their claws, and we afterwards heard that there had been a fatal disease among the sheep, from which they were profiting. We were about 400 metres distant, and we watched them for a long time, both through the glass and with the naked eye. They did not appear to quarrel much, so I suppose they had been well glutted.

In descending the Port de Cardal into this valley, some years ago, I remember slipping in a glissade on the snow rather faster than I intended, and two eagles, who thought I was already gone, made a swoop at me, and came quite near enough for me to hear the rustle of their wings.

I hope I have written enough to show that the Pyrenees are not to be despised, and that a summer among them will not be thrown away even by the most ardent climber. July, August, and September are the best months. For the botanist and sportsman they possess charms of their own, and the fault is mine if I have not invested them with artistic merit in the eye of the mountaineer.

At the same time I must add that here, as elsewhere in Europe, little remains to be done in the way of exploration. To him whose zest for mountaineering depends mainly on the conquest of virgin peaks, I can only offer the advice to turn his steps elsewhere, and notably to that wondrous country which Mr. Graham has selected for proving that the loftiest mountains may be made to yield to persevering climbers.

Travel and Ascents in the Himálaya.
By W. W. Graham.

[The account of Mr. Graham's journey which follows was read before the Royal Geographical Society, and is, with the permission of the Council and Mr. Graham, given at the request of the President of the Alpine Club, reprinted here, with additions, from the Society's Proceedings.—Editor.]

BEFORE I relate the incidents of my recent journey, let us consider—in so far as it is known—that great northern barrier of India, which runs in one almost unbroken chain from the Hindu Kush to Bhutan.* I use the saving clause advisedly. How far eastwards the snows extend is a matter of conjecture, owing to the exclusive policy of the native states. Even as to the southern face our maps are far from

* The following introductory remarks must be looked on as tentative, as a preliminary sketch *from a mountaineer's point of view*, of what has been done in the Himálaya.

complete, while as to the northern, if not 'a perfect and absolute blank,' they are, to say the least, sadly vague. Attempts, indeed, have been made by the Survey Department to collect information by sending out, as sub-surveyors, natives who can evade the restrictions our Government allows to be placed on European travellers. Some of these men, two of whom have received rewards from the Geographical Society, are accurate observers, trained in the use of scientific instruments, and have made great additions to our knowledge of Tibet. Others, however, are of an inferior stamp, and their reports cannot be received with confidence in matters of detail.

In this mountain region are contained without doubt the most mighty peaks and glaciers in the world. To convey an idea of their magnitude by comparison: the Alps contain two peaks above 15,000 feet, six or seven above 14,000, and, in all, about 30 what are called first-class peaks. The Himálaya, on the other hand, or rather the limited part we know of them, contain peaks from 29,000 feet downwards. More than 1,100 have been measured exceeding 20,000 feet, and it is computed that at least 2,000 exceed this height. Nor is this all, for there is a great deal of evidence tending to show that there is a second range behind the first and very probably exceeding it in height. It is well known that the range we know as the Himálaya, is not the true water-parting (I adopt the phrase most in favour with Indian geographers) of India and Tibet; that, though it may be conventionally regarded as a continuous chain, it is broken through in many places by rivers of a considerable size. Not the least curious feature of the range, is the extreme depth and narrowness of the gorges which have presumably been cut or at least deepened by the streams that traverse them. For instance, one of the great trade routes runs along the Boru Gundak, which splits the range between Dhaolagiri (26,700) and an unnamed peak of 22,500. Now the extreme distance between the summits is less than 15 miles, whilst the river-bed is not more than 5,000 to 6,000 feet above sea-level. Again, the route by which the Chinese successfully invaded Nipal, and which lies immediately under Deabang (23,000), is less than 6,000 feet in elevation, while once more the outer chain sinks to a mere nothing between Mount Everest and Kangchinjinga, where the Arun, rising from the true water-parting, flows through it at an elevation of some 8,000 feet.

There is therefore a great water-parting—almost certainly

a great chain of mountains—which lies concealed behind the first range. 'The great peaks, we know,' writes Mr. T. Saunders, 'are a culminating (?) outer range separated by a chain of elevated valleys from an inner range, whose snowy peaks rise to an elevation not inferior to that which is generally attained by the peaks of the southern crest. But while the southern peaks descend to a base for the most part less than 1,000 feet above the sea, the base of the northern range of peaks is elevated between 10,000 and 15,000 feet.'* So far as I am aware, only one peak on this northern range has been measured. This appears through a gap in the Central Nipal block, and was fixed by Col. Tanner of the Survey. It is numbered S^3 and measures 22,400. Several observers who have attained great heights in Sikkim, have also seen extremely lofty mountains in the north-west.

Perhaps a comparison with the more familiar Swiss Alps may render the whole position clearer. The Nipal Himálaya will answer to the Bernese and Glarus groups, the gorge of the Arun to that of the Reuss, the unseen and unknown watershed will correspond to the Pennine and Lepontine Alps and the St. Gothard. Just as in the Alpine water parting we find the supreme peaks, Mont Blanc and Monte Rosa, so in the Himálayan we may expect to find the highest peaks in the world, the true occupants of the throne now usurped by Gaurisankar (Mount Everest.) But without taking the inner *terra incognita* into account, it will be obvious enough that the known Himálaya exceed all Alpine rivals in extent and number as they do in height. They contain problems in climbing exploration and geology, enough to satisfy many generations; and it will not, I venture to think, be until we return to earth as fifteenth or sixteenth rounders (to adopt the phraseology of the fashionable and fanciful esoteric Buddhism), that we shall have any need of the 'far more nobly organised mountain forms' which Mr. Ruskin tells us that Providence is even now preparing to meet the 'collateral progress of humanity.'

But let me describe a little more in detail the physical features of the snowy chain, and I do this with the less diffidence that I have been able to supplement personal knowledge with the admirable series of sketches of Col. Tanner, which we may hope to see published shortly. First, on the extreme north-west, we have the Hindu Kush and

* See a sketch of the mountains and river-basins of India, by T. Saunders, Geographer, India Office, 1870, Stanford.

Karakorum, their gigantic crests split asunder by the Indus. For long it was supposed that in this region there were no peaks of considerable magnitude, but the surveys made under Montgomerie and Thuillier have shown the existence of a most gigantic mass containing some of the highest peaks and certainly the largest glaciers known. The crowning point is K_2 (28,278), the second known peak in the world, with a companion of 25,000, which glories in the singular name of Masher-brum. Next in height, and far excelling in beauty, rises the famous Nanga Parbat (26,700), whose flanks are bathed by the Indus at an elevation of 3,000 ft. only; thus exposing one unbroken slope of nearly 24,000 ft., probably the greatest in the world.* To the south-east the range is continued into Kashmir, the peaks as they diminish in size diminishing also in grandeur of form, so that many summits even of 22,000 feet may be gained by what to mountaineers is little more than a long walk. Crossing the Indus and passing through Ladak and Spiti the peaks, though somewhat higher, are still easy, and here some very high ascents have been made. Southwards, again, and beyond the gorge of the Sutlej, we come to Gangootri, and the peaks once more crop out with formidable abruptness, the range assuming a forbidding and broken appearance. Eastwards, across the Dhauli River is the Gurhwal group, comprising Dunagiri and the triple-peaked Trisuli, and finally culminating in Nanda Devi (25,600), popularly known as the Indian Matterhorn. Here the peaks are wild and savage in the extreme, being for the most part bare scarped rocks, too steep for snow to rest on, although so far above the snow-line, and remarkable for the immense number of rocky aiguilles and pinnacles which defy even the ibex and the Himálayan chamois. I do not hesitate to say that the peaks of these two regions, with a few exceptions, present the most awful series of impossibilities that a climber can set eyes on.

Still eastwards the range runs in an almost continuous chain through the centre of Nipal for a distance of some 600 miles. The western portion has not been accurately surveyed, or even seen, but east of Dhaolagiri (26,700), we once more get on known ground. This chain, as seen from the

* See Colonel Tanner's report in the 'Survey of India' Reports for 1879–80, and Colonel Godwin-Austen's paper in the Royal Geographical Society's Journal, vol. xxxiv. p. 19, with a map. The latter is one of the most interesting records of a glacier explorer in the Himálaya.

Terai, presents the most magnificent mountain panorama. It rises in a wall to the average height of 18,000 ft., out of which, like enormous battlements, shoot up peaks of 3,000, 6,000, and even 8,000 ft. more. So far as I could judge by a distant view, i.e. from some 50 or 60 miles, they appeared to be very difficult. The range continues to Gosain Than, a grand twin peak of some 26,300 ft.; then falls below snow-level only to rise once more into the gigantic group of Mount Everest and his attendant ring. I despair of adequately describing this mighty chain, rising as it does from a very low elevation, and subtending an angle of 120° to the eye. I can again only compare.

Take that noble range formed by the Eiger, Mönch, and Jungfrau, as seen from the Wengern Alp. Double it in height, increase if possible its difficulties, lengthen it thirty-fold till it includes more than 150 peaks, and you will have some conception of the range of Central Nipal.

Still proceeding eastwards, there now occurs the low Arun valley, a comparatively populous and fertile tract about 60 miles in width, and then rises the great block of the Sikkim peaks with their numerous spurs. Second only to the Gurhwal peaks in difficulty, they far exceed them in height, comprising Kangchinjanga (28,156), Junnoo (25,312), Kabru (24,015), and a host of smaller peaks. Along the north of Sikkim and across Chumbi they run, sending down huge spurs to the south, till they finally end in Chumulari, long believed to be highest summit in the world, but reduced by the inexorable theodolite to 23,929 feet. Beyond this all is more or less conjecture; we only know that there are snowy peaks nearly 200 miles further east.

And now, from a mountaineer's point of view, with such inexhaustible materials at hand, what has been done in the way of ascents above the snow-level. I should be the last man to disparage the grand explorations and achievements of the officers of the Survey Department, achievements which have been too much hushed up, and are too little known in this country. Still the fact remains that there are extraordinarily few ascents or glacier explorations of which we have any record. The reason of this is not far to seek. Rock-climbing is a natural instinct, inherited perhaps from our earliest progenitors; but what I may venture to call ice-manship is a fine art, only acquired by much experience. That it is an art, and one only gained by practice, is proved by the great and admitted inferiority of all but one or two of the best amateurs to the average Swiss guide. This art—the

use of ropes and ice-axes, and all that goes with them—does not yet exist in India. None of our Survey officers have received a Swiss training under first-rate alpine guides; the result is that their maps suffer when they come to the delineation of the ground above snow-level. Exactly in the same way we find the Government maps of the Austrian, French, and Italian Alps * defective, whilst the Swiss survey is as near perfection as possible. When the French maps were made there were no glacier guides in Dauphiné, and a Government could not, of course, be expected to do anything so simple as to send to Chamonix for half a dozen. It seems a pity that some of our Survey officers should not be given alpine experience before they go to the Himálaya, just as men in the Forest Department are sent to Austria and elsewhere to learn forestry. The result of the want of such experience is that their glacier sheets will have to be slowly corrected by independent observers, as those of the French and Italian Alps were by Reilly, Nichols, &c., and finally revised by the Staff itself.

To return to our record. The earliest explorer seems to have been one Fa Hian, a Chinese pilgrim of the fourth century, of whose narrative I will only say that, if half be true, he has put into the shade all his successors. But to come from legend to history, down to comparatively recent times there seems to have been an extraordinary want of curiosity and information about the Himálaya. Moorcroft and Petrie, Turner and Saunders, Manning and Bogle, had all passed the range at various parts during the prosecution of their celebrated travels, which still remain unrepeated. 'Captain 'Herbert,' I quote Mr. Clements Markham, 'was the first 'geographer (1818) who attempted to give a general view 'of the physical character of the Himálaya.' † Mr. Hodgson and Csoma de Körös spent many years in Tibet, and the latter died almost in the shadow of Kangchinjanga, yet none of these seemed to have fully realised the gigantic scale of the mountain phenomena. It was rumoured and stated that Chumulari was the highest peak in the world, a claim it probably owed to its isolated and commanding position; but

* Mr. D. Freshfield tells me that the new Survey of the Italian Alps, 1:50,000, now in process of publication, is a thorough work, because the Italian Staff have learnt *mountaineering* since they last made maps. The Austrian staff have, in deference to the observations of mountaineers, recalled and revised many sheets of their Survey.

† See 'A Memoir on the Indian Survey,' by Clements R. Markham, second edition, 1878, p. 345.

it was not till 1845 that Colebrooke finally published a number of authenticated observations, and proved beyond all doubt that the Himálaya was the premier chain, and Kangchinjanga the then premier peak.

About the same date the Gerards did some good work in Koonawar and Spiti, and reached the height of 19,411 ft. on Leo Porgyul. They suffered greatly from cold and rarity of the air. Just ten years later, Dr. Gerard achieved the first complete ascent in the Himálaya, and succeeded in scaling a nameless peak of 20,400 ft.

Meantime Cunningham thoroughly examined the Ladak region; Dr. Thomson reached the summit of the Karakorum Pass. The brothers Henry and Richard Strachey contributed two important and well-stocked monographs on Western Thibet and Kumaon, and the former was rewarded in 1852 with a Geographical Medal. But the man who devoted himself most systematically to extending our knowledge of the mountains was the famous botanist and explorer, Sir Joseph Hooker. In 1848–49 he ascended the Donkia Pass, 18,400 ft. (till lately a regular trade route to Tibet), and from that vantage made several attempts on Donkia Rhi and Kangchinghao. He frequently reached the height of 19,000 to 20,000 ft. I have myself traversed a great portion of his route, and I do not know which to admire most: the marvellous accuracy of research and description displayed, or the pluck shown, not only in encountering a dangerous climate and the great natural difficulties of the ground, but also in dealing with a race always treacherous and suspicious, and then admittedly hostile.

Conspicuous amongst a number of minor explorers stand out the names of Robert and Adolph Schlagintweit. In the prosecution of the Magnetic Survey of India, it fell to them to pass the seasons of 1855–56 in the Himálaya and Kuen Luen, and they achieved, apart from their special work, a brilliant series of explorations and ascents. They started from Nynee Tal, went up to the Pindari glacier, and passed over to Milum by Traill's Pass, nearly 17,000 ft. They then worked round to the north by three passes, all exceeding 17,000 ft., and after much negotiation with the Tibetan officials, were allowed to travel in Tibet. They remained ten days on the slopes of the great Gurhwal peak, Ibi Gamin (25,500), perhaps better known as Kamet. Every bivouac during this time was above 17,000 ft., the highest being as much as 19,326. They made one determined attempt on the peak, finally reaching a height of 22,239 ft., which for long remained the highest ascent. They then

came over a pass they called the Mana Pass, which they found to be 20,430, and by this route reached Budrinath, having crossed no less than nine passes exceeding 17,000. In 1856, Robert Schlagintweit ascended a peak of 20,120 ft. Unfortunately, in 1857, Adolph was murdered near Yarkand, whither he had travelled, and his death, I believe, has never been punished. The Schlagintweits seem to have had certain advantages over later explorers, in that they were allowed, without interruption, to wander in what is now forbidden ground for the white face; and again, they had the advantage of considerable alpine experience.

There is a valuable and interesting paper by the brothers, in vol. xxxv. of the 'Journal' of the Royal Asiatic Society of Bengal. The title is 'Comparative Hypsometrical and Physical Features of High Asia, the Andes, and the Alps.' Though confessedly incomplete, it gives an admirable *résumé* of the respective features of these mountain regions. As regards the passes, the mean height of passes in the Alps is 7,550; in the Andes, 13,500 and 14,500 in the east and west respectively; in the Himálayas from Sikkim to Kashmir, 17,800. Schlagintweit in this calculation neglects the well-known gaps through which flow the Arun, Bhotia Kosi, Buria, and Kali Gandak, the Bheri and Karnali rivers, all of which are not only below snow-line, but probably below 10,000 ft.

We take next the peaks: in the Alps we find Mont Blanc and Monte Rosa, 15,784 and 15,223; in the Andes, Aconcagua, 23,014 and downwards; in the Himálaya, in Schlagintweit's time, above 120 had been measured exceeding 20,000 ft.; this figure must now be multiplied tenfold.

The snow-line in the Himálaya has often been a matter of controversy. Snow falls as low as 5,000 ft., and lies for days at Darjiling (7,000 ft.), but the perpetual snow-line is fixed at about 16,000 ft. on the southern face, and rather over 17,000 ft. on the north.* I am aware that this limit is taken as a scientific fact, and that all sorts of excellent reasons have been adduced to account for it; but neverthe-

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* General R. Strachey fixes the southern snow-limit at 15,500, the northern at 18,500 feet (see 'Enc. Brit.' and 'Journal of the Asiatic Society of Bengal,' vol. 18). His careful paper on this subject is in contradiction to Mr. Graham's hypothesis. The summer snows, he maintains, do not lie permanently. The Reports of the Kumaon and Gurhwal Survey seem to bear out as to this district General Strachey's statement. In Ladak—according to Drew—there is no permanent snow on some passes of 19,500 feet.—D. W. F.

less, at least in Sikkim and Gurhwal, I take the liberty to doubt its exactness, and for this reason: I assume that the line of perpetual snow means the height to which the snow retreats during the hottest season of the year. Now, in India, so far as I know, most of the scientific expeditions and measurements have been made during August and September, i.e. after or during the monsoons.

All July, and in Sikkim all August and September, the monsoon rages with a steady, perpetual south wind, bringing rain below and snow above, all of which is deposited on the southern face, with the natural effect of considerably lowering the observable snow-line. I saw myself, in Gurhwal, the snow-line thus lowered by a distance which I should estimate at fully 1,500 feet, so that an observation in June and one in September would give very divergent results. One other test I would mention: as regards old snow, i.e. the snow that has been honeycombed by the sun and melted to its minimum (every mountaineer will know what I mean)—this is met with at a lower elevation on the northern face than on the southern. No doubt that in August and later, not only is the snow-line lower, but the temperature actually cooler on the Indian side; but I very much doubt this being the case in June before the monsoon breaks.

As regards glaciers, while unquestionably the Himálaya are unequalled, I believe that Schlagintweit was the first to extend the Asiatic icestreams by the curious method of measuring them up one side and down the other of the watershed. By this means the extraordinary length of 64 miles and upwards was easily attained. As well might we measure the Aletsch Gletscher from Grindelwald to the Aletsch Alp, and thus claim 25 miles of glacier for the Alps. I believe that 36 miles, the length of Balsoro, is the longest known, and of those I have seen myself 20 miles would probably exceed the greatest length.

The report also alludes to heights reached and reachable, and to the effects of the air at high elevations, but these matters I propose to discuss later. The elevations suggested for vegetation are too low, notably that of the tree level, which is given at 11,800. In Sikkim it is at least 13,000, and in Gurhwal even higher.*

After the Schlagintweits there seems to have been a great lull in exploration. Probably the Mutiny and its

* See for further particulars a lengthy review of the Schlagintweits' travels in 'Alpine Journal,' vol. vi. p. 43.

attendant troubles barred the way. Sundry trips were made to Gangootri, the Niti Pass, the Donkia Pass, but they were more sporting trips than anything else. In Kashmir alone was there shown any great mountaineering enterprise. Under the supervision of Montgomerie, Godwin-Austen and Elliot-Brownlow did good work as mountain surveyors, and both Messrs. Beverley and Johnson made some very high ascents; one summit reached certainly being 21,072, though, owing to heavy snow and limited space, they were unable to observe from it. Unfortunately, owing to the reticence of the Survey Department, it is very difficult to discover what they ascended, or even to identify the peaks. In 1864 Mr. Johnson is reported by his official superior, Colonel Montgomerie, to have reached a ridge in Ladak which exceeded 22,300 ft., thus by a few feet surpassing the Schlagintweits, and not only did this but took observations from the summit. It should perhaps be stated that the pass in question must have been a remarkably easy one, as not only did he not cut a single step or employ a rope, but was able to cross with the whole of his coolies and impedimenta. There is a story current in the Department which deserves at least investigation. In the following year Johnson ascended a peak further north. The observations, according to rule, were worked out by another member of the party, and it appeared that the height reached had been 23,728 ft.* This result, resting on a single observation, was suppressed.

Later, some lofty ascents and daring explorations were accomplished on the Tibetan frontier north of Gurhwal, and a height of 22,040 ft. was attained on the slopes of Kamet. Mr. Blanford and Mr. Edgar travelled in Sikkim. Mr. Drew wrote on Kashmir, Mr. Wilson on his travels in the 'Abode of Snow,' Captain Trotter on 'Trans-Himalayan Explorations.'

One attempt, though unsuccessful, I should not omit here, because it was the first of its kind. I refer to the expedition of M. Déchy, the Hungarian traveller, who will in a few weeks start for the Caucasus. He was the first man to provide himself with the assistance of a skilled alpine guide, a most necessary thing to any real success in mountaineering. He took with him the late Andreas Maurer, of Meiringen, one of the best and perhaps the most daring of all his famous fraternity. He selected Sikkim for attack, but ill-luck awaited him. He contracted

* See p. 58 for further details as to Mr. Johnson's ascents.—Editor.

that malarious fever for which the pestilential valleys of Sikkim are so infamous, and, though he escaped with life, all ideas of climbing were necessarily disposed of.

Shortly after this trip Captain Harman took charge of the Sikkim Survey, and made serious endeavours to attain some of the greater heights. He attacked Chomiomo (22,000), but was turned back—more, I understand, through his men refusing to follow than by any difficulty presented by the peak. He then scaled the Donkia Pass (18,400), and from its summit saw in the distance peaks which had been seen before him by Hooker, and which he rightly estimated to be enormous. He courageously spent the night there without proper wraps, in order to measure them in the early morning. He was dreadfully frost-bitten, and lost a portion of his feet. The shock undermined his health, and he was invalided home and shortly afterwards died. Thus, though he did not actually perish on the field, still he may be considered as the first entry on the roll of casualties which our own Alps have made so long, and of which the Himálaya will no doubt claim their share.*

May I be allowed, in closing this introductory sketch, to ask a question of interest for the future? Why are we excluded, not only from Tibet, but from Nipal and Bhutan, and only allowed in Kashmir by the Indian dynasty to whom we ourselves presented it under great restrictions and at stated seasons? Tibet is a portion of the Chinese Empire, and the exclusion of Europeans is, I believe, in direct contravention of the Treaty of Tientsin. A strong remonstrance from our Government ought to be sufficient to remove this exclusion. With Nipal and Bhutan the case is still worse; with the former we make a pretence of friendly terms. We keep a Resident, a prisoner on parole, in Khatmandu, and we confer the Star of India on the leading chiefs. No natural boundary separates the territories; on the contrary, the Himálaya are the only natural, and some day must be the political, boundary of India. Would it not be well to strengthen that boundary by Anglo-Saxon colonisation, which can only succeed in the hills. All along the sub-Himálaya, were it permitted, might be established a chain of sanitaria, of plantations and tea-gardens, and the passes might again become, what Warren Hastings and Bogle tried to make them, trade routes for the commerce of Central Asia. Under the present system it seems as though we

* See 'Surveys of India Report,' 1882–3, p. 38.

should have to depend on Colonel Prejevalsky for any certain knowledge of the vast territory at our very gates.*

The travel I have to describe divides itself into three journeys, i.e. spring in Sikkim, summer in Kumaon, and autumn again in Sikkim. I decided on Sikkim principally owing to the comparative ease of reaching it, and selected as guide Joseph Imboden, of St. Niklaus, whose skill and courage I had frequently seen tried and felt assured of. I wanted to test the so-called winter season, and so started early, landing at Bombay, Feb. 20th, 1883. After a few days at Agra, where I picked up some useful hints from Major Michell, a well-known mountaineer, we went on to Calcutta, and thence to Darjiling.† We had no view of the snows as we went up the wonderful Hill Railway, but instead were treated to a snowstorm and extreme cold. That night I could not sleep a wink. Before dawn I was up and hastened to call Imboden, whom I found in precisely the same state of excitement, and together, we hastened round to the Mall to see the sunrise. Suddenly, far away in the dark and yet incredibly high in the sky, a pale rosy pinnacle stole into light. It was the summit of Kangchinjanga. Downwards stole the first glow, tipping the peaks in succession with a golden glory; then suddenly it vanished, leaving them cold and grey against the dim sky. Presently followed the true sunlight, and again the summits flashed forth their glories as the sun leaped

* I think it expedient to show that the more important suggestions in this paragraph are not made without official authority. I quote, therefore, the following sentences from a 'Sketch of the Mountains and River-basins of India,' by the Geographer to the India Office, published by order of Her Majesty's Secretary of State for India in Council (1870), and sold by Stanford. As to Thibet, Mr. Saunders writes: 'All detailed knowledge of the interior of this extraordinary country is wanting, and it must continue to be a sealed book until friendly pressure is put upon the Government of Peking to allow European intercourse between India and the Chinese dominions.'—p. 3.

Again: 'In these regions (the northern range of the Himálaya, which divides the Sanpu from the Ganges) geographical knowledge is limited to the routes of Captain Turner, Dr. Hooker, and Major Montgomerie's pundits, but it is high time that a resolute effort should be made to render them accessible to European science.'—p. 22.

Mr. Clements Markham writes in the same strain.—R. G. S. Journal, vol. xlv., p. 313, &c.

† I may mention here that my experience does not agree with Major Michell's as to the small cost of travelling with coolies in the mountains.

suddenly above the horizon. Only this, only the simple warm, red tint, appeared. We did not see, and probably no one ever does see, the atmospheric colouring which is so characteristic of sunrise in the Alps. There were none of those vivid colours, the prismatic green passing to the gorgeous blue, the red to the yellow; no peak gleamed like an opal before the God of Day. Still though a study in a monotone, the view was too noble and grand to do aught but excite admiration in anyone beholding it for the first time. Alas! in us it excited something more, and as we turned our lengthening faces from the view we read in each other's eyes, 'Inaccessible!' I was very much surprised, I must confess, as I had been under the impression that the peaks were more remarkable for height than for difficulty. Laden with snow more than their wont, owing to the exceptional winter of 1882-83, they still showed out in all their nakedness huge precipices of black or grey gneiss fringed and bordered with broken and overhanging glacier, that said as plainly as they could speak, 'Thus far and no farther.'

We were delayed some days, pending the arrival of guns, &c., but managed to get off on the 23rd of March, with a splendid set of coolies, fellows who could carry anything and who simply laughed at the 60 lbs. per man we weighed out for them. The road is fairly good as far as the Ramman, the British boundary, after which it degenerates into what it would be flattery to call a track. I will not delay you with our various stages over travelled ground; we made halts at Siriong, Hih, Parmiang-tse, Yoksun, Bora, and reached Jongri on the afternoon of the sixth day. This was extremely fast marching, the distance being 42 miles as the crow flies, and quite double that in actual path; while some idea of the road may be formed from the fact that it involves ascents and descents amounting in the whole to 23,000 and 16,000 feet respectively. The last day from Bora to Jongri is very difficult and quite impassable for beasts of burden. We came on snow about 10,000 ft. above the sea. Trees grow only to the top of the ridge, rhododendrons, in a thick impervious jungle, even higher. Finally, the ridge flattens out into a rolling table-land, some 14,000 ft. above the sea, and here stands a solitary little stone hut, the habitation of the herdsmen in summer.

The next day we took the three best men and proceeded west to the foot of the Kangla Pass, which leads into Nipal. The summit of the pass is some 17,000 ft., and is crowned by a noble saddle glacier, whilst on either side rises a sharp rock

tooth some 1,500 ft. higher. We turned to the right, to the foot of the glacier which flows in a beautiful stream south-west from Kangchinjanga. Here we encamped on the moraine in one of the grandest amphitheatres imaginable. Due east rose Kabru, 24,015, its western face almost like a wall, corniced with huge masses of glacier and snow, from which thundered an incessant volley of avalanche. North-east rose Kangchinjanga, its grey precipices even now but lightly touched with snow. North, Junnoo showed its awful southern cliff, whilst west rose a great peak of snow and rock, great actually, though small and easy as compared with its neighbours. The night was the coldest we experienced in the Himálaya—8° Fahr. being the minimum reading of the thermometer.

Early next morning Imboden and I started to ascend the peak on our west. It was a hard and interesting scramble of some 5½ hours, rock and snow alternately. Only one place offered any serious difficulty, and at 10.15 we were on the summit. Though the western view was clouded, we had a noble view of the north-west of Kangchinjanga. Both by aneroid and by comparison with surrounding peaks we estimated our height as rather over 20,000 ft.* It was too cold to stay long, so we descended, packed up our lightened traps, and returned to Jongri, which we reached after a very long and fatiguing tramp, all very tired. Next day we were off again, this time due north, for the glacier from which flows the Great Rungeet. The descent is steep for about 800 ft., then a steady three miles' ascent over very bad broken ground leads to the foot of the glacier between Kabru and Pundim. Here we found a series of small lakes, now frozen hard and fast. Up the ice we went till we reached the foot of the Guicho La, the pass between Pundim and the south-east arête of Kangchinjanga. Here we camped amongst a wilderness of huge gneiss boulders. Next morning after traversing difficult ground, we crossed the pass (rather over 16,000 ft. G.T.S.), and descended first to a level bit of grass-land containing five small tarns, and then by a further descent to the great glacier, which flows almost due east from Kangchinjanga. Right above us rose the towering crags of Siniolchum

* I carried with me an aneroid barometer by Solomons, graduated to 23,000 feet. The heights it gave corresponded, where comparison was possible, within, generally, 100 feet with the G.T.S. heights up to 14,000 feet. Above this, measurements taken with it had only a differential value. It was compared and corrected at Calcutta between each of the three tours here described.

and D_2, behind us lay Kabru and Pundim, so that we were absolutely surrounded by the snowy giants. We thus succeeded in seeing both the northern flanks of Kangchinjanga, and always supposing that the great northern arête can be crossed (which I believe), I should reckon that the circuit of the great peak might be made within nine days, at any rate far within the month allowed by Hooker, who, however, based his calculations on known trade-routes. It would involve one pass of 16,000 ft., one double one of 16 and 17,000, and one of nearly 20,000 ft. Snow now began to fall heavily, and we judged it prudent to return at once, reaching Jongri on the next day.

I now considered the expediency of retiring: it was evidently far too early for climbing, the avalanches were incessant on all sides, the cold was intense, and nearly all the coolies were suffering either from frost-bite, snow-blindness, or fever. A straw turned the balance; a cooly, half asleep from cold, burned my climbing-boots, which I had given him to dry. The next day we started on a retreat almost as precipitate as our advance. One amusing, though somewhat startling, adventure broke the monotony of returning. Imboden and I were on ahead, the ground was deep in snow, though in the forest, and we were shooting small birds. Suddenly, with a crash, a bear broke into the path some five yards in front of us. Imboden, who had the gun, ran up a tree like a lamplighter, whilst I, being unprotected, fairly turned and bolted. Fortunately for me, the bear broke through the snow, which bore my weight, and after a chase of about 100 yards, he gave up. When I reached the coolies and got my rifle, we took up the pursuit, but his bearship took refuge in quite an impenetrable cane-brake, and we had to relinquish our ideas of vengeance. Nothing more occurred, and we regained Darjiling on the 10th of April.

One cooly we had to leave behind, apparently at death's door, with fever. I left him at Hih with some friends, and gave them ample money for him, but could not wait to hear the result. What was worse, Imboden got a touch of fever and diarrhœa, caught in these malarious valleys, and in addition, became so homesick that I was obliged to send him home.

Then came the difficulty of getting a substitute. I had arranged with Emil Boss, one of the landlords of the *Bär* of Grindelwald, and also a captain in the Swiss Army, to send me out another guide, but at the last moment the men proposed refused or were unable to come alone. In the pluckiest

way Boss himself came at a moment's notice, bringing Ulrich Kauffmann as guide, and a better pair of mountaineers I never wish to meet with.

However, all these preliminaries took time, and it was towards the end of June before the men arrived at Nynee Tal, whence I proposed to try the Gurhwal range. We started on the 24th, accompanied by M. Décle, a French member of the Alpine Club. As for the first ten or eleven days we were on a comparatively beaten track, I will hurry over our preliminary marches. Ranikhet, Dourahat, Rawari, Lobah, Narambagar, Nandak, Ganga, Ramni camp, Pana, Kuari Pass, Joshimath, were our successive halts. The rains were just beginning and we were much troubled by that awful Indian plague the hill-leech. In length about an inch, and about the thickness of a knitting-needle, the bloodthirstiness of this tiny pest is horrible. It is no uncommon occurrence to take twenty off at one time, and nothing keeps them out. Décle turned back at Pana, fairly done up with our various troubles, and we went on alone. From Josimath we went along the Alknanda to Rini, the track in parts consisting of a plank or two resting on pegs driven into the rock, whilst the river thunders along beneath. From Rini we hoped to attack Nanda Devi, and accordingly proceeded up the Rishi Ganga. After a day's march, very short but over very difficult and untrodden ground, we were stopped by a curious phenomenon. A glacier had once flowed due north down a lateral ravine from Trisul. It has now retreated, leaving behind a trench worn to the most impassable smoothness. Five hundred feet is the smallest depth I could give it, and though we very carefully inspected its western side, we could find no place to cross it. Nor was it possible to turn it; and I may here remark that these difficulties in the valleys, before you can get near the peaks, are among the most formidable obstacles to Himálayan exploration. Accordingly we had to return, and I then decided to try smaller game, and attempt Dunagiri, 23,186 ft. (G.T.S.). We started up the next valley, down which flows the Dunagiri Glacier. It is impossible to exaggerate the difficulties of traversing these canons. After two days along the river we found the valley so difficult that, in sheer despair, we took to the summit of the ridge. After various ups and downs (one ridge we crossed was just 18,000 ft. [G.T.S.]), we reached the foot of Dunagiri. We had had some very good sport on the way, especially bagging a snow-leopard, a very rare animal. Here a fresh shock awaited me—the coolies were

out of provisions. Although I had supplied them with rations for a fortnight, they had eaten them all in five days. I sent most of them down to a summer village on the north of the ridge, and only retained three with us, one of whom was a little shikari, our local guide.

Next day we took matters very easily, only going to the head of the glacier, where serious climbing began, and camping there. Our height was 18,400 ft. (by aneroid and comparison), so I thought it advisable to send the coolies down, an order which they joyfully obeyed. I shall never forget that view. Due south, with the awful gorge of the Rishi Ganga between, rose the Trisuli and Nanda Devi; east was Dunagiri, on whose very flanks we were lying; north stood Kamet with his attendant peaks; whilst on the west towered Gangootri, like a wall. Nor was this all, for all these peaks are set with rocky aiguilles, all equally black and all equally impossible. I fear I may be taken to task for using the word 'impossible,' which some aver should not occur in the climber's dictionary. Still, the powers of man are limited, whilst those of nature are hardly so. In Switzerland, even, aiguilles, which rarely give more than 1,000 ft. of hard climbing, long resisted the assaults of the best climbers, and only succumbed after a long day's toil. What shall then be said of these rock-towers, at least equally difficult, and beside which the Matterhorn is a mere dwarf? Many of them show 5,000 to 6,000 ft. of sheer descent; and yet look and are no more than second-class peaks beside their mighty brethren.

The night was comparatively warm, and we rather overslept ourselves, so that it was broad daylight before we had fairly started. Our route lay up the west ridge, and for some considerable distance we got along very well. Then we were forced away from the edge to the southern side of the arête, and here we suffered much from the great heat and the reverberation of the sun's rays from the snow, which took greater effect from the height we had reached. So much did this trouble us that we were all nearly fainting when we reached the summit of the arête.

Kauffmann, who had been unwell at starting, was quite overcome, and utterly unable to proceed. We did not like to leave him, but he begged us not to turn on his account; and as we thought that we must succeed, we made him comfortable, and started by our two selves. We were now on the final slope of the peak, and, though not abnormal, it was a very steep bit of step-cutting. The mist crept up and

snow began to fall, and we were thinking of turning, for we had been two hours from Kauffmann, and it was already one. Suddenly the mist cleared away, and we instantly saw the great height which we had reached. Actually below us lay a splendid peak, A_{21}, to which we afterwards gave the name of Mount Monal, 22,516. Over its very summit we saw A_{22}, 21,001, the remaining peak of the Dunagiri chain. We cannot, therefore, have been less than 22,700, and the summit, not 500 ft. above us, was in full sight. We again attacked vigorously, Boss just making notches and I enlarging them to steps. But it was no use; down swept the clouds with a biting hail and wind, and we had to turn. It was with difficulty that we got down again; the mist and stinging of the hail prevented us from seeing the steps clearly, and I fully expected a slip. We picked up Kauffmann and got down with great difficulty, the last part of the way being in darkness. Here another trouble awaited us; everything was soaking wet—matches, food, blankets, and ourselves—whilst the wind cut us like a knife. Boss insisted on our keeping awake, and I have no doubt he was right, but, tired out as I was, it was very unpleasant. Next day we carried our things and got down to our lower camp, to the great joy of our coolies, who had given us up for lost.

As this was the first occasion on which we reached an unusual height, it may not be amiss to give our personal experience. Neither in this nor in any other ascent did we feel any inconvenience in breathing other than the ordinary panting inseparable from any great muscular exertion. Headaches, nausea, bleeding at the nose, temporary loss of sight and hearing, were conspicuous only by their absence, and the only organ perceptibly affected was the heart, whose beatings became very perceptible, quite audible, whilst the pace was decidedly increased.

Unquestionably man's range is increasing. Read any old account of an ascent of Mont Blanc; it was expected that the climber should suffer every possible inconvenience from rarefied air, and the harrowing details were duly forthcoming. Now the ascent is mere child's play, and we hear no more of these agonising horrors. How is this to be accounted for? Many people, friends of my own, have felt various symptoms arising from high ascents; many others, and I amongst the number, have never felt anything of the kind. May it not be that the real strain is on the heart, and that, therefore, those with a weak heart are affected, those with a strong heart escape? I, for one, cannot believe that the

air will be a serious hindrance to sound men in the Himálaya, seeing that balloon ascents have been made to 30,000, and even 35,000 ft., and though the aeronauts suffered, it was more from cold than difficulty of breathing. It must be remembered, too, that a balloon ascent is a sudden change whilst a mountain ascent is made by slow degrees and gradual acclimatisation, and that since the pressure of half the atmosphere is already removed at 18,500 ft., when 24,000 ft. has been reached, the next 5,000 ft. only involve a comparatively small diminution of pressure. Personally I believe that, supposing the actual natural difficulties to be overcome, the air, or the want of it, will prove no obstacle to the ascent of the very highest peaks in the world. I should add that my companions were respectively thirty-two and thirty-eight years of age.*

The weather now set in very bad, heavy snow nightly, and we accordingly returned to Rini, and made our preparations for an expedition to Nanda Devi. Profiting by our previous experience, we took the north bank of the river, and in three days of awful weather reached Dunassau. This is a singular little table-land of about 16,000 ft. in elevation, and protected on all sides by rocky cliffs from 500 to 1,000 ft. more. Judging from the shape alone, I should have thought it an extinct volcano, but I could find no trace of any volcanic matter. This is used as a pasture-ground in the summer, and we found a flock of beautiful goats, herded by two filthy objects, who were indubitably the lower animals of the two. Here we were fairly stopped by very bad weather, and by violent attacks of diarrhœa, which afflicted both Boss and myself. Our coolies were at least as well or as badly off as ourselves, but they got very frightened, saying that Deva was angry with our presumption, and imploring us to return, lest a worst thing should befall us. Finding us immovable, they cut the Gordian knot, and on the 2nd fourteen of them fairly bolted, leaving us with six in all. We were not going to be beaten, so only taking food and one tent, loading ourselves, we pushed on. For four days we toiled on pretty hard, and reached the foot of the glacier on the fourth day. This was all probably untrodden ground, as we found that

* In 'La Géographie Médicale' par A. Bordier (Bibliothèque des Sciences Contemporaines), p. 50, an elaborate discussion of the effects of rarity of the air on the human frame, and of Mons. P. Bert's experiments, will be found. An article on the same subject, by Dr. Marcet, F.R.S., is contained in No. 3 of the 'Echo des Alpes' of Geneva, for 1883.—D. W. F.

the map, part of the Topographical Survey on the large scale of 1 inch to the mile, was highly inaccurate. I am sorry to have to criticise any work of members of a body from whom I received so much valuable aid and kindness as the Indian Staff, but what can I say when we found one whole range omitted, glaciers portrayed where trees of 4 ft. thickness are growing, and the hill shading generally entirely imaginary? I have the more confidence in this criticism as Mr. Kennedy, who made an expedition with alpine guides in August last, on the east of Nanda Devi, describes his map, part of the same Survey, as 'beautifully inaccurate.'*

The wildness of this gorge is almost indescribable. Some idea of the ground may be formed from the fact that in four days we barely compassed 20 miles. In one place, a peak of 17,056 ft. (G.T.S.) falls almost sheer into the stream, which does not exceed 9,000 ft. at that spot. In many places it was only by holding on for dear life and using the rope that we could get on at all. At last we were completely brought to a standstill. The river—for even here it is a big stream—comes dashing down a precipice of some 200 ft., and further progress on our side became impossible. Could we have crossed, some three hours would have put us well on the glacier; this, however, was out of the question, for the stream was running with great fury, and whirled away like straws a couple of pines with which we tried to make a bridge.

We had plenty of provisions and sat down deliberately to wait 'dum defluat amnis.' Luck, however, was against us; the rest of our coolies were frightened by the unusual toil and weather, and bolted, leaving us three alone with one faithful shikari who stuck to us. This was a deathblow to our hopes, and we had to return. It was provoking, for we had been delighted to see that a route was clear and possible to within 2,000 ft. of the summit. True, the last 2,000 ft. looked black and threatening, but there is usually a way to be found up rocks when not too lofty. We had to abandon everything but indispensables, and by dint of carrying some 50 lbs. a man, made our way back to the stage before Dunassau. Of course as soon as we got back the weather changed, and we had four most perfect days for climbing! We sent the shikari back to his native village to bring up some coolies, and during his absence made an assault on A_{21} (22,516). We slept at about 18,000 ft., and the next day achieved the ascent very

* For a further discussion of this map see p. 54.

successfully from the western ridge. It was a fair climb, but presented no great difficulties. We called the peak Mount Monal, from the unusual number of those lovely snow-pheasants we saw on it. We then decided to try the third and last peak in the Dunagiri range, A_{22} (21,001). I had not much hope of success, as it was extraordinarily steep, no snow lying on it. We slept well above the snow-line in one of the most extraordinary places I have seen. We had marked a cavern to sleep in, and when we reached it we found it contained what I can only describe as a miniature subterranean glacier which was fed by an aperture at the back from a small basin of nevé above. It was very curious to see the floor of the cave, about 100 ft. by 30, exhibiting imitations of all the usual glacier phenomena, with crevasses, two moraines, &c. The surface, however, was smooth and polished, and did not exhibit the worn and rough appearance produced by exposure to the sun. It differed from the Swiss and Savoy ice-caves described by Mr. Browne,* in being fed from permanent snows and not from the drift of winter storms. On the morrow, as I expected, we were defeated. We reached a height rather over 20,000 ft. (estimated), but were fairly stopped by the last precipice.

On our return we found the coolies had arrived, so we went back to Rini and thence by stages to Nynee Tal. We returned by the great pilgrim route *viâ* Nand Prayag and Karam Prayag, meeting many hundreds of the pious on their way to Budrinâth and the sacred shrines. The road, particularly after the rains, was in a very bad state; but this is the normal state of hill-roads, which are usually left to look after themselves till a message arrives that the Governor or some great man is coming along. No particular incident broke the 150-mile tramp, and we got back into Nynee Tal on August 12th, having had a pleasant, if not very successful trip.

We then prepared for what we intended to be our *pièce de résistance*, i.e. another trip to Sikkim. We made all our preparations in Calcutta, reached Darjiling on the 22nd, and were able to start on the 25th of the same month. I took the same Sirdar as I had before—a sturdy, honest Tibetan, by name Gaga, who had the extra advantage of speaking Hindustani and a little English. This time, however, we were not so fortunate with our coolies. Owing to the abundant employment at Darjiling itself, it was very difficult to

* See 'Ice-caves in France and Switzerland.'

get good men, and we were finally obliged to put up with rather a scratch pack, over whom Gaga had little control. We soon found this out, for they took to halting wherever they thought proper, and one deliberately set down his load and bolted. The road was worse than before, owing to the constant rains, and leeches were in swarms. The extraordinary number of insects and their aggressiveness is one of the greatest drawbacks to travelling in Sikkim. Mosquitoes are bad enough, bamboo ticks are worse, but the pinnacle of infamy belongs unquestionably to the 'peepsa.' This is a tiny dipterous fly, whose bite leaves a small spot of extravasated blood under the skin, and whether you open it or leave it alone, the irritation is equally intense. Kerosene oil we found kept them off in some measure, but even that was not of much account. On the other hand, there was something to make up for these little troubles. The jungle was magnificent—creepers, orchids, and the most superb magnolias; whilst the size and variety of the moths and butterflies is almost beyond description. We amassed a little collection of over 200 varieties, and a German collector at Darjiling caught in one year, within a radius of 30 miles, upwards of 800 varieties, nearly one-half of which were butterflies and more than 100 absolutely new to science.

Our progress was necessarily slow, and we only reached Jongri on the 2nd of September, i.e. in nine days. We found the hut now occupied by a goitrous old woman and her grandson. They were the guardians of the herd of yak which are annually sent up to these rich pastures. A few presents made them readily allow us to share the house, which was certainly better than tents. As a general rule, September is fairly fine in the mountains, but last year (1883) was very abnormal, and, to our horror, the rains set in worse than ever. The coolies became very discontented, and I finally decided to dismiss most of them. As there would be no climbing for at least a fortnight, we sent the Sirdar with four others back to Darjiling to bring up half a dozen more amenable porters, and also a further supply of rice. Two others were sent to bring some rice we had left at Yoksun, two remained with us and the rest were paid off and dismissed. On the 4th and 5th of September we explored the west side of Kabru and followed the great glacier which descends from Kangchinjanga. The weather was very bad, but we saw enough of the peak to satisfy us that there was not much, if any, chance of success in that quarter. On the 6th, a shepherd who came up reported that

there were *Ovis ammon* in the glen immediately south of Kabru, so off we went, and after a very long tramp next day, came back empty-handed, but with the unpleasant knowledge that the southern face of Kabru was more difficult than the western, being one mass of broken glacier. Returning, a large boulder nearly fell on Boss's leg, and he only saved himself by interposing his gun, the stock of which was smashed.

On the 8th, the two coolies turned up very ill. We conveyed a lot of provisions and blankets to a ruined hut at Ahluthang, at the foot of the Guicho La. On examining the coolies we found that they had only themselves to blame. They admitted that they had eaten thirty seers (a seer= 2 lbs. avoirdupois) of rice in four days, which, when one considers that rice takes up two or three times its weight of water in cooking, comes to a good square meal. The result was that they both got an obstruction, and for some days I thought they must die. However, castor oil and milk finally relieved them, but for just a month they were down and absolutely useless. On the 13th we shifted our headquarters to Ahluthang, and here we were absolutely imprisoned by incessant rain. On the 17th a chuprassie arrived from Colonel Tanner with the unpleasant news that Gaga and our relief party were all down with fever, and others would not go. In the kindest manner he placed at my disposal a store of rice which he had sent up to Gongri for an expedition of his own, and it was solely owing to this kindness that we were not compelled to retreat.

During part of this time I suffered from a touch of blood-poisoning, as the dye from my kharki trousers got into the numerous leech-bites, causing my legs to break out into a mass of small boils.

On the 19th, we started to ascend Jubonu, but, before even we reached our bivouac, were driven back by a heavy fall of snow.

On the 23rd we crossed the Guicho La, purposing to attack Pundim from the north, but, on reconnoitring, we found it quite impracticable. I do not know of any more formidable peak. On the west side it drops sheer, whilst the other three are guarded by the most extraordinary overhanging glaciers, which quite forbid any attempt. We returned on the 26th, the weather being consistently bad, and it was not till the 29th that the break came. That night we had a bitter frost, and the stars flashed out once more. Early on September 30 we started for Jubonu, which lies

immediately east of our camp. At 2 P.M. we had reached a suitable place, well above snow-line, and camped there. Height by aneroid was 18,300, and, though absolute reliance cannot be placed on such uncorrected observations, I think that at least 18,000 may be taken as correct. We got off at earliest dawn the next day, i.e. at 4.30, and settled down to our work at once, leaving the coolies behind. The snow was in good order, and Kauffmann led the way at a great pace. He is, I believe, generally admitted to be one of the fastest step-cutters living, and this day and afterwards he fairly surpassed himself. The glacier was crowned with steep rocks, which formed the edge of a noble amphitheatre formed by Jubonu and Nursingh. We were now on the peak itself, and proceeded to cut up a steep snow couloir. This gradually got steeper till we were forced to take to the rocks. With the exception of one place, which greatly resembled the celebrated chimney on the Breil side of the Matterhorn, we got along very well till we reached the final crags, which rose some 300 ft. above us. We now turned northwards along the slopes of the glacier, which swept down from the rocks. Fortunately there was an incipient bergschrund, and we passed along in this to the north side, whence a short but exceedingly steep slope of nevé led us to the summit, which we reached at 11 A.M. without a halt. This was incomparably the hardest ascent we had in the Himálaya, owing to the great steepness of the glacier work. I consider—and in this I am borne out by both my companions—that glaciers lie at a greater angle in the Himálaya than in Switzerland; and, indeed, the general slope of the peaks is greater.

The height of the peak is 21,300 or 21,400 ft., according to G.T.S. measurements. In the descent we suffered considerably from the heat, which is felt much more at these elevations than is perhaps generally supposed. On the 3rd we examined carefully the eastern face of Kabru, and made all preparations for an assault. On the 6th we finally started, and made our way up the eastern glacier of Kabru. On its banks we met with immense quantities of Edelweiss, the climber's flower, and success was prophesied accordingly. We climbed up the highest moraine I have seen (fully 800 ft.) to the base of the eastern cliff of Kabru. There was only one route to the higher slopes, and that we could not find in the mist. Heavy snow fell, and we camped where we were. Next day we found our opening and worked up it. We three went on ahead and pushed straight up the

face of the ridge, intending, if possible, to camp on its summit. This we reached at midday, but found that we were cut off from the true peak by a chasm in the arête, so that we were on a detached buttress. We descended, met the coolies ascending, and turned north along the steep snow slope, finding at last a small ledge just big enough to accommodate the Whymper tent.

This was, I think, the highest camp we had, being certainly 18,500 ft. I estimate this by aneroid and comparison. The night, however, was mild, and the coolies, who were very tired, preferred to stay up instead of descending as before. We were off next morning at 4.30, and found at once all our work cut out for us. The very first thing was the worst. A long couloir like a half-funnel, crowned with rocks, had to be passed. The snow was lying loose, just ready to slide, and the greatest possible care had to be taken to avoid an avalanche. Then a steep ice-slope led us to a snow incline, and so to the foot of the true peak. Here we had nearly 1,000 ft. of most delightful rock-work, forming a perfect staircase. At 10 we were at the top of this, and not more than 1,500 ft. above was the eastern summit. A short halt for food and then came the tug of war. All this last slope is pure ice, at an angle of from 45° to nearly 60°. Owing to the heavy snow and the subsequent frost, it was coated three or four inches deep with frozen snow, and up this coating we cut. I am perfectly aware that it was a most hazardous proceeding, and in cold blood, I should not try it again, but only in this state would the ascent have been possible in the time. Kauffmann led all the way, and at 12.15 we reached the lower summit of Kabru, at least 23,700 ft. above the sea. The glories of the view were beyond all compare. North-west, less than seventy miles, lay Mount Everest, and I pointed it out to Boss, who had never seen it, as the highest mountain in the world. 'That it cannot be,' he replied: 'those are higher' —pointing to two peaks which towered far above on a second and more distant range, and showed over the slope of Everest at a rough guess some 80 to 100 miles farther north. I was astonished, but we were all agreed that, in our judgment, the unknown peaks, one rock and one snow, were loftier. Of course, such an idea rests purely on eyesight; but, looking from such a height, objects appear in their true proportions, and we could distinguish perfectly between the peaks of known measurements, however slight the differences. It has been suggested to me since that we mistook Mount Everest; but this is impossible; for just here occurs the remarkable

break in the chain, and there is no snow range at all between Kabru and the group of Mount Everest.* However, we had no long time for the view, for the actual summit was connected with ours by a short arête, and rose in about 300 ft. of the steepest ice I have seen. We went at it, and after an hour and a half we reached our goal. The summit was cleft by three gashes, and into one of these we got. The absolute summit was little more than a pillar of ice, and rose at most 30 or 40 ft. above us still, but, independently of the extreme difficulty and danger of attempting it, we had no time. A bottle was left at our highest point, and we descended. The descent was worse than the ascent, and we had to proceed backwards, as the snow might give way at any moment. At last we reached the rocks, and there we fixed a large Bhotia flag on a smooth slab. We then hastened on, the latter part of the descent being made in the dark, and finally turned into camp at ten, having been much helped by a brilliant moon. The ascent was dangerous rather than difficult, but without the new snow the difficulties would have been enormously increased. During the ascent we saw a pair of snow-white hawks at a height of quite 22,000 ft., and their flight did not seem to be in the least impaired by any atmospheric effect.†

We felt, after this success, emboldened enough to try something even more formidable, and having engaged some more coolies from Yoksun, on the 13th we started for the Kang La once more. This time we held on due west and camped at the foot of the glacier. Next morning we crossed

* The pundit on whose statement the 'very high snowy peak,' inserted in official maps on the inner range north of the Arun, rests, is shown by the Report of the Indian Survey, 1871–2, Appendix, pp. 1–6, to be 'No. 9.' Colonel Montgomerie speaks with respect of his qualifications. He took boiling-point and latitude observations. One paragraph of Colonel Montgomerie's report deserves particular attention, for the peak mentioned in it is exactly in the position assigned by Mr. Graham—who had never seen this report—to his new mountain higher than Mount Everest. 'Several of the other peaks fixed by the explorer were very lofty ones, covered with perpetual snow to a great distance below their summits. Those north of Mount Everest and Kangchinjanga are perhaps the most interesting as being beyond (?) the Himálayan watershed. *One, to the north of the road between Shakia and Dengri, the explorer thought was very much loftier than any of the others.*'—D. W. F.

† The summit of Kabru is given by the G.T.S.—the high accuracy of which is, I believe, indisputable—at 24,015 feet. Our point must therefore have been within a few feet of 24,000 feet.

the pass, 17,500 (G.T.S.), into Nipal, and I ascended a peak west of the pass of which the G.T. height is nearly 19,000 feet. From this we were able to carefully examine Junnoo, and came to the conclusion that it was too late to attempt such an ascent. We thought that we could again distinguish the afore-mentioned great peaks, but the horizon was not so defined as on our previous view. We accordingly gave up further ascents, and returned by steady marches to Darjiling, which we reached on the 22nd.

One more trip we made, starting on the 29th. We went up the Teesta Valley *viâ* Tumlong and Cheungtam to the juncture of the Zemu and the Lachen, where we halted at the foot D_3, 19,183. The winter set in with heavy snow before we could recommence climbing, and we were obliged to finally refrain. We returned and reached Darjiling once more, on the 21st, and soon afterwards Kauffmann left for Switzerland, Boss remaining with me for a shooting trip in the Terai.

And here in mentioning them for the last time I must pay a tribute to my two Swiss companions, a tribute the more necessary in one case as the hasty sentences of a private letter have found a publicity and been given a meaning equally far from my intention. Comparisons are proverbially odious; but this I must say that both men are admirable in all the qualities that make the ordinary first-rate Alpine guide. Wherever a strong arm was needed to overcome mountain obstacles, Kauffmann's was ready. It is no disparagement to him to say that Boss was something more. He has that power of pathfinding which is rare equally among guides and mountaineers; he has that still rarer power of being daunted by no unfamiliar obstacle or danger, whether above or below the snow-line, which makes the true traveller. I could say more but that he is present to-night, and I fear to hurt his modesty. I will only add an expression of the pleasure with which I have heard that the Council of the Geographical Society has distinguished him by a prize which I am sure he will always highly value.

I may mention in conclusion that I left the corrections we were enabled to make in the maps of the Sikkim frontier, in the hands of the Survey Department in India. I shall not venture into details I can hardly, without the sheets before me, succeed in rendering intelligible. I ought to state, however, that your map maker has been placed at a disadvantage in preparing the diagrams before you, inasmuch as the sheets of the new survey of Sikkim, on a scale of 2 miles to the