents its condition at that season.

joins the Zemu from the N., lies the Jongsong La, crossed by the Pundit R. N. in his high-level tour of Kanchinjinga (see 'Report of Indian Surveys,' 1884-5, or 'Alpine Journal,' vol. xiii., p. 27). Mr. White and Mr. Hoffman, entering the Zemu Valley high up, were, it will be seen, able to visit and partially explore its glaciers, being the first Europeans to do so.

Several important deductions may be drawn from Mr. Hoffman's narrative, and they are confirmed by private letters received from Mr. White. He considers midsummer, despite the rains, the best season for high glacier exploration. He experienced in the middle of July intervals of fine clear weather. By the middle of September, when the settled fine weather begins, the flocks have already left the high valleys, and the cold is intense at great elevations. Mr. Hoffman's photographs show that there is possibly a route up the north-eastern slope of Kanchinjinga not steeper than that up Mont Blanc from Chamonix. Here too there is obviously a "Grand Plateau" at the base of the final crest. The Zemu Glacier has been proved to be only a fortnight's journey from Darjeeling. The Guicha La is only eight days from Darjeeling. Could the gap marked 19,300 feet on the survey map be crossed, the head of the Zemu Glacier might possibly be reached in two days more.

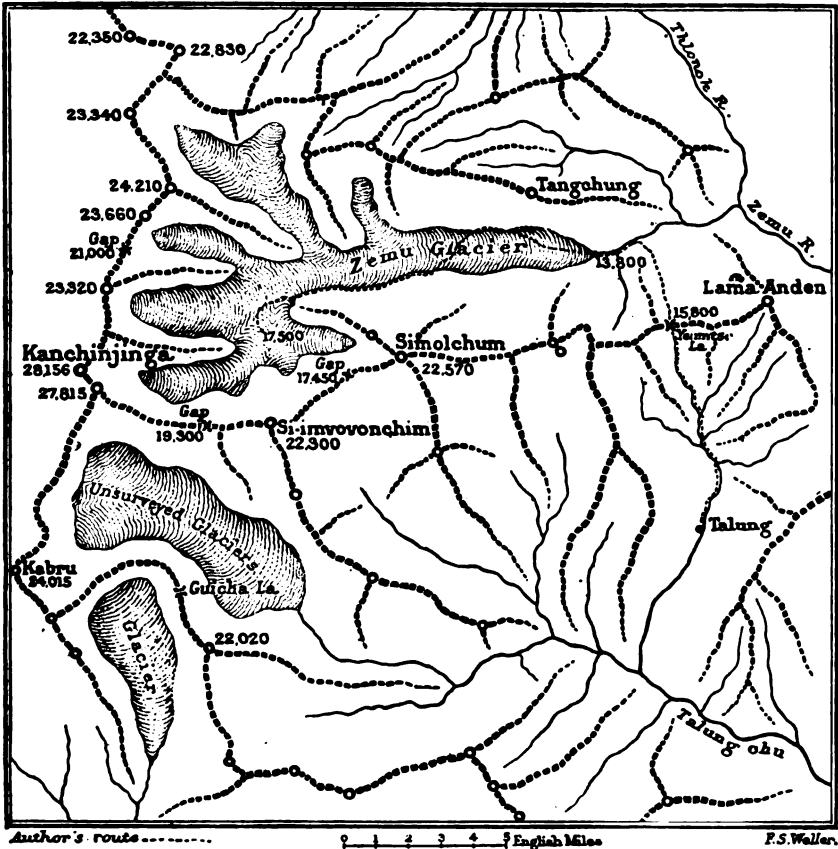
Mr. Hoffman proposes this season to pay a second visit to the snows, and he promises an account of his visit, and specimens of its photographic results. Any addition to our knowledge of this region, the neglect of which hitherto by the English at Darjeeling has been very singular, will be most welcome. It is to be hoped that the new views may include some extensive panoramas taken from high stations similar to those brought home from the Caucasus by Signor V. Sella. Such views are invaluable for topographic and cartographic purposes; but none have yet reached us from the Himalaya. A photographic camera forms part of the equipment of the mountain surveyors in Italy; but a system there developed has not yet apparently been brought into use in India. Meantime, the following extracts from Mr. Hoffman's narrative of the part of his 1891 journey which lay in hitherto unknown, or at any rate undescribed, country will be read with much interest by all lovers of mountains.

Talung is the limit of habitation on our line of tour. The village consists of about fifteen huts. It is prettily situated, and is surrounded by high mountains, the lower ridges of which are thickly wooded with pine forest. The people here had, up to the date of our visit, seen no Europeans except Mr. White and myself. Mr. White had been there in the previous year, and was the first European visitor to the Talung monastery.

We had to stay there for two days to recruit coolies and repack our kit, so as to make the loads lighter. We had to carry all necessaries, including commissariat, and even food for the coolies. Ahead of us was nothing but a howling wilderness—a *terra incognita*. We started our men early in the morning, and took care that

they were all in front of us. One of their little weaknesses is that it takes them hours to tear themselves away from "their sisters, and their cousins, and their aunts." But the parting once well over, they give little trouble, except that they will travel only at their own pace; it proved perfectly useless to try to hurry them.

After leaving Talung behind, we passed through a dense and very damp forest, principally of magnificent pines. The jungle swarmed with leeches, which fastened on to our ankles, and were very troublesome. Putties would be very useful on this journey, and I regretted I had not worn them. Having crossed a river, we reached a wooden hut, which would afford shelter for the coolies, and finding just



enough level ground to pitch our tent, we camped here for the night. The following day's march brought us to our first camp, a place marked on the map, but consisting of only one solitary hut erected to shelter herdsmen. The ground about this place was covered with yak's dung. The road ascended gradually, and a mile or so higher up we met with the first snow, which was melting fast. We now left the forest behind, and the country became open ground. The path led up a steep slope to a precipitous wall of rock, over which, to the left, descended a magnificent waterfall, called the Tizong Babza. We groped our way up the rude roadway, which ran along the face of the almost perpendicular rocky wall, using hands and knees. Progress was slow and laborious, but at last we reached the summit of the rock

safely. We here sought for a bit of level ground for our camp, but there was no level surface sufficient to pitch a tent 8 feet square. So we had to make shift on the slope of the hill, levelling our camp beds with stones. The ground was partly covered with snow. The vegetation consisted only of low rhododendron bushes, some of them still in flower. It began to rain, and the prospect from the tent was anything but cheerful. The rainfall in these high latitudes is a light drizzle, much of the character of a Scotch mist. *The year's record is not above a fourth or fifth of the quantity registered in Darjeeling.*

The weather next morning was clear and bright, and we had a splendid view of a grand snow-capped peak about two miles distant, known as Lama Anden, which rises over 19,000 feet above sea-level. After taking several photographs we pushed on. The way led over fields of snow, very soft in places, and we often sank as far as our knees. A long and heavy pull over a good many miles of slushy snow and through rhododendron fields, which also offer serious obstacles to rapid progress, the plants being thickly and strongly interlaced, brought us to a narrow valley with high hills towering on both sides. A broad but shallow river which impeded our progress, wound its way through the valley. However, we overcame all difficulties, and higher up were rewarded by discovering that the source of the river was a beautiful lake, partly frozen over; but the ice was breaking up fast, and large pieces were being carried away by the stream. We skirted the lake to the left, as the river at the junction with the lake was too deep and rapid to ford.

We were now at a height of 14,000 feet. The mountain scenery was grandly wild. Amongst the most conspicuous objects were immense boulders strewn everywhere, half buried in deep snow. Some of these boulders form natural caves or rock shelters, and are used by coolies and herdsmen as their camping-grounds, offering a welcome protection from wind and weather.

We pitched our camp at the base of the Yeumtso La. Failing to find any bare ground, we were obliged to pitch our tent on snow, which lay everywhere 8 and 10 feet deep; but we passed a comfortable night, in spite of the intense cold.

The next day dawned calm and clear, but very cold. After breakfasting in the open on the snow, we were soon afoot with the object of crossing the pass, 15,800 feet (17,040 on map). As we toiled up the steep ascent, far above us a gigantic peak lifted its hoary head, silent, frigid, and white. On we scrambled over snow and bare rocks, often wading through torrents, which descend on all sides, feeding the lake below. On reaching the summit, we halted for a while to allow the coolies to come up. The scenery viewed from the pass is of wondrous beauty. Bold and precipitous cliffs tower high up, the peaks capped with snow; here and there a block of rough splintering rocks shows through, a dark mass forming a contrast to the dazzling snow. Watercourses rush and leap down the steep sides of great mountains. Far below lies the beautiful lake, with Lama Anden forming a most effective background. It was a scene to charm the beholder with its remarkable beauty. We could not enjoy it as long as we wished, because the envious mist swept over, and shut out the view.

As we continued our route down hill, the weather cleared again, and the view of the Zemu Valley was charming. The clouds just parted to the south, and revealed the glacier which descends from the perpetual snows of Kanchinjinga. *On all the maps a large glacier is marked as a moraine.** This was the point we were aiming for, and keen speculation was excited as to whether it was a very ancient moraine

* No glaciers are marked as such on the last maps of Sikkim, issued by the Indian Survey Department, and it is but a few years ago that the Survey Report contained a statement—since contradicted—that there were no glaciers in this region.—D. W. F.

or a glacier. The view we had from the pass convinced us it was a glacier, and probably the largest in Sikkim. We could trace the Zemu River descending from its source in the glacier.

The Zemu Valley is narrow, with precipitous mountains on both sides. The view, looking down the valley, was magnificent, showing in the far distance ridge upon ridge, and behind them snow-capped peaks. The further bank of the river is covered with pine trees and grass. We halted here for a day, giving rest to the coolies, while we explored the valley up-stream. The scenery along the river is very pretty. Rhododendrons form the chief vegetation, covering the mountain slopes like a garment. Two species were still in blossom, giving the effect of balls of brilliant colours. The ground was covered with wild flowers of many descriptions. There were primroses, cowslips, and wild roses, and many other exquisite flowers of which I do not know the names. We collected many specimens, which I brought back with me in good preservation. The height of the river here is 13,000 feet. It is a boisterous torrent, rushing over big boulders. Higher up the mountain sides sloped more rapidly, and the winter snow still lay deep in some places, forming bridges of frozen snow over the river.

With the object of visiting the ice caves forming the sources of the river, we crossed over extensive snow beds and rounded big rocks on the edge of the stream. In some places large patches of rhododendron had to be passed over. In due course, after a hard climb, we reached the base of the glacier, at a height of 13,800 feet. Here we counted four distinct caves in the ice, with the water which forms the beginning of the river flowing freely out of them. The face of the glacier is about 400 to 500 feet deep, the immense mass of ice resting between the two slopes of the valley. The ice of the glacier is of a dark green colour.

It was too dangerous to remain here long on account of the huge stones that were continually falling from the glacier. They came rolling down at times in a great heap, and we had to keep a sharp look-out, and sometimes dodge them to escape annihilation. Rain commenced to fall, too, which put a stop to photographing, and we returned to camp. On the following day we sent our camp on to the other side of the glacier, and we made another attempt to photograph the ice caves. We crossed over one of the snow bridges to the opposite bank, and reached our destination after a trying march. But the weather was now bright and fine, and we attained our object, getting some excellent photographs of these curiosities of nature's architecture. We then continued our route up the steep slope of the glacier, which was difficult on account of the loose stones that went leaping down when they were touched. After marching for some miles over the glacier proper, we reached an open strip of land with high hills on the left, the glacier extending to the right. Numerous streams cut their way through the plain. An extensive mountain chain rises to the north-east, which is the Tangchung La. We removed the camp next day higher up the valley. The weather was misty, so nothing could be seen of the hills. The valley was almost a plain, with splendid grazing-grounds. We now mounted to 16,000 feet, and found our first edelweiss, growing in patches. Edelweiss is found only near perpetual ice or snow. Another plant we found was a wild rhubarb (*Rheum nobile*), growing a yard high. Its reflex brackets overlap one another like tiles, and protect the flowers from wind and rain. The natives call this plant *tchuka*,* and they eat the stems, which are not unlike the rhubarb of English gardens.

Better luck in point of weather favoured us the next morning. The mist cleared away for a short time, and we saw one of the finest shaped peaks in the Himalayas,

* See Hooker's 'Himalayan Journals,' ii. 48.

marked on the map D. 2; or Simiolchum. I succeeded in taking a fine negative of this peak before it disappeared again in the mist.

Here we left our heavy kit, the big tent, etc., and selecting a few coolies and taking a small tent, we started for the higher regions. Following the valley to the end, we pitched the tent near a small lake of beautiful clear water. The elevation here was 17,000 feet. We experienced no difficulty with regard to firewood. A dwarf juniper grew in patches on the side of the hills, which gave excellent fuel. This was a great comfort.

The following day we started to cross the glacier, intending to strike a rock not far from the foot of Kanchinjinga. The glacier descends from the perpetual snows of Kanchinjinga almost in a straight line, and is fed by many minor glaciers coming down from D. 2, and the peak to the north of it. We counted a dozen glaciers on one occasion joining the main glacier. By their different colour and character the stones which form the moraine can be traced to their original source. The side view of the glacier has the appearance of a huge embankment, with confused heaps of *débris* ready to be levelled.

A more dismally barren and desolate part of the world could not be imagined, and walking at this elevation was slow and laborious, though we experienced no discomfort in breathing. The atmosphere was very clear, and distant objects appeared much nearer than they really were. We reached a height of 17,500 feet. The scenery was wild and grand all round. To the south-west was a gap in the range of 19,300 feet (see map). The rock we had hoped to reach was still a long way off at 2 P.M., and we reluctantly turned back to camp. The rumbling noise of avalanches and the crashing of falling rocks never cease amongst these giant hills, and it is dangerous to camp near the base of a mountain.

The next day dawned gloriously. For the first time we obtained a view clear from all clouds and mist. Kanchinjinga towered high above us almost a perpendicular wall of rock and ice.* To the south Simiolchum looked like a burnt-out crater filled with snow. Then came a 17,450 feet gap in the range, with a wavy snowfield, and next to the left a magnificent group of peaks (not named on the maps). The rocks that peep through the snows are of a rugged splintered appearance, broken by the continuous frost. The view on the other side, looking down the valley, was not less grand. We could see the Donkia † and Lama Anden and a number of minor peaks. We also discovered two peaks, one in front and the other to the right of Kanchinjinga, both above 22,000 feet. We photographed to our hearts' content, and returned to camp in a happy frame of mind.

Before leaving this neighbourhood, we visited a narrow valley to the north-east of Kanchinjinga, shut in by gigantic hills. We counted here eight glaciers coming down from the different slopes, some joining the main glacier, and others ending abruptly, forming a jagged wall of ice or a more gradual slope. The rays of the sun caused these masses of ice to act like huge prisms reflecting most gorgeous colours.

We returned down the valley, and reached the main camp after two days' march. The weather now became cloudy, and we had nothing but mist and rain. The following day I said good-bye to Mr. White, and we parted, he to continue his tour to the north, and I to return to Darjeeling, where I arrived after twelve days' continuous marching, none the worse for my trip, and in the possession of a valuable collection of negatives depicting scenes at the back of Kanchinjinga, unvisited before.

* The photographs do not wholly bear out the adjective used. Sloping glaciers seem to descend transversely between the "perpendicular" tiers of cliff.—D. W. F.

† Sir J. D. Hooker would hardly have thought this possible.