

addition to containing the latest information, will have the hills painted in grey, in order to make the map more legible. A third edition of the 32-mile map of India is in preparation. It differs from the previous editions in being extended both to the east and west, so as to include the whole of Baluchistan and Burma. The skeleton railway maps of India, on the 48 and 64-mile scales, have been corrected up to January 1890. Editions of these, with hills, have been prepared and published, with the hills in grey tint. These two maps will be found useful to those requiring good general maps of India not overcrowded with detail.

A large amount of work was thrown upon the geographical drawing and compilation branch, owing to the complete alteration of the district and *taluk* boundaries by the Mysore Government, and the consequent necessity of revising the whole of the standard sheets of the Mysore Survey.

Among the various pieces of work turned out by the Photographic and Lithographic branch may be mentioned a panoramic profile of the Hill Ranges of the Himalayas seen from Landour, lithographed in colour from a drawing by Major St. G. C. Gore, R.E., and a new military map of India showing the military districts and commands in red.

The great services to photographic science and art rendered by Colonel Waterhouse, Assistant Surveyor-General, have been recognised by the grant of the Photographic Society of Great Britain's "Progress Medal" for 1890, for his "original and continuous researches in relation to orthochromatic photography; for his successful elaboration of a process of photographic etching, and for his recent investigations on the action of thio-carbamides in the direct production of reversed images."

The new drawing-office at Simla, under Colonel Holdich, has been chiefly employed in the preparation of the western sheets of the north-west frontier series and the maps of the South-West Asia series on the 8-mile scale, a task which necessitates great care in the extraction and collation of all information from gazetteers, reconnaissances, reports, and miscellaneous documents.

Our present Knowledge of the Himalayas.

By Colonel H. C. B. TANNER (Indian Staff Corps).

(Read at the Evening Meeting, April 27th, 1891.)

THE paper I am now about to read will, I fear, afford little, if any, new information on the great Himalayan region; but as I have been honoured with an invitation to offer remarks on my experiences and work, extending over a long period of years, on our northern frontier, I gladly subscribe my quota of information to the general store which you have been so long collecting.

These pages are written chiefly from memory, and if from this reason any slight inaccuracies occur, I trust that they may be leniently dealt with. The subject is a vast one, and my chief difficulty has been to sufficiently curtail my paper, so that I may not trespass too long on your patience.

Of the history of Himalayan geographical research I have been

unable to learn much, but as it is probably known to many here present, I pass it over and commence with some remarks on the subject of Snow—the “Him” of Sanscrit—the “Im” of Pliny, which occurs in Imaus, the name by which he is said to have known the Himalayas. Avalanches play a great part in the conformation of the topography—a greater part, indeed, than is generally supposed, and this factor has not received the attention that it deserves at the hands of geologists. If we imagine a great slope scoured for centuries by ponderous masses of snow, which carry down with them all that is movable, we may suppose that the accumulation of the débris at the foot of the slope would present some peculiar features, or, at least, that the piled-up waste of the mountain would exert a noticeable influence on the drainage of the valley into which it was poured, and this we find to be the case. At the base of slopes which receive a large snow-fall there are always fan-shaped, turf-clad declivities, which push the stream over against the opposite side of the valley, where unscalable cliffs are the result. We find in the spring and early summer, after a winter season of ordinary severity, whole valleys lying hundreds of feet deep in snow. Valleys which in summer present rocky beds with precipitous banks, over which it is difficult and laborious to travel, may be passed over as gentle down-like declivities when the snow has sufficiently hardened to bear the weight of man. The torrent may be heard now and then rushing along in its dark tunnel where the snow lies thin, and sometimes a forbidding chasm reveals it if you peer down into the recesses of these dangerous holes. One may travel miles over such snow slopes, treading lightly where you hear the deep hum of the waters very close below your feet, and glissading merrily down where the gradient is sufficiently steep to admit of this pastime.

In the year 1879 I had occasion to travel through Kashmir to Gilgit, and it was my fortune to observe the havoc committed by the avalanches of that year of calamity, when, from the excessive snowfall, the fields of the upper villages were not cleared of snow sufficiently early to permit cultivation. In some places large areas of forest had been levelled and carried along by the snow, and piled up in narrow places into great masses of tree trunks, some whole, others broken into a thousand splinters, but all interwoven in inextricable chaos and confusion. One avalanche, near the well-known hunting retreat of Tragbal, had received such an impetus on the mountain side whence it originated, that it was propelled nearly half a mile through a forest, where the gradient was but slight or almost nil. The giant trees went down before it like grass under a steam roller, leaving here and there only a shattered tree-trunk standing alone.

Between Tragbal and Gurais an avalanche at one place had filled the valley, and on this had been precipitated a considerable landslip with its forest trees. The stream tunnelled a way through the mass, and for two

or three years this icy-walled passage through the snow was the only practicable route up the valley.

Beyond Gurais, and on the Gilgit side of Astor, one of the valleys of Nanga Parbat had been so scoured out by avalanches that the forest lay combed down *longitudinally with the course of the valley*, and this happened at least five or six hundred feet from the torrent, which means that the snow must have made its way along the valley-trough in a mass five or six hundred feet deep. The snow happened to have been arrested at a narrow gorge, which I found quite choked up with tree-trunks, the combined strength of which had arrested its further progress.

I became acquainted with four distinct kinds of avalanche,* which, perhaps, are called by distinctive names by mountaineers, though I have been unable to ascertain them. The first, and the most common, is the precipitation of a mass of new snow from slopes which, from their steepness, are unable to retain more than a limited quantity on them. They occur generally in winter and in early spring, and are the cause of the results just described. The second kind of avalanche is a descent of *old* snow, which is loosened by the heat of the sun. They may be heard throughout the summer and autumn, and are dangerous from the unexpected and irregular manner in which they slide off. The sportsman and traveller should guard against them by intelligently placing his camp in some sheltered spot out of their reach. This class is not usually of any great extent or weight, but such avalanches are of constant occurrence. The third kind can only be seen when the mountains are of peculiar formation or structure, and are really ice, and not snow avalanches. They are of very constant occurrence in some localities, more particularly where small glaciers are situated high up on the crest of mountains, and are gradually pushed over the edge. In Lahaul, in the company of a friend,† we watched the face of the well-known Gondla cliffs from the right bank of the Chandra River, and saw a number of these ice-falls, which came down every few minutes, filling the air with the noise of the loosened rocks and ice-blocks. The fourth kind of avalanche is one that I have only once seen, and have never known described. It is very curious, being the movement of billions of snowballs, which in a stream a mile or half a mile long, I

* Mr. Freshfield sends me the following note on avalanches:—Class 1 are, I think, "Staub-Lawinen," or dust-avalanches, so called from the snow being less compact, and falling in cloud-like incoherent masses. 2. "Grund-Lawinen," which fall "im Grund" down to the valley bottoms, or at any rate below the snow-level. 3. Are the summer ice or glacier-avalanches, such as are seen every fine day on the cliffs of the Jungfrau and Wetterhorn. 4. Is a variety of this 3 sort. The "snowballs" are disintegrated névé, that is, snow not yet transformed into ice. The material is not "rolled up into balls," but broken into balls by the descent. I have seen falls of this kind, and have watched the "balls" play leap-frog over one another often enough. The sound noticed is very characteristic, and not easily forgotten.—D. W. F.

† Sir Benjamin Simpson, who was so fortunate as to secure a photograph of an avalanche actually in motion.

saw slowly wind down the upper part of an elevated valley in the Gilgit-Darel mountains. I was after ibex at the time of the occurrence, and was watching a herd of these animals when I became aware of a low but distinct and unusual sound, produced by a great snake-like mass of snow winding down one of the valleys in my front. It occasionally stopped for a moment, and then proceeded again, and finally came to rest below me. I found this curious movement of snow was produced by countless numbers of snowballs, about the size of one's head, rolling over and over each other. The torrent-bed was full of them, an accumulation formed by numerous similar freaks of nature. I am quite unable to account for such an avalanche as the one now described. How does it originate? or by what process is the snow rolled up into these innumerable balls?

The sportsman, surveyor, or artist, when alone in the forbidding solitudes of the higher Himalayas, frequently hears the rocks grinding their way down from the heights into the valleys, and very often hears avalanches descending, but he sees few. The sound of a falling avalanche may be heard at a distance of several miles, and when he hears one he in vain looks in the direction of the noise. The reason is not far to seek, when we remember that an avalanche takes but a few seconds to complete its course, and that sound travels about a mile in five seconds.

On one occasion it was my fortune to see an avalanche of what I will here name the first class, descend from the upper slopes of one of the Kumaon peaks, about 22,000 feet. Its nose was rounded, and it tore down the steep snowfield at a great pace, sending up a cloud of powdered ice particles behind it; presently, after the snow had lodged in the Karnali valley, the deep roar of the avalanche reached me. In this case I happened to be looking in the right direction, otherwise I should not have perceived the occurrence at all.

We have but few recorded descriptions of Himalayan floods, and these are I think only to be found in Mr. Drew's book on Kashmir,* in which he gives all he was able to ascertain of the most noted of the floods of the Indus. Mr. Drew himself proceeded to the scene of that great flood which in 1841 swept the Indus valley from Bunji downwards, and noted from personal observation the lie of the features in the vicinity of the dam which for six months held the Indus in check. Some years subsequent to the publication of Mr. Drew's work, I had occasion to ascend the range whence the hillside had slipped into the valley below, and I found only a fresh wound on the face of the mountain, with little trace of the dam itself; but during the progress of my observations I became aware that the causes which led to the landslip described by Drew are still to some extent present. Every few minutes, from the slope of Nanga Parbat, just over against my station, rocks and

* 'The Jummoo and Kashmir Territories,' 8vo., 1875, map and plates.

stones were being precipitated into the forest below, which was completely wrecked. The hill sides in the neighbourhood were much cracked, and a second slip on a large scale may at any time occur.

It was in the mountain chain facing Bunji, and close over the right bank of the Indus, that I myself experienced an unusual flood—unusual only because such a one can occur only during the very short period of the year when, on the higher places of the range of mountains, clouds can precipitate anything but snow or hail. It was in August that I was camped in the very deep and precipitous Sai valley, leading from Sai Fort on the Indus to the romantically situated settlement of Gor, on the Dareyl side of the range. At night, after all but myself had retired to rest, a flood of mud, trees, and boulders descended like a thunder-clap on our camp, and in a few minutes carried the camp, trees, and much of our property away; we barely had time to rush up the piles of boulders above the torrent when it was on us, and then occurred such a turmoil of the elements as I shall never cease to look back on as one of the most awful of my experiences. The vibration of the boulders tearing down the valley, carrying with them the trunks of huge trees, was such that we feared rocks might be loosened from the cliffs which towered above us. The blackness of night could nearly be felt, and we had to sit through it till dawn revealed to us a great scene of wreck. Pines of 10 feet girth gone; a great boulder as big as a house, under which generations of shepherds had slept, overturned; and all the bridges between our position and the Indus swept away. The people in the valley below were wakened by the roar of the flood, and feared the worst for us. Such a flood had not occurred within the memory of man. The cause should be borne in mind. At any season except the hottest—the time of my visit—there would have been no rain to cause a flood, but the water which nearly overcame us would have come down quietly as snow, which would have melted gradually and passed off unnoticed, and my proposed journey to Gor would not have been stopped.

It was on my second attempt to see Gor that, passing up the Sai valley in the company of Colonel Biddulph, I visited the crest of that stupendous cliff, which, rising from the right bank of the Indus, faces Bunji Fort. I can only describe the scenery, both of the Sai valley itself, which is exceedingly wild, and of the highlands at its head, as presenting to the traveller the most awful and majestic sight that can be met with in the Himalayas, so far as we are at present acquainted with them; scenery that, from the great heights and gloomy depths which surround you, must move even the most apathetic. Reaching, after passing along a dangerous saw-like edge of rocks, rising from empty space, the extreme south-west corner of the Gilgit Dareyl range, and after ascending the last slope strewn with angular boulders, you find yourself

confronted at a distance of some 20 or 25 miles, with the mighty slope of Nanga Parbat, which rises, from the Indus at your feet, a height of some 24,000 feet to its summit. Facing you stretch the slopes of pure snow, untainted with the dust of the plains. Craigs, serrated ridges, and needle rocks are piled on each other, through which wind many river-like glaciers, and below the snow appear the brown cliffs which flank the Indus valley. The forest-clad tracts are just visible as a well-defined contoured band, growing in a zone between 12,000 and 7,000 feet, and below the latter occurs sparse vegetation and barren gravelly patches. Except the ancient and independent settlement of Gor, at the base of a cliff at your feet, there is no habitable spot visible. From this standpoint the second highest mountain of the Himalayas, the "K2" of the Survey, is seen amidst a wild mass of perpetual snow peaks, themselves so high that the commanding point which dominates the rest loses very much of its importance. Haramosh peak, 24,285 feet high, also forms a conspicuous object of the view, and Rakaposhi is also to be seen.

The height above sea of this point of vantage may be some 16,000 feet, and if one has sufficient nerve one may look down the highest of known cliffs, which descends the first 4,000 feet without a break, and below that, to the Indus, another 8,000 feet past broken crags. This cliff I believe to be by far the highest in those portions of the Himalayas that are known to us from the visits of Europeans, and the exposed mass of Nanga Parbat—a slope of 24,000 feet from base to peak—is pretty certainly the most extensive on the globe.

In a paper written by me some years back, I compared this slope with the exposed portions of other great mountains, and it exceeded the next in rank by many thousand feet.

Distance in Miles (approx.).	Name of Mountain.	Place of Observation.	Height above sea-level.	Amount of slope exposed.
115	Everest	Trigonometrical Station in Dewanganj, 200 feet ..	29,000	8,000
86	"	Sandakphu, 12,000 feet ..	"	12,000
	K ² (Kashmir boundary)	Range between Gilgit and Gor, 16,000 feet	28,278	—
100	Makalu (No. XIII.) ..	Trigonometrical Station in Purneah, 200 feet	27,800	8,000
70	"	Sandakphu, 12,000 feet ..	"	9,000
25	Nanga Parbat, or Deo Mir	Cliff above Gor, 15-16,000 ft.	26,600	23,000
25-35	Tirach Mir (Hindu Kush)	On road from Gilgit to Chitral, 8000 feet	25,400	17-18,000
15	Rakaposhi (Gilgit) ..	Range behind Chaprot (Gilgit), 13,000 feet ..	25,560	18,000
48	Kinchinjanga	Darjiling, 7000 feet	28,160	16,000
(?)	Mont Blanc	Range above Chamoni, 7000 feet	15,781	12,500

With regard to the height of the line of perpetual snow, I have a few words to offer. Various authorities lay down such a line with great assurance, but for myself I find that circumstances of position, of climate, and of latitude, play so great a part in the position of this line that I am unable to define it even approximately. No sooner in one locality, or during one particular season, have I settled, to my own satisfaction, the line of perpetual snow, than I presently have been obliged completely to modify my views on the subject. On page 154 of "English Cyclopædia," vol. v., I read that snow lies 4000 feet higher in the northern than in the southern side of the Himalayas. On page 281, vol. x., of the same work, it is stated that the snow line on the northern slope is at 19,000 feet, which I should have been inclined to say is 1500 or 2000 feet too high. In Gilgit, during the end of summer, I found masses and fields of snow at 17,200 feet, and they extended down the northern slope certainly 2000 feet or even more below that altitude. In Kulu, which has many degrees of latitude less than that of Gilgit, avalanche snow lies in valleys above 8000 feet throughout the year after a good winter snow-fall, but during the past spring, following a very mild winter, I found no snow at all at 8000 feet. There had been no avalanches, and even in June, at 14,000 feet, snow lay only in patches. I think that in determining the snow-line with greater precision than has been done hitherto, scientific men should ascertain those altitudes on which perpetual snow lies on flat places in the position where it first falls, and should neglect the occurrence of a snow-field where it may have been protected from the sun's rays by its position on the north face of a mountain. From memory I can state that there are a considerable number of typical localities which would help out such an enquiry. There is a peak (without name) about 30 miles north of Gilgit, with rounded summit, which, though only 17,500 feet high, is covered with a cap of perpetual snow. In Sikkim, close to and to the north of a point marked Dopeni on the map, there is a peak of similar shape and height, and this also has snow throughout the year, and these two examples which I here instance, and which I am certain of, differ by eight degrees of latitude from each other. In both cases the snow-cap is exposed throughout the day to the rays of the sun, so that if I am accurate in this statement it is clear that the snow-line must be somewhere *below* 17,500 feet. In Gilgit I was led to consider the snow line at about 17,300 feet, but certainly not *above* that limit.

The important subject of Himalayan glaciers is one that, from personal observation, I have had but little time for studying, and none of my remarks here can pretend to any degree of scientific accuracy. All I can say is that these great frozen rivers have always filled me with a continually increasing wonder and interest, whenever and wherever I have met them. The most extensive and the most picturesque I have seen are in the Sat valley, which drains the southern face of Rakaposhi

mountain in Gilgit. Three immense glaciers come down into this valley, and dispute with the hardy mountaineers for the possession of the scanty area of the soil. Here may be seen forests, fields, orchards, and inhabited houses all scattered about near the ice-heaps. The only passable route to the upper villages in this valley crosses the nose of the greatest of the three glaciers, and threads its way over its frozen surface. This glacier is cut up into fantastic needles of pure green ice, some of which bear on their summits immense boulders. About half-a-mile from its lower end I found an island bearing trees and bushes, and at one place above this a very considerable tarn of deep blue-green water. The glacier had two moraines parallel with each other, both bearing pine trees; and from the highest point reached I fancied I saw the ice emerging from the névé at its source, far away up the slopes of Rakaposhi. In this glacier the pinnacles, wedges, blocks, and needles of ice were of the most extraordinary appearance, and the whole formed a weird and impressive view which I can never forget. Though the largest glacier I have ever approached, it is very small indeed when compared with those described by Colonel Godwin Austen in a locality not very far from the Sat valley. Insignificant though it is, it was more than I could take in during my visit of two days' duration. It struck me at the time of my inspection that the peculiar stratified appearance of the ice needles, which in the case of the Sat glacier is very strongly marked, must have been caused by the different falls of avalanche snow on the bed of névé at the source of the glacier; but the "English Cyclopædia" gives another and perhaps the truer reason for this appearance of the ice.

As the latitude decreases Himalayan glaciers lose much of their picturesque and striking appearance, and, though they may cause a considerable conservative effect, as mentioned by Mr. Freshfield, and though their close study might well repay the scientist, yet to the mere casual traveller the fact, as in Kulu, that they are loaded with an accumulation of dirt and débris renders them no longer objects of more than passing interest. Many glaciers are so buried beneath mud and rocks that the ice is seldom visible, and then only by kicking away the stones.

The lowest glacier I have seen in the Himalayas is one that lies at the foot of the range near Chaprot Fort in lat. $35\frac{1}{2}^{\circ}$, in Gilgit. It is formed of beautiful clear ice and has no dirt.

In Kulu and Lahaul, lat. 32° , glaciers do not come down below 12,000 or 13,000 feet, and all are very dirty, and in Sikkim, lat. 28° or 29° , without having visited the glacier region myself, I should say that the lowest limit reached by the Kinchinjanga group must be considerably higher, perhaps by 2000 feet or even more.

Again, the smallest mountain I have ever met with capable of giving rise to a glacier, is one on the Gilgit-Dareyl range whose height

is 17,200 feet, and in this case the mass of ice formed is of very inconsiderable size.

Of the glaciers round Mount Everest and its great neighbours we know next to nothing, and the little we have learnt is derived from the itineraries of native explorers, who, of all classes of travellers, seem the least capable of furnishing trustworthy information regarding any subject lying at all outside their actual angular and distance measurements. But with my telescope, when employed on the survey of the Nipal boundary, I have gazed long and earnestly at the icy region at the foot of Everest, and Peak No. XIII., where the glaciers extend over a very large area.

Some few years back I was asked to aid in the collection of meteoric dust, by obtaining from an altitude sufficiently high, snow water in which it was hoped that the presence of such dust might be detected; but I pointed out that terrestrial dust is carried up to very great heights, and that it would be next to impossible to obtain the one without the other. During the spring and early summer the atmosphere is so loaded with dust that it sometimes actually rains muddy water, and all the small crevices of the rocks are then full of mud, and snow up to about 19,000 feet is quite discoloured with it. Avalanche snow in the lower valleys after some spring showers assumes the colour of earth, and all appearance of snow is destroyed by the mud. After a shower at an elevation of 7000 feet, I collected a dessert-spoonful of fine mud from a quart of water and sent it to a friend for analysis, but the package did not reach him. I fancy it was merely Punjab mud with a fair admixture of ashes from the forest fires.

This paper, so far, has not touched, except indirectly, on our present knowledge of the Himalayas, and I will now repeat, from memory, as far as I am able, the work that has been done up to date by the various departments of the Government of India. I think that, perhaps, our botanical knowledge is far ahead of other branches of science. Many eminent botanists have been at work for a long time past, and of late Dr. Duthie has been allowed to travel, on duty, into tracts not before visited by any one possessing the requisite knowledge. It is likely that Dr. Duthie's museum at Saharunpur will, within a moderately short time, become an almost complete depository of the chief vegetable products of the Himalayas.

The geologists, Messrs. Blanford, Godwin Austen, Richard Strachey, Stoliczka, and Lydekker, have been pretty well over those tracts open to Europeans, and are now well acquainted with all the leading features of their branch of science presented by the mountains of Kashmir, Kumaon, Kangra, and Sikkim.

The philology of the Himalayas has received considerable attention, but when we find in a circumscribed region like Gilgit no less than five or six distinct languages, it may be surmised that in this direction a

rich field still remains for examination. Colonel Biddulph in Gilgit, and Dr. Leitner elsewhere, have done their share of investigation into the interesting languages of the peoples with whom they have been brought into contact, but it is by no means improbable that along our northern frontier, and especially in Nipal and Bhutan, tribes using a new and distinct language may yet be discovered.

Ornithology has found many votaries, and the birds of these mountains are now probably all or nearly all known, though in saying this I remember that the late Captain Harman, only a few years back, discovered a new and handsome pheasant in the extreme eastern end either of Bhutan or Tibet. The mammals, I suppose, are all known, though one, at least, the Shao, or great stag of Tibet, has not yet even been seen by an European, and the famous *Ovis Poli* has been shot by not more than two or three sportsmen.

Having touched lightly on what has been done by other departments, I will now state the work that has been effected by the Survey of India, to which it has been my privilege to belong for the past twenty-five years. I will begin at the western end, at Rakaposhi peak, which, from my point of view, I regard as the western extremity of the true Himalayas. This great needle, 25,500 feet high, as I have before stated, appears to form a fitting and sufficiently imposing north-westerly termination of the greatest chain of mountains to be found on our globe. It dominates all Gilgit, and Hunza and Nagar as well, and has been largely used by the surveyors, who, with myself, some twelve years ago, made a fairly accurate sketch map of the Gilgit territory.

The Gilgit survey is a continuation of similar work in Kashmir, where a small scale survey was conducted under the late Colonel Montgomerie, helped by a large staff of officers. The maps of Kashmir and Gilgit, without being free from error, are of the greatest use to a large class of officials. Incomplete though they may be, they were not brought up to their present state without taxing to the utmost the endurance of a hardy set of men.

Adjoining Kashmir to the eastwards comes Kangra, with its subdivisions of Kulu, Lahaul, and Spiti. Kangra had once been roughly surveyed prior to the arrival there of my party, who are now at work on a very elaborate contoured map, which will take a long time to complete, owing to the intricacy of the detail demanded.

Between Kangra and Kumaon occur various native states whose territories are being surveyed on the scale of 2 inches to 1 mile, also contoured work, resulting in very elaborate and trustworthy, though somewhat expensive, maps.

Eastward of Kumaon, Nipal stretches along our border for some 500 miles till Sikkim is reached, and eastward again of Sikkim comes Bhutan, and various little-known semi-independent states which lie on the right bank of the Sanpo river; and here again, for convenience sake,

I propose to assign a second limit to the Himalayas. Both eastern and western terminations of the mountains are here assigned in a purely arbitrary manner, and only so that I may define for my own purposes an approximate limit to the tract touched on in this paper. If exception is taken to these limits of the range, where, may I ask, should they be placed? To the westward of Rakaposhi should we include in the Himalayas the Shandur mountains, which approximately extend to the Hindu Kush? or shall we leave the western extremity where I place it? Again, how far to the east of the Dihong or Sanpo River shall we push the eastern extremity? or if such an extension of the chain under one name is objected to, at what point in Bhutan shall we place the eastern limit? And leaving these questions for you to answer, I now proceed with the statement of facts relating to our geographical knowledge, in order, from Kumaon towards the east.

Nipal marches with the Kumaon border for some 120 miles, and advantage was taken of the existence of the trigonometrical stations on the Kumaon hills to extend our knowledge of the adjacent topography of Nipal, and this was done about four years ago with some little result. The more prominent peaks in Nipal within a distance of about 100 miles were fixed trigonometrically, and some slight topographical sketching was done. From the trigonometrical stations near the foot of the lower hills, both in the North-west Provinces and in Bengal, trigonometrical points have lately been fixed, and some distant sketching done in Nipal for 500 miles, between Kumaon on the western and Sikkim on the eastern extremity of this kingdom; and, again, from the trigonometrical hill stations along the western boundary of Sikkim more points and more hazy topography of Nipal was secured. This very meagre topography, sketched from very great distances, comprises all the geography of Nipal other than the sparse work collected by Colonel Montgomerie's explorers, or by explorers trained to his system who have worked since his death. All the existing data, whether trigonometrical, distant sketching, or native explorers' routes, are now being combined, as far as the often conflicting and contradictory materials admit. The resulting map of the country, though at most little better than none, is all we have to expect until some of the strictures on travelling are lessened by the Nipal Government.

The whole of the Nipalese border, which marches with British territory for some 800 miles, is jealously guarded, and no European is allowed to cross it, except when the Resident of Kashmir or his own personal friends are permitted to proceed by a certain and particular route, between the military station of Segowli and Katmandu. The goodwill of the Nipalese is far too valuable to us to risk it in asking too much of them. All we have to do, therefore, is to continue, as far as may be practicable, the fixing, by a trigonometrical operation, of the more prominent peaks visible from suitable points in our own

lands, and a further continuation of the distant sketching of the visible ranges of mountains. Photography should largely be brought into play, for by its means not only, with suitable apparatus, could an approximate measure of angles be secured, but, also—and this is the most difficult part of such work—a correct record of the shape and identity of peaks be obtained, so that, in computing the trigonometrical data the correct angle, as recorded in the field book, might, without doubt, be combined with its pair, obtained in a similar manner from a second point of view.

The difficulties of this class of survey are pretty equally divided between those inherent to the operation and to unfavourable atmospheric conditions. Cloud, mist, dust-haze, and smoke-haze obscure the distant ranges for, perhaps, nine days out of ten throughout the year, and the observer has to exercise the utmost patience when waiting for the few clear periods during which he can distinguish those remote features which it is his duty to lay down by accurate observation with his instruments.

Independent and British Sikkim flank the eastern boundary of Nipal. British Sikkim is a small tract, which has twice been surveyed on suitably large scales, the last work having been conducted by the late Captain Harman, and, subsequent to his untimely death, by myself. Independent Sikkim, which contains Kinchinjanga, one of the highest mountains, and some famous passes has been visited by Sir Joseph Hooker and a few others; and the Jelap, where our forces, under General Graham, have lately been employed, was surveyed in reconnaissance style by Mr. Robert, an energetic and hardy assistant of the Survey of India Department. The sketch map obtained by this gentleman is complete, and similar in character to that of Gilgit by myself, and to that of Nari Khorsam and Hundes by Mr. Ryall. It does not pretend to any exhaustive detail, such as is met with in maps done in the manner of large scale survey where time and money have not been spared, but it is good enough as a traveller's guide, and entailed a great amount of hardship on the surveyor. It is weakest with respect to its boundaries, which is due to a simple reason. The mountaineers who accompanied the survey party in its hasty movement over the country were neither willing, nor able had they been willing, to point out the boundaries of Bhutan and Tibet.

Our knowledge of Bhutan, or, rather, our ignorance of it, is about on a par with that of Nipal, but in Bhutan we have the valuable information left by Captain Pemberton, who forty-three years ago traversed the greater portion of the country from west to east. Besides Pemberton's work, Captain Godwin-Austen, while he accompanied Sir Ashley Eden's mission to the court of the Deb Raja in the year 1863, executed a route survey in Western Bhutan. The engineer officers who were attached to the military force at Dewángiri also did some little topographical work, and beyond this we have distant sketching and a trigono-

metrical survey, as in Nipal, which, also, has yet to be combined with the route surveys of native explorers, some rather recent, and some of old date. The difficulties which are presented to further researches in the direction of Bhutan geography seem unlikely to diminish; in fact, since our war with Tibet, they have sensibly increased, and for some years to come I should think it would be impolitic to send native explorers into the country.

Our knowledge, then, of Bhutan is as unsatisfactory as that of Nipal, and I can see no way of furthering schemes for increasing it beyond an extension of the feeble distant sketching and of the fixing by trigonometrical observation of the more conspicuous peaks.

Eastward of Bhutan occur those numerous semi-independent hill states which sometimes, when necessity presses, own allegiance to Tibet, and at others assert their complete freedom from control. They enjoy such names as Lo, i. e. barbarous, and Lo Karpo, and hold both banks of the Sanpo just outside and north of the Assam boundary. Certain proposals for executing some reconnaissance surveys which would have considerably elucidated geographical puzzles in the neighbourhood of Eastern Assam have been sent in, but owing to political difficulties, which still, I fear continue, they could not be carried out. General Graham's movements towards Manipur are pretty sure to get wind over a large area, and tribes always mistrustful of us will be rendered now even more suspicious than ever. So this tract must also be considered as closed to our surveyors for a long time to come. The only trustworthy work that has been done in connection with the hydrography of the regions north of Sadya still remains to the credit of the late Captain Harman, who, under instructions from General Walker, measured the discharges in cubic feet per second of the Sanpo (Dihong) and of the Dibong. This measurement of the Dibong is pretty well all that is known of the river, for it is lost in a maze of mountain ranges a very short distance north of the low range of hills which lies close above Sadya, and no two surveyors seem to assign to it even approximately the same course. There is much conflicting information at our disposal regarding the course of these two streams, and it is our misfortune that we are obliged to make the best of a very bad piece of work. We are forced to make a map of some sort, and have to construct it of materials that we know to be of more than doubtful value.

The late Captain Harman was more *au fait*, and had more local knowledge of Eastern Assam than any other survey officer, but he was unable before his death to embody in a general form the data which from time to time he had collected. He graphically described the difficulties encountered by the surveyor in the mountains of Eastern Assam, not the least of which were leeches and ticks in countless numbers, to say nothing of tribal treachery and a continual war with the unpropitious weather, which appears to be quite hopeless for eleven months

out of twelve—hopeless to the ordinary tourist, but still more so to those who require a transparent atmosphere to enable them to perform their duties.

The rivers of the Himalayas are so important that the mere passing notice which I have time to give them here seems derogatory to their dignity, and so numerous that I shall merely group most of them into classes of unknown and well-known, giving a slight sketch of those which are most interesting.

Of the former group are the Swat, a branch of the Indus, the Karnali-Gogra of western Nipal, and the great river system of central Nipal, which, issuing from the lower chain of hills near Deoghat, emerges into India as the Gandak; also the important river system of eastern Nipal, the combined waters of which form the calm sea-like expanse in the Kosi of the maps. In Bhutan *all* the rivers can be set down as unknown, except the Lhobrak of Tibet, which emerges into India as a part of those large rivers which united form the Manas of the plains. In the same category are also the streams of eastern Bhutan, which flow into the unknown parts of the Lower Sanpo.

Of those valleys which the survey officers and others have examined, we have learnt more of the main branch of the Indus than of many of its tributaries. It traverses perhaps the wildest parts of the Himalayas, and makes its way, after leaving the inhospitable highlands north of Kailas mountain in Tibet, past the fruit garden of Skardo, through the deep and gloomy gorges of Rondu, and under the great cliff facing Bunji, which it washes for some distance. It then skirts the lofty Nanga Parbat, and has not been seen below this by a European until it reaches the tribal lands where our forces are now engaged with the Miranzais, and where Captain Wahab is at present engaged in pushing his work so as to reduce still further the length of this unseen portion of the river. The affluents of the Indus are perhaps more interesting than the main stream itself, but I now have time to name them; they are, the Cabul, the Swat, the Kunar, and the Gilgit, the last two being the most interesting of the group.

Rivers known almost, if not quite from their sources to the plains, are the Chenab, Jhelum, Ravi, and Beas in the Punjab; the Ganges, Jumna, and Karnali-Sarda of the N.W.P.; and the Tista of Bengal. One of the most trying and dangerous routes that can be travelled over occurs during the last two days' journey up the Ravi, proceeding from the Chamba capital to Bangáhal. The faint indication of a pathway is continually led across the face of cliffs, where the smoothness of the scarp offers but few facilities for placing the naked feet in anything approaching to security, and where often there is nothing for the hand to grasp. The hardy people of the valley have no other means of proceeding on business or pleasure than along this trying goat's path which in some places is so bad that even they, trained though they be from

infancy to climb the loftiest cliffs, enter on the journey with more or less trepidation. One place, in the opinion of the inhabitants the most dangerous of all, and where many have lost their lives, needs some description. It occurs where the sheet slate rock is tilted at a high angle, and across which one has to walk bare foot along the edge of a slight flaw. It may be likened to a mighty billiard table, and the path-way to the almost imperceptible depression where the slates join.

At Bara Bangal village one comes into contact with a people who are almost more cut off from communication with their fellow tribesmen than in any other locality I am acquainted with. To leave their village they must either follow the route towards Chamba, just described, or else cross high snow passes into Lahaul or into Chhota Bangal on the Kangra side of the Dhaola Dhar range. The scenery of this part of the Ravi is some of the wildest in the Punjab Himalayas; in the valley, cedar groves; on the lower slopes the interesting dwellings of the primitive and kindly inhabitants. Huge cliffs, standing smooth and vertical, are backed by lofty peaks of perpetual snow; and below all, the foaming river fills the dark fissure, through which it thunders away towards Chamba.

The Beas, though a small stream, is interesting because it drains the beautiful valley of Kulu and the hills of Kangra, where English men and women live their lives surrounded by their families, in a climate which is sufficiently temperate to admit of long residence without appreciable detriment to the European constitution. The Beas drains none but the smallest and dirtiest of glaciers, but towards the source of the Rupi, the chief branch, there is much picturesque scenery. Near its lower course occurs the ancient and ruined palace of Tira, and the populous town of Sujanpur, where the kings of Lambargraon held their court two generations back.

The Satlaj now comes, and is so well known, except in the neighbourhood of the Mansorawar lake, that I need say little about it. A great deal of its course may be travelled, even near its upper portion, with ease and comfort, by using the Hindostan-Tibet road, an engineering work of some magnitude, whence visitors from Simla may enjoy fairly grand scenery. Above Shipki the river traverses the highlands of Gnari Khorsam or Hundes, seldom visited now, but surveyed some years ago by Mr. Ryall in reconnaissance style. I here remark that the moot question as to whether the Satlaj actually issues from the Mansorawar lake or not, does not appear to have been definitely settled, though controversies have been raised on the point, and notwithstanding that more than one Englishman has actually been along the supposed bed as far as the lake.

I will pass on to the Karnali, the Sarda of the plains, which forms the boundary between the British district of Kumaon and Nipal. Few rivers flow through grander scenery than is to be found along

the Karnali Sarda, especially for the last four upper stages. Few villages are more romantically situated than Shangar, Budi, and Garbiáng. None, perhaps, are inhabited by a more interesting people; and nowhere is such an irksome and almost dangerous road to be encountered than the Nirpania-ki-danda stairways, which for miles have been constructed by the villagers up and down the face of the cliffs above the right bank of the river. One of the most facile entrances to Tibet is to be found at the head of this river, where, by the Lipu Lek pass, some 16,500 feet in altitude, traders carrying borax, wool, and rice travel between the large Tibetan town of Tákla Khár and India.

By exercising cunning, and by adopting a ruse, this pass may still perhaps be crossed, when the traveller will be rewarded by a peep at Tibet, where the scenery and the people may be put down as typical of all the land north of the Himalayas, from Changohenono on the one side, to Chethang in longitude 92° on the other; but as long as the irritation caused by Tibetan reverses in Sikkim shall continue, so long will this route be vigilantly guarded by the Jongpen at Tákla Khár, and even by our own friendly subjects at Garbiang, who have a distinct understanding with the Tibetans that, in consideration of trading facilities being allowed them, they shall promptly give notice of the intended visit of any European, so that his passage over the Lipu Lek and other pass shall be prevented by the Tibetan authorities. In my case, though I started from my bivouac at the foot of the pass long before the first streak of dawn, the foot-marks in the snow showed how two runners had preceded me, and the Tibetan functionaries were still in time to prevent me entering the town of Tákla Khár, and I had to remain some two miles outside, in anything but a pleasant locality.

The Bheri, which is the eastern and larger branch of this river, has a long course on the map, but we know nothing of it. Eastward from the Karnáli Sárda occurs a larger river, the Kárnali Gogra, which, rising just above Tákla Khár, flows past the shrine of Khojarnáth, in Tibet, and then entering Nipal is not known to us, except from the report of a native explorer, till it reaches the plains of India. In Tibet, the river, where I saw it, was an expanse of shingle cut up by many streams of foaming water. At this place some years ago a number of British officers set the Tibetans at defiance, and pushed boldly over the Karnali Gogra river, halting only when they reached the base of Nimo Namling mountain—an ugly lump without glaciers below 20,000 feet, though over 25,000 feet high. In place of valleys, this mass of apparently solid rock has only deep fissures or clefts on its face, and except that its dimensions are far vaster, is much like many of the hills round Quetta. It has no spurs, and may be called a mountain in its rudimentary stage of formation. I can describe it only as being hideous and devoid of any interest whatever. Vegetation, of course, is next

to nil, for its base even stands at some 13,000 feet. My visit took place in June, which may be regarded as early spring in Tibet, the small patches of wheat round Tákla Khár and Khojarnáth showing only the earliest blades above ground.

A few words now about the Gandak. The splendid array of snowy mountains drained by the Gandak system may be seen to great advantage from the old hill fort of Someshwar on the northern boundary of the Bengal district of Champáran. From the Someshwar hills, which rise at their highest point to a little over 2000 feet, my assistants were able to secure a certain amount of Nipal topography and to fix a considerable number of peaks, but a low range about 20 miles to the north masked all but the snowy range which lay behind it, and no portion of the large streams such as the Buri Gandak, the Seti, the Kali, and Tirsuli Gandak could be seen. The hydrography of this part of Nipal is in considerable confusion, and though we were able to fix with fair precision the upper courses of one or two of these rivers where the great snow-clad mountains give forth glaciers, yet in the lower ranges their courses have been laid down from the route surveys of native explorers only, and as some of these route surveys show a want of completeness in this neighbourhood, the points of junction of the rivers above named remain largely open to doubt. One glance at the tract north of the low range above noted would furnish more geography than could be derived from years work by explorers; yet, I regret to say, access to any point north of the Someshwar range is denied us, and will remain so until by degrees the Nipalese allow us some freedom of movement amongst their hills. It is in the stretch of flat ground below the Someshwar range that the Nipalese entertain distinguished Englishmen with hunting parties, no access to the neighbouring hills being, however, allowed.

Before I close this paper perhaps I may be excused if I offer a few suggestions as to the best routes which should be travelled by those who may be in search for the picturesque. First and foremost I would place the mountains and valleys of Gilgit, where facilities for locomotion are by no means absent, and where nature may be studied in its grandest phases; where the most lofty cliffs rise from the deepest and most gloomy valleys, where glaciers fill all the side depressions of the great ranges, and where rivers and torrents strike the beholder with wonder at their irresistible impetuosity. All the greatest forces of nature are in this land still at work, and may be watched by the intelligent and attentive traveller. Here, also, may be studied, by numerous and diverse examples, the action and behaviour of great masses of snow, and of the largest ice fields to be found except in the Polar regions. Not the least interesting of the lessons that might be learnt are the regularity and precision with which vegetation, whether as trees or only as annuals, is arranged in its own suitable climate. And more, he may see an ancient people who for centuries have remained with respect to many of

their modes of life as stationary as the Chinese. Everywhere in the Himalayas, except in Bhutan and Eastern Assam, he will be treated with courtesy, and even with kindness, if he only to some extent respects the feelings and prejudices of those he employs. I say this from many years experience, gained amongst all classes, from Gilgit to Bhutan; and in all my wanderings—some of them arduous ones—I have found the inhabitants almost invariable in their willingness to assist in difficult times. In Gilgit the most interesting places to myself are, the Sat valley, the Gilgit-Darel watershed near the Sai valley, and the highlands above Chaprot, whence may be obtained the unparalleled view presented by Rakaposhi Needle, 25,500 feet high, and only 25 miles distant. Nanga Parbet may be studied from all its accessible points of view, and by returning to Kashmir via the Mir Malik route, some magnificent scenery will be passed through.

In Kumaon, fail not to travel from Almorah to the Lipu Lek pass, where, round Budi and Garbiáng, you will be rewarded by unusually fine scenery—foaming cascades, vast cliffs, roaring torrents, and very lofty mountains capped with perpetual snow and their sides clothed with lovely forest of the densest growth. From Darjeeling or from Simla travel by easy stages along the made roads, and enjoy the spectacle offered by the varied scenery you will pass through. From Kaugra visit the Rupi valley of Kulu or cross over into Bara Bangáhal by the Thameer pass; but on no account, unless you be a trained mountaineer, attempt to reach that remote village by the Rávi valley. From Kulu visit the easily accessible Rhotang pass (13,000 feet), and if you have time descend thence into the wilds of Spiti and Lahaul. If you have the opportunity, make a point of visiting the Someshwar range of Chumparan, in Bengal, where in clear weather you may see more of Nipal than can be described from any point along the five hundred miles where that country skirts our own districts. I will close by saying, go by all means into *any* of the high valleys of the Himalayas, whether from Bengal, from the North-western Provinces, or from the Punjab, and whether you have any particular hobby to work or whether you have not, whether you are an artist or only a photographer, or whether you go simply to enjoy life, you will be hard to please if you return without having learnt many new things and without having enjoyed your journey; but if you are so fortunate as to be permitted to enter any tract which in this paper I have indicated as unknown, then, in the interests of science in general, and of this Society in particular, I beg of you first to arm yourself with such instruments and with such learning as may be requisite for furthering our knowledge of the people, and for filling up the many lamentable blanks which still exist on the map of the Himalayas.

As a last word I would say go by all means very soon, before, in fact, all the beautiful trees in the land shall have been converted into railway sleepers; visit the country before the beautiful camping grounds

shaded by trees 500 years old, such as I now show, shall have been improved off the slopes of the Himalayas. The forester is everywhere abroad, and, under orders which he is bound to obey, he spares nothing.

After the paper,

General J. T. WALKER, R.E. :—It is not my intention to make many remarks on the subject of the interesting paper which has just been read to us by Colonel Tanner, giving his account of the physical constitution, the avalanches and glaciers of the great Himalayan regions, because I have no personal knowledge of them, never having visited them; although I have resided for several years on the mountains in the outer ranges at the various sanatoria, I have never had occasion to go in among the glaciers and avalanches in the most interesting portion of the inner ranges. What I wish to do now is to state that of all the officers of the Indian Survey Department, probably no one has had a better opportunity than Colonel Tanner of becoming acquainted with the characteristics of the principal features of the Himalayan ranges. He has been employed on the extreme western ranges, those ranges round Gilgit, and in the vicinity of the peak known by the Trigonometrical Survey as K₂, which is the second highest mountain yet measured on the earth; afterwards he was moved from these regions into the Eastern Himalayas and carried on survey operations on the frontier between Nipal and British territory, where he was in the vicinity of Mount Everest, the highest peak yet determined on the face of the earth; and finally he was employed in the Kulu and Lahaul and other native states round Simla, in what may be considered the Central Himalayas. He commenced his acquaintance with the great ranges to the north of the British frontier during the Afghan campaign of 1877-8, when he was attached to the British army under Sir Samuel Browne, which marched from Peshawar to Jellalabad. When there, after all his regular survey operations had been completed on the spot, he made the acquaintance of a native chieftain, the head of an important district lying between Jellalabad and the southern frontier of Kafiristan, with whose help he crossed the border and got into one of the Kaffir villages, when he unfortunately fell very ill, and had to return. After the conclusion of the campaign he was sent up to Gilgit, with the idea that possibly he might be able to proceed from there to Kafiristan by a more easy and accessible route for Europeans which passes through Chitral. In those days the survey operations had not gone west of the Indus. Gilgit lies to the west of the Indus, but when the survey operations under Colonel Montgomerie were completed, about twenty years previously, the state of the country around was such that it was imprudent for Europeans to visit it. The country was nominally subject to the Maharajah of Kashmir, but his hold over it was slight. By the year 1879, however, the country had very much quieted down, and a British officer, Colonel Biddulph, was resident at Gilgit as British agent on the frontier. Thus Colonel Tanner was able to proceed with ease to Gilgit and commence making a survey of the country, getting to the peaks beyond, and fixing as much as he could possibly see of the great ranges to the west and north. The second year that he was employed there he had completed his field work and was returning to headquarters to bring up his mapping and computations, and had arrived at Lahore, when intimation was received that the tribes round Gilgit had broken into insurrection and surrounded Colonel Biddulph, who was in a very critical position. Colonel Tanner was immediately directed to return to Gilgit in command of a detachment of the troops of the Maharajah, and he relieved Colonel Biddulph very satisfactorily. Thus he has had opportunities of being located for a very long time in a very interesting region, probably the most interesting part of the Himalayan mountains. When his work there was completed he was sent eastward to Darjiling and employed in carrying on a boundary survey

between Nipal and British territory. Here his operations were of an entirely different nature. He was no longer able to go about through the mountains from point to point, but was obliged to remain on or outside the frontier and from there fix the peaks of the Nipal ranges, making sketches, and getting such topographical information as he could. On the extreme left he managed just to push his way into Tibet and went through some most interesting country.

There is only one point in his paper on which I feel inclined to make any objection: I do not know that I quite agree with him in the remarks he makes as to the maps which have been produced of the lower course of the Sanpo river from Chitang, in Tibet, where it is known, to the vicinity of Sudiya in Assam. It is true the map of that region is very rough, and constructed entirely from information supplied by native surveyors and explorers, and the explorers who gave the information were very inferior to our best explorers; but the best explorers would not go into that country, and it is believed dared not do so. Such information as has been obtained has been put together and mapped, and I think it may be regarded as very fairly correct. Colonel Tanner, is very much inclined to discredit it and consider it objectionable. Perhaps he may be right, but it is no doubt better than nothing. We have got all we have the means of getting at the present time, and we are not likely to get better for many years to come, because the country is on the *qui vive* and alarmed at the probability of European aggression. The people would not allow any European to enter it, and it is highly improbable that they will allow even native explorers to do so. I have merely to add that Colonel Tanner has the advantage of being an artist as well as a surveyor, as you will have seen from the pictures which have been exhibited on the screen, and, I should also tell you that he has always been regarded as one of the most valuable officers of the Indian Survey.

Dr. LITTNER: You are too kind in calling on me to offer remarks on this extremely valuable and correct paper; indeed, we are all surprised, not only to have had an evening of instruction, but also one of delight. There is only one point on which I might possibly offer a slight—a very slight—addition to your information, and this regards the rolling mountains to which Colonel Tanner has alluded. I happened to be in these mountains in September 1866, and noticed that as soon as one stone was moved from the path there was a tendency for a number of boulders, stones, &c., to follow. I am not sufficiently a geologist to be able to tell you the reason of a movement which I have not seen in other parts of the Himalayas. In the winter, or rather towards May and June, when the snow melts, the rolling matter comes down rather in the form of balls than in the huge masses such as are seen in Kulu and elsewhere. This circumstance was used by the people of the country in 1866 in order to conceal the path to their little treasure-caves, which I am sorry to say, although they were nominally Mahommedans, contained wine as well as butter; the butter is kept in the form of little dried fingers and the wine is kept in large jars concealed in the mountains. In this and other more important respects, I was just there in time to catch a last glance as it were of their primitive customs. Our allies were very anxious to destroy us then in order that I should not give to the Government of India, or rather to the Government of the Punjab, which employed me, the required information, which was not political by any means, but purely linguistic. One of their little traps was to put on the road, or rather goat-paths, little stones so arranged that the moment you tread on them you bring down the whole mountain side and are in danger of being swept into the wild torrent below. With regard to glaciers I am ashamed to say that not only because of my own ignorance but also because of my wish not to attract the European adventurer to these regions, I have confined myself to purely linguistic information and have not referred to the fact that these glaciers cover layers of gold that is precipitated into the rivers below, from which the natives are perfectly content to wash

from 4 to 8 annas' worth a day. It seemed to me then desirable not to comment on this fact, but now it is too late, as everybody is at liberty to find out that there are immense treasures there, and it is only to be hoped that the European adventurer who searches for gold will also bring with him something more than that desire, and that we may have dawnings of improved civilisation in lieu of what I will not call the particularly gentle, but the natural kind of life that exists there at present. It seems to me that if these matters were absolutely and entirely left to the Indian Government, the dangers of these discoveries would be minimised. I do not know what else I can say except that I for one feel grateful to those regions for having instilled in me for the first time a real love of nature. I have been exploring mountainous countries, north and south, in Europe and Asia, but my love of nature appeared to me obtained from books rather than feeling. I was really attracted to Dardistan, as elsewhere, by a desire to study the people, the languages, the songs, the history, in fact all that concerns the human being generally; but there is no human being, however callous, who would not be converted to the love and worship of nature by seeing those stupendous revelations of herself, which she gives in the regions so admirably described and depicted to-night by Colonel Tanner.

A MEMBER: May I make a remark upon these interesting glaciers on the head-waters of the upper Indus? I think I am right in saying that the late Sir Douglas Forsyth and his expedition in 1873 were the first Europeans to visit these tremendous glaciers at the sources of the upper Shayok, which, taken in connection with the Gilgit watershed, are the largest glaciers out of the Arctic regions, and I think it right to refer to the fact that these glaciers were fully described in the report of that expedition, and also in two books which were published by members of that expedition, the one called 'Kashmir and Kashgar,' the other 'The Roof of the World,' a title suggested by the late Colonel Yule, the most perfect "mer de glace" being pictured in the last book I mentioned.

THE PRESIDENT: The very large gathering which has assembled to-night shows us that much was expected by the Society from Colonel Tanner's paper, and I am very certain that the Society has not been disappointed; in fact I hardly think that since I have had the honour to occupy this chair a more interesting paper has been read. Several gentlemen who followed Colonel Tanner have also given us valuable information and I know that it will be your desire to include them in the very warm and sincere thanks you will direct me to give to Colonel Tanner for his most admirable paper.

*Mr. Alfred Sharpe's Journey from Karonga (Nyassa) to Katanga
(Msidi's country) viâ the Northern Shore of Lake Mweru.*

WE are indebted to Mr. Ottley Perry, F.R.G.S., for the following brief account of an important journey recently performed by Mr. Alfred Sharpe (recently appointed Vice-Consul in Nyassaland) from Lake Nyassa to the chief Msidi in Katanga. The account is taken from letters which Mr. Perry has received from this enterprising and intelligent traveller; and the accompanying map is from a sketch of his route accompanying the letter. A paper which Mr. Sharpe has prepared especially for the Society, and which gives a fuller account of the geographical results of his expedition, has, unfortunately, not yet come to hand.