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into details: but I think that even the brief notes I have given will explain how very anxious I was to have a chance of examining these important and, to me, extremely interesting questions.

(To be continued.)

THE EXPEDITION OF H.R.H. THE DUKE OF THE ABRUZZI TO THE KARAKORAM HIMALAYAS.*

By Dr. FILIPPO DE FILIPPI.

THE expedition undertaken in the summer of 1909 by the Duke of the Abruzzi to the head of the Baltoro and the Godwin Austen glaciers in the Karakoram was essentially a mountaineering expedition. Nevertheless, it furnished opportunities for new geographical observations of the region, of which the following is a brief account.

The expedition, consisting of H.R.H. his A.D.C., Marchese Negrotto (Lieut. R.I.N.), Cav. Vittorio Sella, and Cav. F. De Filippi, together with seven Alpine guides and porters from Courmayeur, and Sella's photographic assistant, left Srinagar on April 23, 1909. They were accompanied by Mr. Baines, an Englishman chosen by Sir Francis Younghusband, then resident in Cashmere, to give the assistance of his knowledge of the region and people. On the way out the longer summer route was followed across the Punjab Himalayas over the Zoji-La (11,230 feet), and down the valleys of the Dras and of the Indus, to Skardu, the capital of Baltistan. Here the route quits the Indus to ascend the Shigar and Braldoh valleys up to Askoley, the last inhabited spot, after which we enter the glacier region. While traversing Baltistan the expedition had the opportunity of seeing much of the Balti population, and of photographing several groups of them. There can be no doubt that the great majority of the Baltis belong to the Aryan stock and not to the Mongol-Tibetan, as has been stated by all English writers on the subject. The distinguished Hungarian anthropologist Ujfalvy had already demonstrated their close affinity to the Dards by comparative anthropometrical measurements.

A few miles above Askoley the Braldoh valley is intersected by the snout of the Biafo glacier. This glacier has undergone considerable variations in a recent period. In 1861, when Colonel Godwin Austen first visited it, it was wedged against the opposite or left flank of the Braldoh valley in such a way that the emissary stream of the Baltoro flowed through a tunnel underneath it. In 1892 Sir Martin Conway noted that it had withdrawn to such an extent as to leave free more than half of the valley, upon which it had deposited a deep layer of

* An abridgement of a lecture delivered by F. De Filippi to the Society's meeting of November 21, 1910. Map, p. 128.

moraine. Since then the movement has again been forward, and in 1909 there were only from 200 to 300 yards between the snout and the rocks of the left wall of the valley.

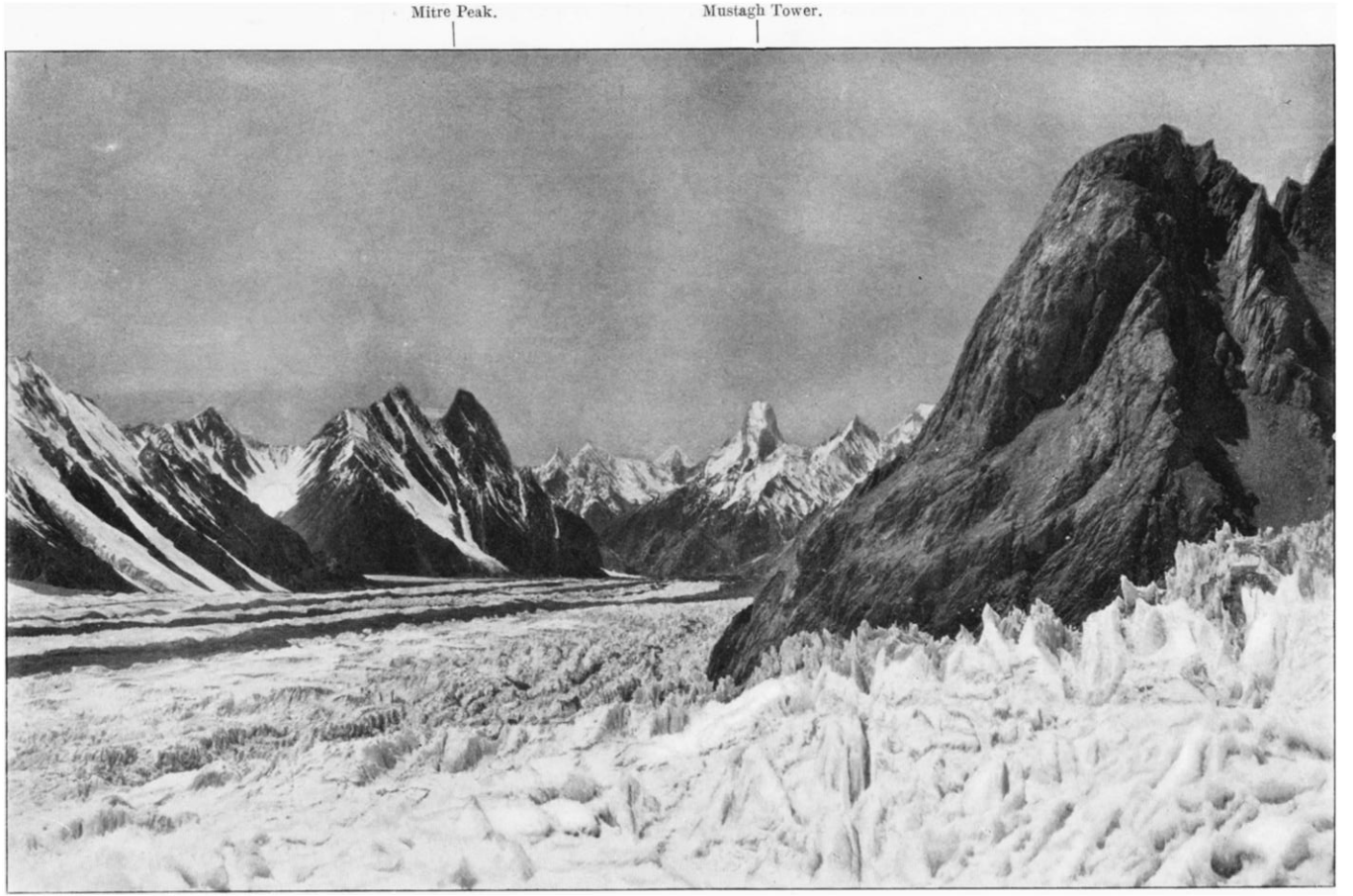
On May 18 the expedition climbed up on to the Baltoro glacier upon which they were to remain for more than two months. The snout of this glacier still corresponds absolutely with the description of it given by Conway in 1892. It may possibly be stationary, but certainly shows no sign of shrinking.

All the tributary glaciers appear to be on the increase and stretch out for a long distance on the top of the Baltoro, whose surface they strew with broken seracs. This is more especially noticeable in the tributaries to the north.

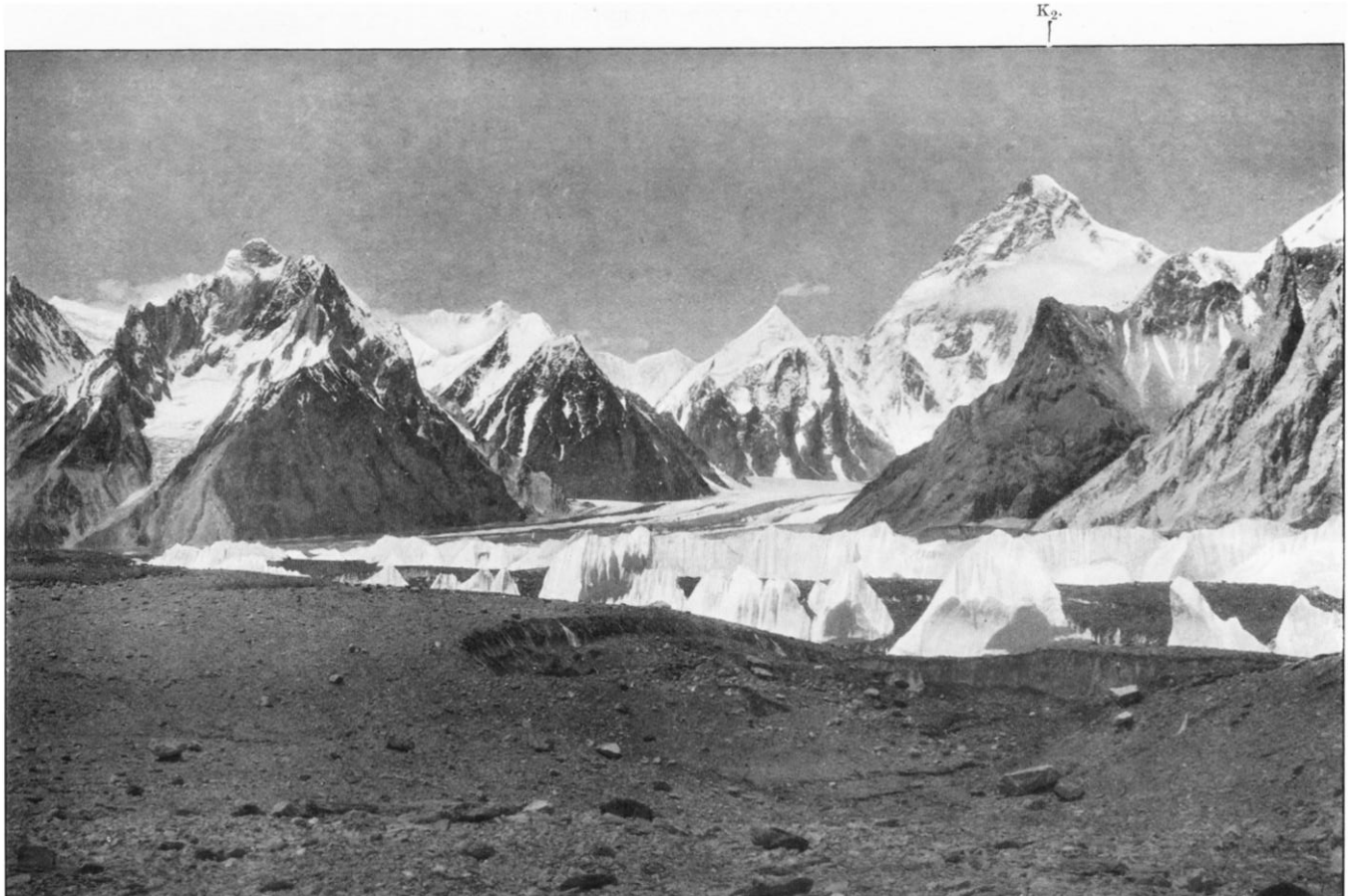
The Duke established his base camp upon an advanced spur of the left wall of the valley about 10 miles above the snout of the Baltoro. This spur is thickly clothed with shrubs, and is known as Rdokass. Mr. Baines, who remained here, was entrusted with the forwarding up of supplies, and with the reading of the instruments left behind to form a small meteorological station, comprising a mercurial barometer. Here Negrotto took angular measurements from the extremities of a measured base to a cairn built on the central moraine of the Baltoro, which measurements he repeated two months later on the return journey, and hereby established that the rate of motion of the centre of the glacier is on the average $5\frac{1}{2}$ feet a day during the months of June and July. This is a considerable speed if we take into account the very slight grade of the slope. On a distance of 25 miles from the foot of the Gasherbrum range to the snout of the glacier the drop is 4550 feet. This gives an average inclination of less than $3\frac{1}{2}$ per cent.

Later on, by a rare piece of luck, we were enabled to observe the rate of the upper Godwin Austen glacier. Some articles of equipment had been left behind by the Eckenstein-Wessely-Guillarmod expedition in one of their high camps in 1902. In the course of seven years these had been carried down less than a mile, giving an average daily rate of barely 2 feet—considerably less than that of the lower Baltoro, although the grade is much steeper.

Near Rdokass we began to notice on the glacier the strange pyramids of pure white ice which were first observed by Col. Godwin Austen in 1861. At this point they appear as isolated cones, from 10 to 20 feet high; next as sharp pinnacles; and at last higher up as huge blocks from 100 to 150 feet in height, shaped like irregular prisms and getting nearer and nearer together until they seem to be arranged in longitudinal rows. They may be remains of the high moraine-covered ridges which are found upon the glacier, and which Dr. Workman attributed, with apparent probability, to upheavals caused by the pressure of lateral affluents upon the glacier. I must confess, however, that I do not understand how these ridges should



THE UPPER BALTORO GLACIER.



THE JUNCTION OF THE GODWIN AUSTEN AND THE BALTORO GLACIERS.

have become so split across as to give rise to the formation of isolated pyramids.

On May 24 the expedition reached Concordia, the vast glacier amphitheatre where the Baltoro divides in two branches, one of which rises southward towards the Golden Throne and the Bride Peak, while the other, known as the Godwin Austen glacier, runs northward to the foot of K_2.

The exploration of the district round K_2 comprised a complete survey of a great glacier which is at the foot of the mountain to the west. From this glacier, by a somewhat difficult climb, the Duke reached a col on the watershed at the foot of the north-western ridge of K_2 (Savoia pass of the map, 21,870 feet), which afforded a view towards the north. The north wall of K_2 was, however, nearly entirely hidden by a large snow cornice.

The Duke had, on a later occasion, a better opportunity of observing this precipitous northern rock wall of K_2 from the great southern ice-ridge of Staircase peak, which he climbed to a height of 21,657 feet. From this point he was able to take a photographic panorama, which, together with those taken by Sella from the Windy Gap, serves to illustrate the region towards the east.

In the year 1889, Captain (now Colonel Sir F.) Younghusband went up from the Yarkand river to explore its tributary, the Oprang, to its glacier sources, which descend to the east of the Gusherbrums. From his account, compared with the only map then existing of the upper Godwin Austen glacier, namely, that published by Guillarmod,* the Duke expected to find the Oprang valley immediately to the east of Windy Gap. This, however, was not the case. At the foot of Windy Gap there flows down south-eastward a great glacier, bounded on the east by a chain containing peaks over 20,000 feet high. This chain appears from its direction to join the northern spurs of the Staircase peak. Beyond these mountains are visible the still higher peaks of another range, which might be the Aghil of Sir F. Younghusband.

From another col (Sella pass, 20,207 feet) on the left buttress of the upper Godwin Austen glacier, the Duke and Sella saw and photographed the ranges and the valleys to the east of the Gasherbrums. The whole of this distant region is dominated by a great peak which, after comparing the bearing taken by Sella, Dr. Longstaff identifies as Teram Kangri (27,610 feet), first measured by him just five days earlier. The glaciers which flow down from the eastern slopes of the Gasherbrums, and of the Broad peak, all meet in one great glacier, which may be the Gasherbrum glacier of Younghusband. There is no doubt that the topography of regions to the east and south-east of the Baltoro district is very intricate. The data collected by the expedition are insufficient as a basis for even such an approximate

* Dr. J. J. Guillarmod, 'Six Mois dans l'Himalaya.' W. Sandoz, Neuchatel.

sketch as might serve to connect our map with that portion of Sir F. Younghusband's which deals with the upper course of the Oprang river and with the glaciers to the east of the Gasherbrum peaks. Nor is it possible as yet even to sketch the chains and valleys which lie between the Godwin Austen glacier and the upper Siachen glacier (this latter explored and discovered by Dr. Longstaff), although they all appear in Sella's panorama.

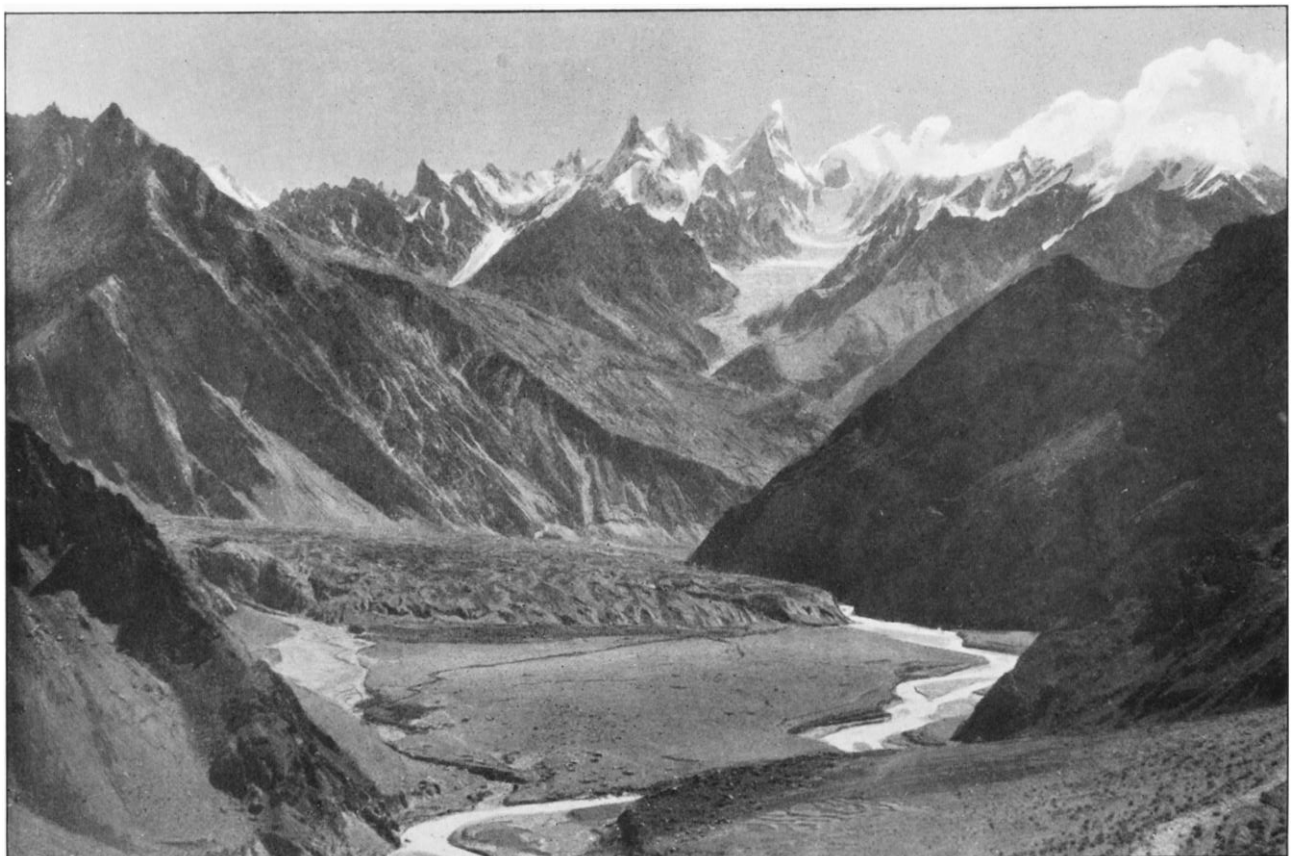
Among the passes leading from the upper basin of the Godwin Austen glacier, the Sella pass alone seems possible to cross without excessive difficulty, so far as may be judged by looking down from above.

The Karakoram range does not seem likely to offer an opportunity of solving the problem of the highest altitude attainable by man. The greater portion of the chain looks absolutely inaccessible. The difficulties of the ice and the rock are in most places so great that not even European alpine porters could carry up a load without the help of fixed ropes. This prevents the establishment of high camps, and was the obstacle which frustrated the Duke's one attempt to ascend K_2 by the rocky south-eastern arête.

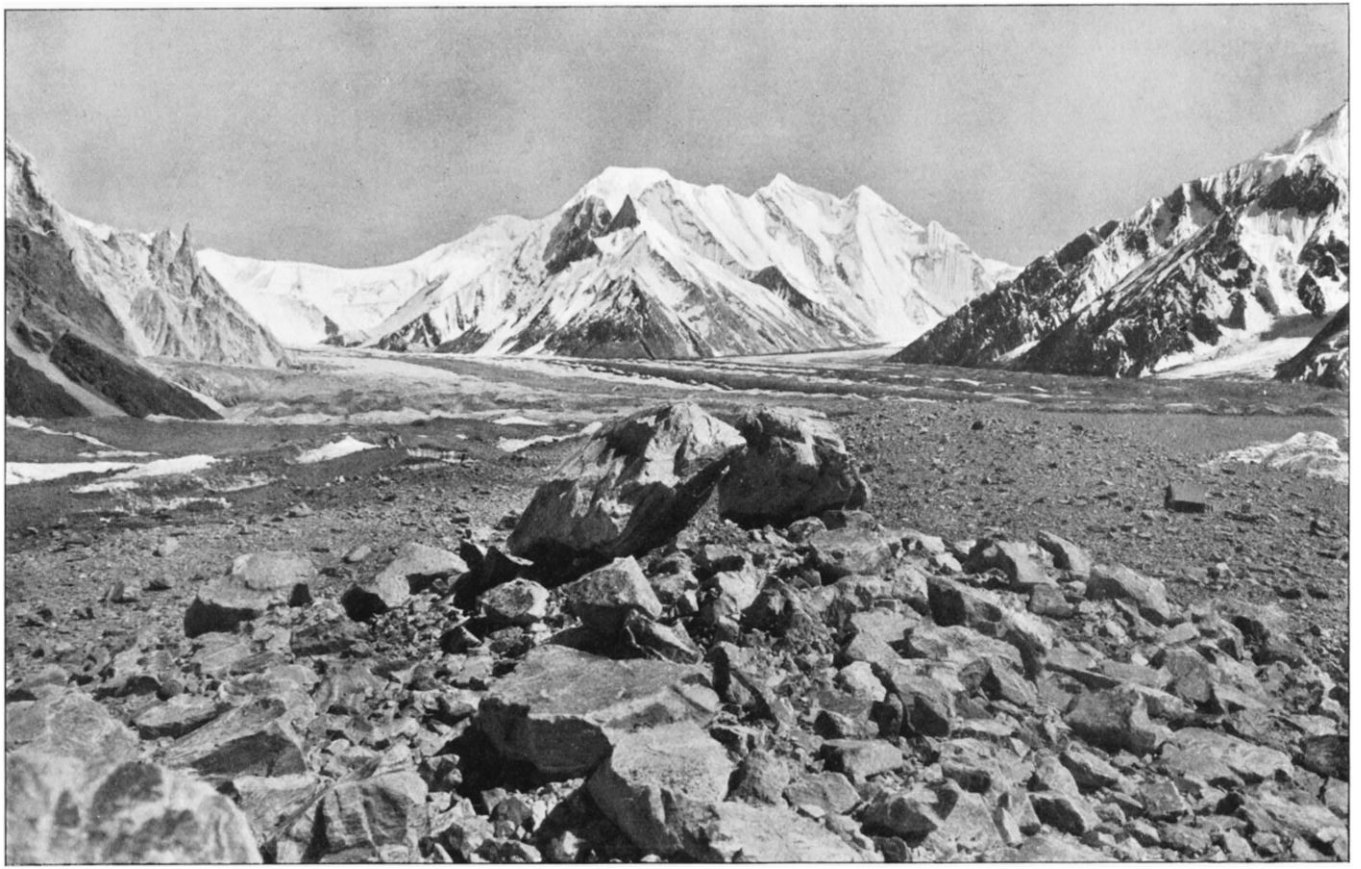
The exploration of the Godwin Austen glacier was completed by the end of June, and the Duke now decided to attempt reaching a great altitude upon some other peak of the same group. The only two which seemed possible were snow-peaks at the end of the upper branch of the Baltoro glacier, due south of K_2; namely, the Golden Throne and the Bride peak (Karakoram No. 8 of T.S. of India, 25,110 feet). The Duke's choice fell upon the latter, as being the highest and offering the additional advantage of having been trigonometrically fixed by the T.S. of India.

The weather had been very unsettled throughout June, with a nearly constant south-west wind blowing hard and cold on the ridges. In July the wind abated somewhat, but in its place came heavy snow-falls, often lasting for days together, while the sky was mainly overcast, and dense mists prevailed. In spite of these untoward atmospheric conditions, and of the deep soft snow, which considerably increased the fatigue of the ascent, the Duke succeeded in establishing a camp on the Chogolisa saddle (20,778 feet), between the Golden Throne and the Bride peak.

From this high camp he made two attempts to ascend the peak by its eastern ridge. After spending the night of the 11th at 21,673 feet, he started with the guides J. Petigax, H. and E. Brocherel, and reached 23,300 feet. A heavy storm forced him to come back. On July 17 he again camped at 22,483, and on the following morning, with the same guides, in spite of a dense mist, succeeded in reaching an altitude of 24,600 feet on the same ridge, a little over 500 feet below the summit. Here the party waited two hours in the vain hope



THE SNOUT OF THE BIAFO GLACIER.



THE BRIDE PEAK (KARAKORAM NO. 8 OF THE INDIAN SURVEY).

that the mists might lift. In view of the obvious risk involved in climbing a steep ridge fringed by a perilous cornice, without being able to see the way, the Duke was compelled to give up the attempt to reach the summit. The calculation of the altitude reached is based upon a barometric reading $12\frac{9}{32}$ inches referred to those taken on the same day at Skardu, Leh, Srinagar, and Gilgit.

I will not here dwell at length upon the physiological effects of great heights as experienced by the expedition. Suffice it to say that no acute phenomenon of mountain sickness occurred. The Duke and five guides spent nine days at and over 21,000 feet, without experiencing insomnia or any other unpleasant symptom. As far as 24,600 feet the pace, although slow, may keep tolerably steady, even in soft deep snow and on rather steep slopes, the only symptom recorded being shortness of breath, and a slight increase in the pulse.

The experience of the expedition is by no means discouraging to the prospect that one day some of the highest peaks may be climbed. But it is essential to success that the mountain should be an easy one, and not of such a nature as to involve exceptional ice or rock work, which would render it impossible to carry up the necessary equipment.

The adverse weather which had prevailed for three weeks almost without interruption showed that the worst period of the monsoon had begun, nor was there the least hope of improvement in the immediate future. The Duke therefore decided to return. On July 24 the expedition left the Baltoro glacier, and reached Askoley on the 27th. Hence, by the shorter summer route over the Skoro-La, and the Deosai plains, we reached Srinagar in a fortnight.

The survey work was carried out by Lieut. Negrotto. The system used was Paganini's photogrammetry, supplemented by theodolite mensuration. In addition, mercurial Fortin barometers, aneroids, and hypsometers were used to determine various heights. These heights were calculated with reference to the base station Rdokass, on a spur of the south or left buttress of the Baltoro glacier. The altitude of Rdokass (13,205 feet) was ascertained by observations taken three times a day during two months, compared with the readings of the observatories of Skardu, Leh, Srinagar and Gilgit.

The result of the survey is a map which comprises the upper basin of the Baltoro glacier, the whole of the Godwin Austen glacier, with its tributaries, which encircle three-fourths of K_2, and the mountain chains which enclose them. This map shows that the configuration of the district differs widely from that given in the map of the Anglo-Austro-Swiss Expedition, published by Dr. J. J. Guillarmod. A number of new altitudes are given on the map. Of these the most important is the one which assigns to the Broad peak an altitude of 27,133 feet. This altitude, added to that of Teram Kangri (27,610 feet), at the head of the Siachen glacier, brings up to seven the number of peaks now known

to be above 27,000 feet. The other five are Mount Everest, K_2, the two peaks of Kanchenjunga, and Makalu.

The experience of this journey agrees with that of the Ruwenzori expedition in showing that the aneroid barometer is too delicate an instrument for mountain expeditions, and must be regarded as quite untrustworthy. It can only be useful as an instrument of comparison. In spite of every precaution a discrepancy resulted at certain points between altimetric figures derived from the reading of pressure and those obtained by intersection. Rather than take a mean it is for the present advisable to retain both data until further observations may be forthcoming.

This was the first time that the photogrammetric method had been tried on an exploring expedition of such a nature. The result has been very satisfactory. The method is very useful for survey work in bad climates with changeable weather because it is rapid. A panorama may be made in less than an hour. There is no possibility of errors in reading; all the calculations are made after returning home, and the plates give an absolute test of the accuracy of the work, and remain as a permanent document. The only drawback is the necessity of carrying glass plates, which are fragile and heavier than films.

As on his former expeditions, the Duke took regular meteorological observations three times a day during the entire campaign. The experience of a single season is not conclusive as regards climate; nevertheless the data will be useful in the future in comparison with further observations. During the whole of June the wind blew steadily from the south-west and at a great height. The nights were cold and the days not excessively warm. In July the violence of the wind diminished considerably, and the temperature rose, but heavy snow-falls began. There is every reason to believe the the high regions of the Karakoram have a climate of their own which differ from that of the lower valleys notwithstanding the shortness of distance as the crow flies. Our experience confirms the observation recorded by our predecessors as to the absence of all electric phenomena in the atmosphere.

About July 20, at Footstool Camp (about 16,600 feet altitude) the snow began to turn into heavy rainfall.

The expedition has recorded that the great chain of mountains comprising the Broad peak, the four Gasherbrums and the Golden Throne is composed of limestone and sedimentary rocks; whereas the opposite ranges, comprising the Staircase peak, K_2, and Bride peak consist of crystalline rocks. A small detached portion of the limestone formation forms the peak of white rock on the corner of the Baltoro and Godwin Austen glaciers. In a recent article Col. Godwin Austen has compared this double formation of the Baltoro and the Godwin Austen valleys with that recorded by Dr. Neve and Dr. Longstaff in the Siachen valley, which has also a south wall of granite and a north wall of stratified

rocks, of which north wall Teram Kangri forms a part. According to Dr. Longstaff and Dr. Neve, the chains formed by sedimentary rocks may even be considered as a separate system which constitutes a northern Karakoram range corresponding to the second Hindu Kush range.

The specimens of plants brought back by the expedition are now being studied, and go to confirm the resemblance which has already been recorded between this flora and the mountain flora of the other great Asiatic ranges, and of the chief European ranges, including the Alps.

The Expedition are unanimous in their high praise of the Baltis, whom they found docile, willing, easy to persuade, extraordinarily sober and always good-humoured. Thirty-five of them lived with us upon the Baltoro, of whom fifteen were our constant companions in the high camps. They even went up to the Chogolisa saddle. They acquired a perfect knowledge of the use of the rope on the high glaciers, which were full of crevasses and covered with dangerous snow, and they possess all the necessary qualities to become first-rate Alpine porters in a few seasons.

The CHAIRMAN (Mr. Yates Thompson), before the paper, alluding to the circumstance that the lecturer was an Italian, and that the Italian Ambassador was present, remarked that all people were perhaps not aware how much geography owed to Italy. It was, however, an Italian who first discovered the whole of Central and Eastern Asia; it was an Italian, Christopher Columbus, who discovered America; and now we had an Italian gentleman who, in the cause of geographical science, had penetrated to the most remote regions of Asia—regions which Cæsar never knew—and who would doubtless give us an excellent account of what he had seen.

Mr. YATES THOMPSON (Chairman), after the paper: We have all been greatly delighted with the lecture of Dr. Filippi, and we only wish that the Duke had been here who commanded this expedition, and who is a Duke, for his energy, his industry, and his vigour, who might almost meet the requirements of the Chancellor of the Exchequer. What is most remarkable about this lecture and this region is, that we have here the last explorer of it, and we have also the first, Colonel Godwin Austen, whose name is connected ever since the year 1861 with this remarkable, this terrific region, and I hope he will let us hear his view of the achievement of the most recent explorer of the regions he first visited.

Colonel GODWIN AUSTEN: The first diagram we saw on the screen gave the route of His Royal Highness the Duke of the Abruzzi from Rawulpindi to the Baltoro glacier on the Karakoram range. It gives me the opportunity, which is fitting, to bring to your notice the names of two officers who, as far back as the early fifties, were associated in mapping that part of India. Those officers were Captain D. G. Robinson and Captain T. G. Montgomerie, of the Bengal Engineers; they organized the survey parties, and we owe all the geography to them. The work that was done near Rawulpindi, in the Sind Sagor Doab lying between the Jhelum and the Indus, was a fine piece of surveying work from the excellence of its topography. The work that was done by Captain Montgomerie

KARAKORAM HIMALAYAS.

THE UPPER BASIN OF THE BALTORO GLACIER THE GODWIN AUSTEN GLACIER AND THEIR TRIBUTARIES

surveyed by the expedition of H.R.H. THE DUKE OF THE ABRUZZI.

Scale 1:125,000 or 1 Inch = 1·97 Stat. Miles.

1 ¾ ½ ¼ 0 1 2 3 4

Reference.

Route
Camps ..... OXI
△ 26000 = Heights in feet from Survey of India triangulation
· 20974 = " " " " " Photogrammetric intersections
· 24583[b] = " " " " " Barometric readings

Note.

This map is based on theodolite and photogrammetric surveys carried out by Lieut. Marchese F. Negrotto R.I.N., supplemented by the survey of Sir Martin Conway 1892, and adjusted to the Survey of India positions.

A Photogrammetric survey of the Expedition.
B Sir W. M. Conway's survey with additions from A.C.F. Ferber to the Mustagh Glacier
C Sir W. M. Conway's survey modified by observations of the Expedition.

Published by the Royal Geographical Society.

76° 15′ 76° 25′

KARAKORAM HIMALAYAS.

THE UPPER BASIN OF THE BALTORO GLACIER THE GODWIN AUSTEN GLACIER

AND THEIR TRIBUTARIES

surveyed by the expedition of

H.R.H. THE DUKE OF THE ABRUZZI.

Scale 1:125,000 or 1 Inch = 1·97 Stat. Miles.

1 ¾ ½ ¼ 0 1 2 3 4

35° 55′

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Reference.

Route

Camps XI

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· 24583[b] = " " " " " Barometric readings

23163 ·

21785 ·

22785 ·

23829 ·

18097 ·

23524

23478

23304

18717

Mustagh Tower

Seven Pagodas

Mustagh Pass 19029

Snow Cap

Tower Glacier

Black Tooth

Snake Glacier

Snowy Peak

Black Tooth Glacier

Mustagh Glacier

Neptune

Pale Glacier

Younghusband Glacier

B A L T O R O G L A C

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XVII

Rdokass 13205[b]

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76° 25′ 76° 35′

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XI

om Survey of India triangulation
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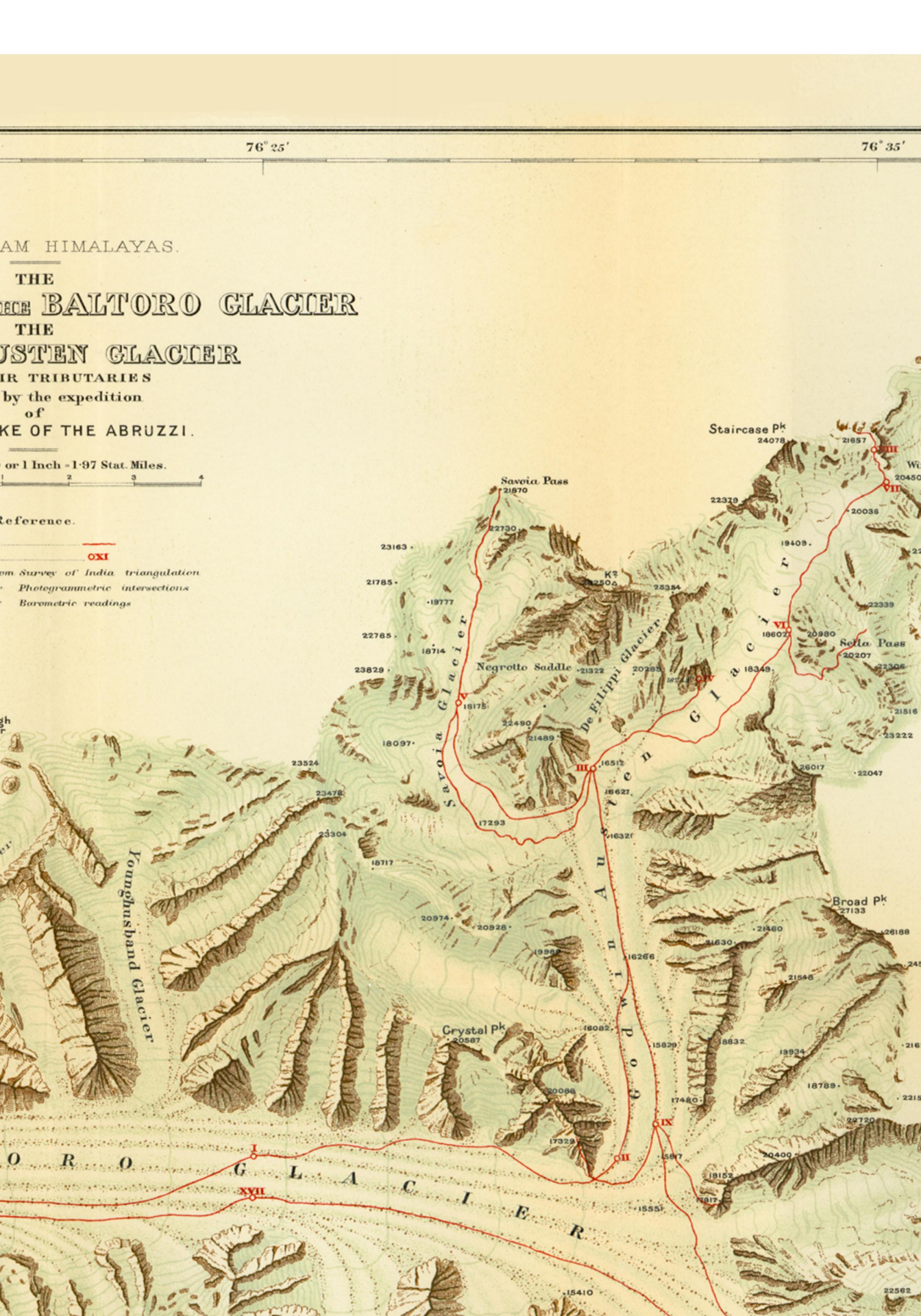


76° 35′
35° 55′
35° 45′
Staircase Pk
24078
Windy Gap
20450
Savoia Pass
21870
Sella Pass
20207
Negrotto Saddle
21322
De Filippi Glacier
Italian Glacier
Abruzzi Spur
Broad Pk
27133
Gasherbrum Pks
Hidden Pk
26470
Note.
This map is based on theodolite and photogrammetric surveys carried out by Lieut. Marchese F. Negrotto R. I. N., supplemented by the survey of Sir Martin Conway 1892, and adjusted to the Survey of India positions.

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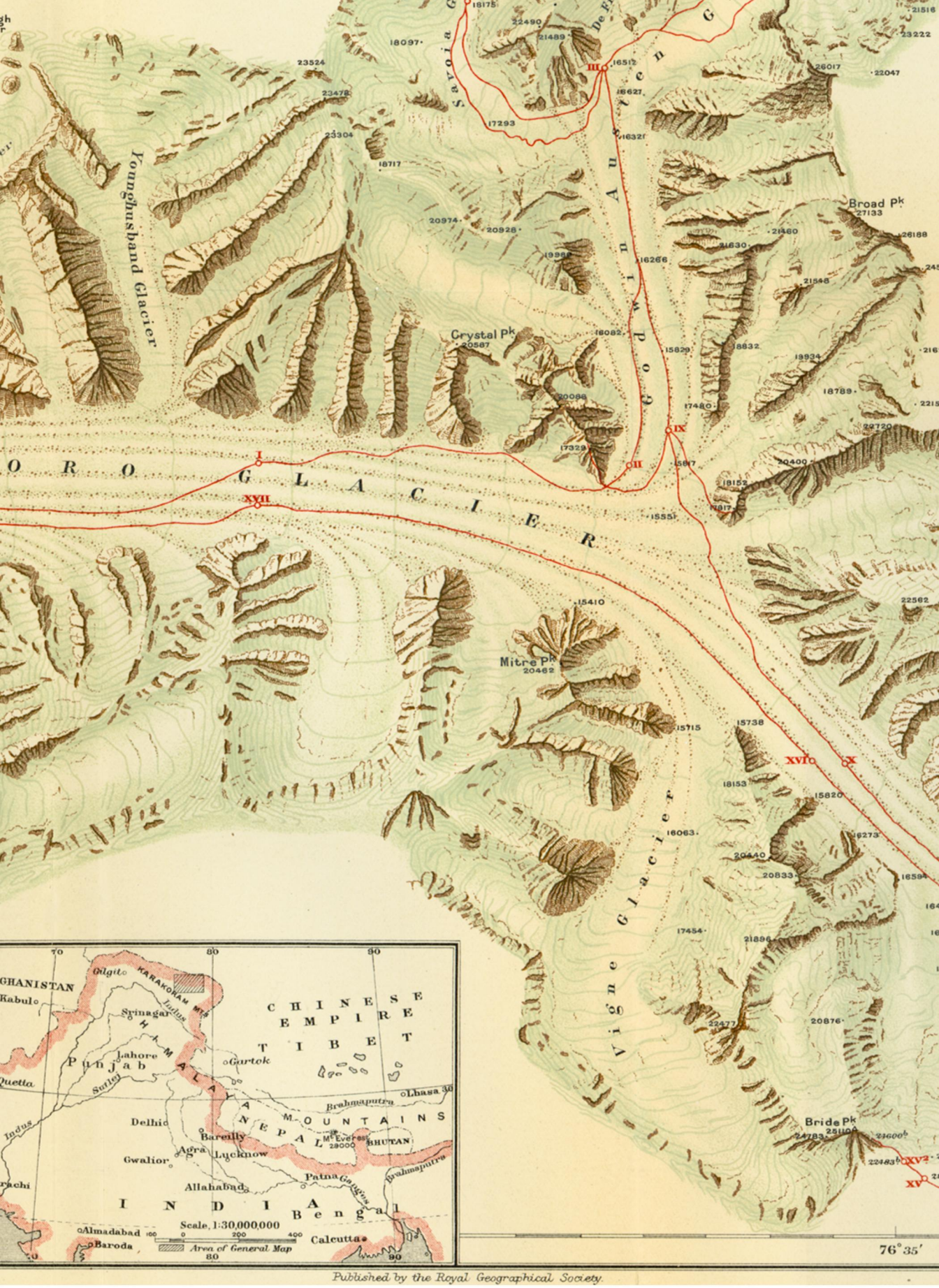
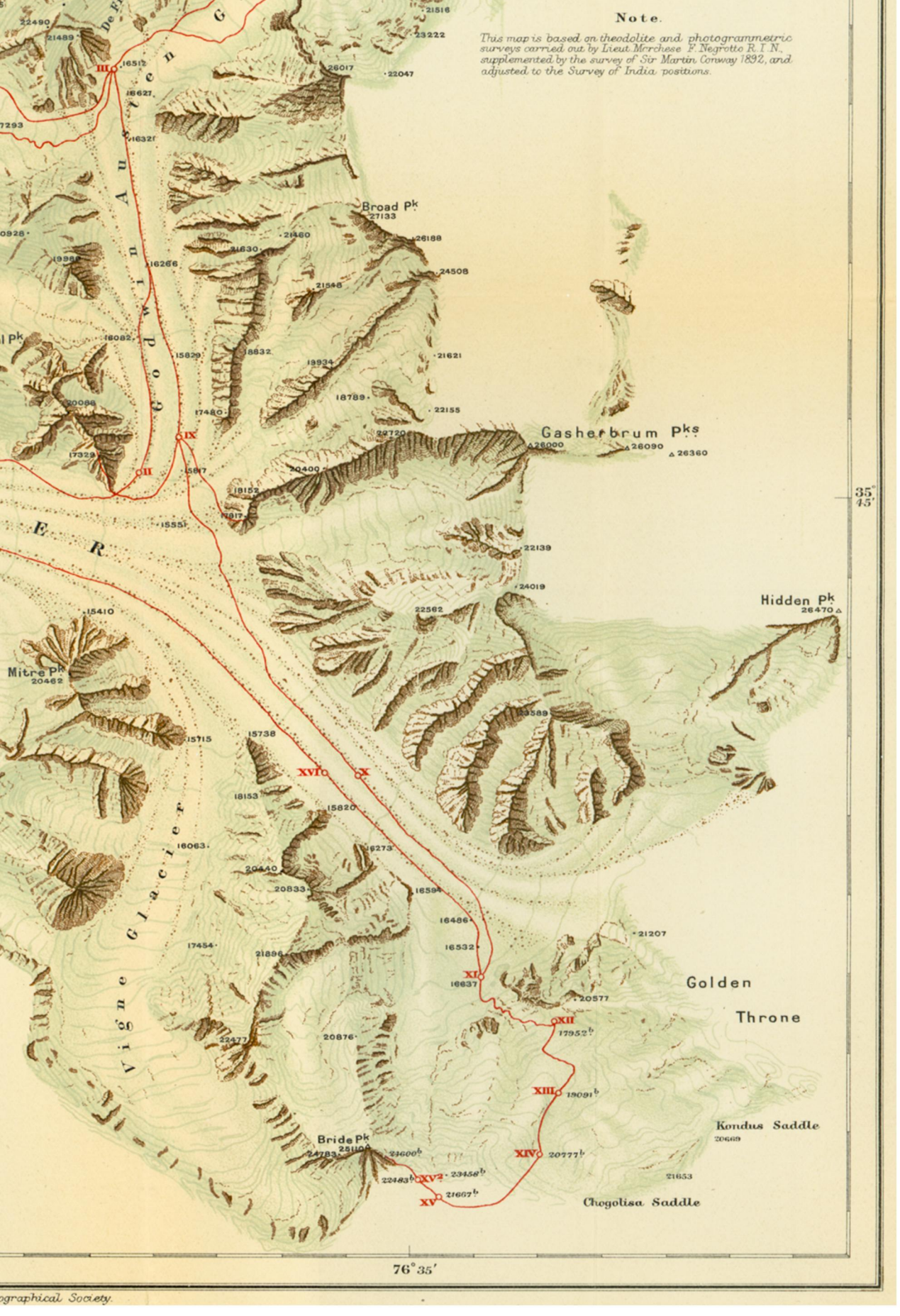


Published by the Royal Geographical Society.



ographical Society.

was the region from the plains of the Punjab up to the main range of the Himalayas. That survey is perhaps one of the most accurate, as far as its triangulation goes, as any that was ever done, and particularly for the very lofty peaks on which observations were taken. The most rigorous observations were taken close up to the main range which we have seen depicted this evening. As the triangulation and topography advanced from the plains into Kashmir and on beyond, the great ambition which we had was to reach the snowy peaks which we had seen looming far away for several years. They were fixed so accurately that when the plane-tabling work had to be done, it was comparatively easy to do it. A great work is before some future surveyor in carrying the survey further to the north. A fine attempt was made by Dr. Longstaff in proceeding up the Saltoro glacier, and the work that has been done by the Duke of the Abruzzi is of a similar nature. It is a great pleasure to me, who took part in the survey operations, to find that surveyors are penetrating into a portion that we were unable to reach, and that there is every possibility of their proceeding on beyond the range of the Himalayas and mapping a great deal of the country, of which at present we know very little. There are many points in the address we have had this evening that would form a lecture alone, and it is almost impossible to touch upon questions of geology; but I was struck with one point, in two or three of the diagrams which we have seen thrown upon the screen. The summit of K_2 appears to me to be of a more recent rock than that of the base, and it is not at all unlikely that the summit may prove to be of stratified rocks, while the base is of granite, which the Duke has recorded. It is very interesting to find the allusion to the limestone and stratified rocks which occur at the head of the Baltoro glacier—it leads us to connect that portion of the range with what was observed by Dr. Longstaff to the east, and what I have seen myself on the Changcheumo and Pankong lake still further to the eastward. I think that the work that was performed by the Duke of the Abruzzi and those with him in remaining upon the Chogolisa plateau for ten days was a most extraordinary feat, and every credit is due to them for the exposure that they underwent on it.

Sir FRANCIS YOUNGHUSBAND: I think we must all admire both the great energy, daring, and skill, with which His Royal Highness the Duke of the Abruzzi led this expedition, and the thoroughness of the scientific work. But as geographers I think we must all admire, quite as much as the thoroughness, his reserve. I dare say you noticed on the right hand corner of the map a great blank space; although His Royal Highness had seen peaks there, he had seen enough of these mountains to know that you cannot trust a mountain a yard further than you can see it. Upon every side it presents a different aspect. Some twenty-four years ago, when I stood before this Society and described my journey across these mountains, which I first saw from the northern side—the side directly opposite to that from which His Royal Highness's expedition has been working—I said that this great range on the northern side looked to me as if it was made up of a series like one hundred Matterhorns in a row. It was an exaggeration; still, I think after you have seen these magnificent photographs, which I think we must all admit are the finest series of mountain photographs which have ever been presented to us, you will agree that if I was wrong in saying that there was one hundred Matterhorns, at any rate, that was the best means I could possibly employ of producing upon your minds, without these beautiful photographs, an impression of the grandeur of the mountain region. After seeing those photographs, you will be able to realize what my feelings were, when, without any Alpine guides, without any Alpine appliances, without tents

even, I had to find my way right through those mountains into India. But, fortunately for me, I had to get across the very easiest point, and not like His Royal Highness, aspire to climb the very highest peak.

Dr. de Filippi and Colonel Godwin Austen have dwelt upon the importance of prolonging the explorations which have been already undertaken by His Royal Highness and Dr. Longstaff, and filling up that extremely interesting and important gap which lies beyond what has already been done, between that and the valley of the Oprang river. When we discussed these points together, previous to his Royal Highness proceeding to these parts, I was fully under the impression that when he reached the watershed, at what we then thought would be Windy gap, which I dare say you noticed at the extreme right of the map, the party would then look down into the Oprang river. But I think, probably from the geographical point of view, the most important result which has come from this expedition is the fact that between there is another valley and another high range; it would be of interest to explore the northern slopes of this magnificent mountain, Teram Kangri, discovered by Dr. Longstaff, and which in all likelihood will prove to be even higher than the height he attributes to it at present, 27,000 feet. I think that is the chief piece of exploration to be done in the region, and much as I admire Italian enterprise, I hope English enterprise won't be behind in carrying it out. We all owe a deep debt of gratitude to his Royal Highness for permitting Dr. de Filippi to give us this lecture, and to show us those splendid photographs, which have been taken with infinite care by Vittoria Sella; and I should like to thank Dr. de Filippi, and to express my admiration for the excellent way in which he has lectured to us, in what is to him a foreign language.

Sir MARTIN CONWAY: I think one of the most revealing photographs that was shown upon the screen to-night was the first photograph—of the map. It would be difficult to find a piece of the world anywhere that would show you such an extremely intricate tangle of mountains as that portion of the map shows. There is, I think, no part of the world where mountains throng together, and finally uplift themselves into so astounding a group of super-eminent peaks, as do the mountains that surround this knot-point of the ranges of Asia. The mountains that surround the head of the Baltoro glacier—I think you will admit, after seeing, as you have, the wonderful photographs of them shown to-night—yield to none that any of us have ever seen, in precipitance, in boldness of form, in loftiness, and in the way in which they are grouped together. They are beyond question the finest mountain group in the world. When I went up that region, now eighteen years ago, it was with the hope that we should find there a high mountain that we could climb, and I cannot describe to you how, as day after day passed and we got further and further into the heart of these mountains, the feeling of hopelessness overwhelmed us—hopelessness of ever finding anything we could climb at all. Because in the case of most of these mountains it is not merely impossible to reach the summit, it is difficult even to commence the ascent from the bottom. There are no peaks I have ever seen that are more inaccessible than the bulk of the peaks that surround the Baltoro glacier, regarded even from the most expert rock-climber's point of view. If anything is to be done in climbing in such a district as this, it is necessary that the climbing party should be exceedingly well equipped, exceedingly well organized, and exceedingly well supported by a large body of porters. To organize an expedition which shall be able to carry into the front line—what I may call the "fighting line"—a sufficient body of expert mountaineers, to organize an expedition of that kind,

with its quantity of coolies, its huge organization, and then to lead that expedition to the highest point that has ever been reached by man, is indeed a great achievement. That was the achievement of the Duke of the Abruzzi. I have no doubt that in the future another expedition, not only one other, but many others, will go up this same Baltoro glacier, and will attempt again either the Bride peak or the Golden Throne, or possibly one or two more which may conceivably be climable among these mountains; but I cannot believe that any expedition will be better led, better organized, or more successfully brought back. The Balti coolies, upon whom ultimately the success of the expedition depends, are very docile men, but they require much care and a great deal of attention, or they would be very easily lost. I think that the fact that this expedition has returned after employing some three hundred of these men, taking them right into the very fastness of the mountains, and bringing them safely back, is one we should take note of. It would be easy to talk at great length about this district, but I will confine myself now merely to expressing my hearty congratulations alike to the leader of the expedition and to his followers, and our thanks to Dr. Filippi for the extremely interesting manner in which he has described the journey to us to-night.

Dr. T. G. Longstaff: I have not myself been on the Baltoro glacier, although last summer I was, Asiaticly speaking, fairly close to my friend Dr. de Filippi; I was then on the glaciers further to the south and east. If I attempted to take up the many interesting points that are raised in Dr. de Filippi's paper, I am afraid the hall would be empty before I was half through. I should like, however, to draw attention to one thing, about which, with characteristic modesty, very little has been said, and that is, that Broad peak has been for the first time measured, and turns out to be over 27,000 feet. Now, 27,000 feet is a peculiarly interesting orographical number. You have the twin peaks of Kanchenjunga, 28,000 and 27,000; you have Everest and its companion peak, Makalu, 29,000 and 27,000, and now we have K_2 and Broad peak, 28,000 and 27,000. Those are the only three groups in the world that are definitely known to attain such an extraordinary altitude. There are no others besides those five mountains, with the possible exception of Teram Kangri, whose height cannot as yet be definitely accepted; so that really this addition of a fifth peak is a very important one indeed. With regard to the excellent survey of Lieut. Marchese Negrotto, it was carried out by Paganini's photogrammetric method, of which you hear very little in this country; I do not quite know why. The method was started in 1849 by Colonel Laussedat, in France, and since then it has been steadily improved. It was introduced into Canada by Dr. Deville, and has been exclusively used by Wheeler and Drewry and other eminent Canadian surveyors in the Rocky mountains. It is an extremely accurate method of survey, and I do not think there is any other which is so suited to a mountain country. Mountaineers must have listened to this lecture and seen these photographs—the most beautiful photographs Sella has ever produced—with a certain amount of regret; all the mountaineers I have met who have much experience practically give up hopes of being able to do any very high climbs in the Karakoram. There does not appear to me to be the slightest chance of success. I have no doubt expeditions will continue to attempt K_2. I was myself asked last January to join a man to go out to K_2. He assured me it was perfectly easy, so I suggested that he had better do it himself. I was of course exceedingly interested when Sella came to develop his photographs, to hear from him he had found Teram Kangri, a big peak to the south-east which I had seen and measured in the same year,

because there is some doubt about my measurements, and all the summer I have been wondering whether the peak really does exist; so it is a matter of great gratification to me to see it in that panorama. Sella took it on June 22. I crossed the Saltoro pass with Neve and Slingsby on June 15, and, I think, made my first measurement of Teram Kangri on the 17th, so I just managed to get it in by five days. At any rate, I think we may be certain that a very high mountain does exist in the position I indicated.

About that final climb of the Duke's. Dr. de Filippi, and his companions also, have such a rare habit of modesty, that I do not know whether you quite realise what a very remarkable feat that final climb of the Duke's was. The bare idea of camping at over 21,000 feet for ten days is perfectly horrible to anybody who has ever done anything like it. It is appalling to think of; and then at the end of that time, having got to 24,600 feet, to wait for two hours for the weather to clear and make the last 500 feet of corniced snow-ridge possible. To go on was merely to court the disasters that have made the Lyskamm so notorious in the Alps; it is a danger that no sane mountaineer would dream of encountering. It is exceedingly hard lines, when complete success was almost in his grasp, that he was not able to complete the ascent. Naval officers are admittedly very accurate observers; the altitudes were deduced by mercurial barometer, checked at Leh, Srinagar, Skardu, and Gilgit; also they had their own base station at Rdokass. So this ascent to 24,600 feet is absolutely certain and definite beyond all doubt, and is much the highest ascent that has ever been made, or that any one else has ever claimed to have made.

Dr. STEIN: It is a somewhat unexpected honour that I find myself called upon to speak after the eminent mountaineers who have given you their high appreciation of this wonderful expedition of His Royal Highness. But I cannot deny the fact that I have passed the Karakoram, both west and east, on scientific expeditions, and that long ago I had also the good fortune, on what I may call a mere holiday trip, to sight Mount Godwin Austen or K_2. It was after my first year in India, after a Punjab "hot weather," during which one felt half roasted and half boiled by the heat of the plains, that I made up my mind to get as near as I could to the greenest spot on the Indian maps, green being the colour used in them for glaciers, and there is certainly no spot anywhere in the mountain regions of Asia where that colour occupies a larger space than about K_2. It was a short holiday: I just managed to get near the foot of the Baltoro glacier and back again in time without exceeding my leave. But ever since, the vision I had of that wonderful mountain has been a cherished possession to me. I am not qualified, from such an acquaintance as I have got of Mount Godwin Austen, to speak about the physical conditions of that region. But certain points which Dr. de Filippi mentioned at the beginning of his paper encourage me to make a remark or two as to historical facts concerning it. We humans have a way of intruding into the mountain world, even where it is "horrible," as Dr. Longstaff has called it. Thus there is the broad fact that this Baltoro glacier has seen regular trade during centuries, and in periods which by no means go back to dim antiquity. We have the evidence of one of the most observant visitors the East has ever seen, Dr. François Bernier, who went to Kashmir during the reign of the Moghul Emperor Aurangzeb. He records how, the Ladak route being closed by war, the trade between Kashgar and Kashmir was carried on over that high Muztagh pass, which again centuries later Sir Francis Younghusband crossed twenty-four years ago as the first European. I also might mention that the important observation of Dr. de Filippi's regarding the racial origin of the Baltis is entirely confirmed by early

Chinese records, which tell us that Baltistan, known to them as Great Po-lu (Bolor), as well as Gilgit, were occupied by the Tibetans in the eighth century A.D. I have no doubt that the prevalence of Tibetan speech is largely due to that prolonged occupation.

A nearer past and nearer historical links must rise to our minds here. I think it a truly memorable occasion, when we have present here the first explorer of that great region, Colonel Godwin Austen, after whom the mountain was named, rightly as I believe, by a former President of this Society. Since his days many expeditions have gone up to the great peaks of the Himalayas; but I think that none of them has done more remarkable pioneering work than Sir Francis Younghusband when he came down withc ıt guides, without a camp, over that glacier pass disused for centuries. It is also no ordinary occasion when we can hear Sir Martin Conway, who led the first large mountaineering expedition to these parts, and Dr. Longstaff, whose recent explorations have opened out a new region to us east of that great peak. We have here also the linking of the past with the future; because I have no doubt whatever that unexplored region to the east of Mount Godwin Austen will attract many an expedition yet to come. However, I believe that none of them could possibly exceed in daring, in leadership, and in organization, the one which Dr. de Filippi has described to us, and which H.R.H. the Duke of the Abruzzi led. I have had my humble experiences of work in mountains which are deserts too. I have been obliged to move large parties across high mountain regions where for forty or fifty days nothing in the way of food could be secured, and it is the practical knowledge of the difficulties involved which fills me with the highest admiration for the organization, care, and skill with which this prolonged exploration was carried out. We have received here, as it were, personal evidence of H.R.H.'s skill in organization. I am sure he could not have entrusted the task of acquainting us with the results to anybody more qualified than Dr. de Filippi. He told us at the beginning that he had no adventures to relate. He wisely allowed nature and the peaks which we saw before us to speak. No words on my part could possibly add to the appreciation which Cav. Sella's slides must have excited in all of you. I only wish to add my own personal gratitude for having been allowed to see Mount Godwin Austen again in such marvellous photographs, and my thorough admiration for the way in which the expedition's work was related.

Dr. DE FILIPPI: I can make no reply to everybody who has so kindly spoken, except my thanks. I think the weighty authority of Colonel Godwin Austen, Sir Francis Younghusband, Sir Martin Conway, Dr. Longstaff, and Dr. Stein have contributed to convince you that although the chief aim of the expedition was mountaineering, still H.R.H. the Duke of the Abruzzi has given it every chance of doing whatever geographical and scientific work might prove possible. I beg you to accept my warmest thanks for the indulgence you have shown to so dry and technical a paper. It would please Sella to know how keenly appreciative you have shown yourselves of his work. I shall be proud to convey to H.R.H. the Duke of the Abruzzi the warmth of the reception which you have accorded to the narrative of his journey and your appreciation of his labours. I know I interpret his wishes correctly, in thanking you heartily on his behalf.

TIBET.

'India and Tibet.' History of the relations between the two countries. By Sir Francis Younghusband, K.C.I.E. London: Murray. 1910. 21*s. net.*

No better authority than Sir Francis Younghusband could have been found to write a record of the Tibetan expedition of 1903–04 and the events that led up to it. And the story of the expedition practically occupies the whole of this work for the events from the time of Warren Hastings' mission in 1774 up to Lord Curzon's attempts in 1899 to open direct communication with the Tibetans only cover sixty-five pages. It will be understood, therefore, that the present book is historical and political rather than geographical; at the same time geography plays such an important part in the better understanding of the Tibetan problem that we should have liked rather more detailed information regarding the trade routes of the country, particularly those leading into India and the passes across the Himalayas, and the practicability of the routes through Bhutan and the Mishmi country, which are at present very imperfectly known. The author's principal suggestion towards remedying the anomalies and difficulties of the present *impasse* is the appointment of a British agent at Lhasa, and on the whole one is forced to agree with him. But at the same time the chief justification of such a step would be found in the expectation of a lucrative trade being thereby fostered, for this is, after all, the mainspring and general object of ordinary international intercourse, to which hitherto our governments have been so strangely opposed in the case of Tibet. A carefully written chapter on the existing resources of Tibet, and the opportunities for trade would thus have been most welcome, for the subject is extremely important and little understood, though ample materials for a trustworthy account are available in every direction. The present state of the relations between India and Tibet is clearly temporary. With the advent of the Chinese at Lhasa a radical change in the political and social organization of Tibet must occur sooner or later, and the monkish supremacy must give way in the end. Neither the Tibetan people nor their Chinese masters are opposed to commercial dealings with their neighbours, so we may fairly anticipate that the new *régime* will be productive of a better *entente* between India and her northern neighbours.

'Forest Life and Sport in India.' By S. Eardley-Wilmot. (London: Arnold. 1910. Pp. xi., 324. *Illustrations.* 12*s.* 6*d.*) This we should judge to be an important work on its subject. It is written by an ex-inspector-general of Indian forests, who in his book has made sport only incidental to his work, as it was in actuality. Without entering into technicalities, the book covers the whole subject of forests in the Indian Empire, describes and illustrates them and their diverse conditions, clearly shows the present position of forestry as a branch of the administration, and gives indications of the duties of a forester.

AFRICA.

GERMAN EQUATORIAL AFRICA.

'Zwanzig Jahre in Deutschen Kolonien.' By Major Wilhem Langheld. Berlin: Wilhelm Weicher. 1909. 10*m.*

In October, 1889, Major, then Lieutenant, Langheld joined von Wissmann's staff at Dar-es-Salaam, where he met Stanley and Emin Pasha on their return from "darkest Africa." A little later he met the ill-fated trader Stokes. His African services, which thus link on to the romantic era of exploration, did not end until February, 1908. From 1889 to 1900 he was employed in German East

removal of tissue by a medical corrosive may appear to justify this use of the term; but the essential part of both those processes is not the solution, but the excavation or pitting of the material attacked. Hence Merrill's * description of rocks etched by solvents as "corroded surfaces" is fully justified.

The word "corrode" comes from the Latin *corrodere*, to gnaw away, which consists of *cor*, from *com*, the intensive prefix, and *rodere*, to gnaw. Its primary meaning as given in the Oxford Dictionary is "to eat into;" and it implies penetration into a body rather than the general gnawing away of the surface.

There seems no advantage in the limitation of the term "corrosion" to chemical action. The term "solution," used by Chamberlin and Salisbury in 1904,† is adequate and self-explanatory; there seems no need for a special term for rock solution as an agent in denudation. If there be, the introduction of a new term would be better than the misapplication of an old one; for the use of the term "corrosion" in physiography for the filing action of transported sediment seems etymologically more correct than for the chemical solution of rocks.

It may be objected that this paper looks upon scientific terms from an altogether impracticable standpoint, and that it is useless at the present day to attempt to limit the meaning of words by etymological considerations. I am quite prepared to follow well-established usage, even in those cases when a term is adopted in the exact opposite to its original meaning; but when there are alternative meanings in use it seems to me that the etymological test is of value; for the closer a term agrees with its strict interpretation, the less excuse is there for its being misunderstood.

It will be unfortunate if the important geographical terms considered in this paper should come to have different meanings in Europe and America, and I have submitted this statement as to their diverging use in the hope that it may lead to some more general agreement.

It seems to me convenient, in the mean time, to use the terms as follows:—

denudation for the wearing down of the land by any agency;

erosion for the widespread lowering of the land by wind, rain, and weather and by rivers and glaciers acting laterally;

corrosion for the excavation by rivers and glaciers of their beds;

corrasion dismiss as a synonym of corrosion;

abrasion for the attack of the sea on the land, though when used in this restricted sense it is well to refer to the process as marine abrasion;

solution for the action of solvents.

THE SURVEY OF THE HIMALAYA.

By Dr. T. G. LONGSTAFF.

THE publication of Synoptical Volume XXXV. by the Trigonometrical Survey of India will be welcomed by many students of Himalayan problems, for much information is thereby made conveniently accessible which formerly could only be gathered piecemeal from scattered annual reports.

* G. P. Merill, 'A Treatise on Rocks, Rock-Weathering, and Soils,' p. 250, pl. 16 (not 17, as in text). 1897.

† T. C. Chamberlin and R. D. Salisbury, 'Geology,' vol. 1, p. 116. 1904.

This volume, the North-East Longitudinal Series, covers the Central Himalaya from longitude 78° to 88°. It also includes those peaks situated between longitude 88° and 92°, which were observed from stations in the North-East Series, but which properly belong to the Assam Longitudinal Series, as yet unpublished in this form. The long delay, almost inevitable under the circumstances, which occurs between work in the field and final publication of the results, probably accounts for the scant recognition by geographers and travellers of the labours of the Indian Survey in the Himalayan region. This delay is particularly regrettable in the case of the important survey operations so successfully carried out in connection with the recent mission to Tibet.

The present volume deals with the Himalayan region from Simla to Punakha, filling the gap between Volume VII. of the North-West Series, which covers Kashmir and the adjacent regions, and Volume XXII. of the Assam Valley Triangulation. The computation and classification of the data have been superintended by Mr. J. Eccles, M.A., and during his absence by Captain H. H. Turner, R.E. The preface is written by Colonel S. G. Burrard, R.E., F.R.S., and deals with some novel problems of great interest. Mr. H. G. Shaw's series of observations during the last four years are passed under review. They prove conclusively that refraction is greater in autumn than in spring ; but they also indicate that there must be some other cause, besides differences in refraction, which produces discrepancies in the altitudes obtained for the same peak from different stations. The height of Trisul is discussed by way of indicating the difficulties of determining the actual height of any high mountain. The value 23,406 feet is found on both the official maps of Kumaon and British Garhwal (1872–75), and was obtained by the survey officer, Colonel Carter, from a small secondary series of triangulation which he carried through Kumaon and Garhwal. The height of the peak is given differently on the map and in the book, for individual observers have had different ideas about refraction and other corrections. When once the data have been handled and published, the preliminary values entered upon the maps are to be considered as cancelled. The writer has seen no explanation of the fact that heights on the maps are usually higher than those in the books. The value 23,360 feet, now officially accepted, was derived from observations of the peak obtained between 1841 and 1850 from distances of 29 to 84 miles. They vary from 23,441 to 23,280 feet, and the true height is taken as between 23,350 and 23,380 feet. Even here we have a further element of uncertainty, for it has been stated that when in future we come to correct heights for the disturbances produced by Himalayan attraction in the levels of theodolites, we shall probably have to add 60 or 70 feet to the values now accepted. In the present volume Colonel Burrard points out that gravity also causes the datum-level surface to be heaped up under the mountains, so that we are in doubt what surface we are measuring the heights of peaks from, for in trigonometrical operations we assume the

surface of the spheroid to be our datum, and in spirit-levelling we measure from the surface of the geoid. In the present state of our knowledge it certainly seems wiser to follow Colonel Burrard and ignore this additional complexity.

These volumes are indispensable to travellers undertaking any fresh topographical explorations of these regions, for they give the officially accepted height and position of the great Himalayan peaks and also full data from which can be ascertained the precise degrees of accuracy with which these have been determined. In the "degree charts," published in a separate volume, all peaks and stations have been plotted by Messrs. W. M. Kelly and J. H. Nichol, on a scale of 1 inch to 4 miles. This is particularly useful, as some of them are not shown on the topographical sheets of the Indian Atlas. An excellent innovation is the labelling of all peaks with a letter and two numbers by which they may be at once referred to their proper degree-square and identified without possibility of error.

The introduction by Captain H. H. Turner, R.E., deals firstly with the main triangulation carried through the fever-haunted Tarai between 1841 1851, and then with the topographical survey of Kumaun and Garhwal from 1864 to 1877, and the Sikkim survey of 1878 to 1885. The second portion contains a few scanty references to various ascents by the indefatigable officers of the survey, which mountaineers will regret are not given in much greater detail. Some additional information can, however, be obtained from the Annual General Reports of the Survey of India.

During the previous operations in Kashmir and the adjacent districts, the officers of the Survey showed repeatedly that the physical obstacles of such a country were powerless to defeat them in the execution of their duty. They set up their theodolites on 10 stations of over 20,000 feet; they visited 20 other stations of over 20,000 feet and 5 of over 21,000 feet. By far the greater number of these ascents were in Ladak, and none of them presented such difficulties as the Nela peak, 19,069 feet, in Bashahr which was successfully ascended on June 22, 1854, by W. H. Johnson with a 12-inch theodolite. This peak had baffled the surveyors for two seasons and had defeated three previous parties. But the officers of the Survey of India lay no emphasis in their reports on achievements so remarkable, achievements each one of which would be enough to send many a modern traveller headlong to his publishers. As an instance of this, I may mention the case of the peak Shilla 23,050 feet, shown as a station on p. 259 of Volume VII. This peak is shown on Atlas Sheet 46 as "Parangla No. 2 Station 23,064 feet." On reference to headquarters at Dehra Dun I was furnished with the following particulars: It was observed from two stations, each of which was above 20,000 feet. When it was being observed the observer intended to visit it and to observe from it. But he never carried out this intention. It was visited by native Khalassis, who erected a staff. The name was changed to Shilla in the office at Dehra Dun.

When in the present volume we meet again with the names of such

officers as Carter, Thuillier (now Sir Henry R. Thuillier, K.C.I.E.), and foremost of all Montgomerie, supported by such tried mountain surveyors as W. H. Johnson, W. G. Beverley, E. C. Ryall, and others, we may expect to find some reference to mountaineering achievements comparable to those already accomplished in Kashmir. It should be remembered, however, that General Walker had, in the present instance, instructed the Topographical officers not to attempt accurate surveys above 16,000 feet, the department not being in a position to afford the cost in time and money. Hence areas of perpetual snow were occasionally mapped from sketches made from considerable distances, and much less climbing of high peaks was attempted. Many stations, however, were established at over 17,000 feet in Kumaon and Garhwal, and a few at over 18,000 feet, while along the borders of Hundes three peaks of over 19,000 feet were utilized. In 1874 in the Upper Mana valley the *average* height of Mr. I. S. Pocock's plane-table stations was 19,500 feet and his maximum height visited was 22,040 feet, this being so far the highest authenticated plane-table station in the Indian Survey.

Ryall's successful survey of a large part of Hundes is merely referred to. His own brief account was published in the General Report for 1877–78. Ryall and Kinney's map is, for much of the country, still the best which has ever been produced of this most interesting corner of Tibet. The Introduction includes a brief account of Captain H. J. Harman's survey of Sikkim in 1879. His feet were badly frostbitten on the Donkia pass (18,100 feet), and although he continued his work for three and a half months and in 1881 made an attempt to reach the neighbourhood of Kinchinjunga, he was obliged to take leave in November, 1882, and died early in the following year, having never completely recovered.

In the course of these several operations the surveyors, in addition to the privations inseparable from such work, suffered much from fever, to which several of them actually succumbed. Captain Basevi died at his post in 1871 on the exposed plains of Lanak. Dr. Stoliczka, of the Geological Survey, died on his way back to Leh in 1874, while in 1878 of the members of this branch 34 per cent. died or were incapacitated! The great Montgomerie died at the early age of forty-eight, his death being generally attributed to his long and severe service in the Himalaya.

It is to the arduous, conscientious, and unadvertised labours of these surveyors that both mountain climbers and explorers of these regions owe, and must continue to owe, a great debt of gratitude. The delineation in the Indian Atlas of topographical details in the regions of ice and snow is admittedly imperfect. The accuracy of maps is merely a question of degree, for no ordinary scale map can possibly be free from error; but it should be remembered that there is no other mountain region of the world at all comparable in extent to the northern frontiers of India, the physical features of which have been laid down with any approach to such a degree of accuracy.

NOTE ON MAPS ILLUSTRATING DR. STEIN'S EXPLORATIONS IN CHINESE TURKESTAN AND KANSU.*

By Dr. M. AUREL STEIN.

THE maps published herewith are intended to illustrate the explorations which were carried on by me during the years 1906–08 in Chinese Turkestan and westernmost Kansu under the orders of the Indian Government, and with the special assistance of the Survey of India Department, and of which a preliminary account has been furnished by me in the *Geographical Journal* for July and September, 1909. They comprise a general map (I.) of the area over which the explorations of those years extended, between the approximate longitudes 75° to 101° E., on the natural scale of 1 : 3,000,000; and two maps, on the scale of 1 : 1,000,000, showing important mountain regions within that area, viz. portions of the Kun-lun range south of the Karghalik-Khotan-Keriya line (II.), and portions of the Western and Central Nan-shan between the longitudes of Yü-mên-hsien and Kan-chou (III.). The general map contains also insets showing, on the natural scale of 1 : 1,000,000, the geographically and archæologically interesting region through which the remains of the ancient Chinese frontier wall extend, from the desert west of Tun-huang to the vicinity of Yü-mên-hsien (A, B); as well as the oases of Chira, Gulakhma, and Domoko (C), on a scale 1 : 500,000 between Khotan and Keriya, which along with the adjacent desert tracts may claim a similar interest.

These maps have been reduced from the map in 94 sheets, drawn on the scale of 4 miles to 1 inch or 1 : 253,440, and each extending over one degree of latitude and longitude, respectively, in which the Trigonometrical Survey Office, Dehra Dun, under the direction of Colonel S. G. Burrard, R.E., F.R.S., has embodied the results of the surveys effected by my topographical assistants and myself. These sheets, at present in course of reproduction by heliozincography at the Trigonometrical Survey Office, Dehra Dun, are intended for publication, in the form of an atlas, with my detailed Report on the scientific results of my journey. They will also be utilized by the Survey of India for the preparation of its "Transfrontier" degree sheets of those regions. At the time when the present reduced-scale maps were being drawn the sheets of the 4 miles to 1 inch map were available for reference in outline proofs only, not showing as yet the hill shading. The latter along with certain other details had, therefore, to be supplemented from the tracings retained by me of the original plane-table drawings. In addition, the surveys effected on my previous journey in 1900–01, and already shown in the maps attached to my paper in the *Geographical Journal* for December, 1902, and to my *Ancient Khotan* (Oxford, 1907), have been utilized for filling in certain portions of the ground shown in the extreme west of the general map as well as small areas in Map II., re-visited in 1906–08, but not

* Maps, p. 348.

re-surveyed. The only features shown in the present maps and taken from sources other than the original surveys of my journeys are certain portions of the Tarim, Kashgar, and Charchan river courses, which for the sake of clearness were added (in broken outlines) from the maps illustrating Dr. Sven Hedin's explorations, and a number of triangulated points in the mountains south of Keriya which were inserted by the Trigonometrical Survey Office from its early Ladak triangulation records and Captain Deasy's observations of 1898–99.

The map sheets prepared by the Trigonometrical Survey Office and here reproduced on reduced scales are based principally upon the plane-table surveys carried on continuously in the course of my travels by my topographical assistants and myself. These were supplemented by astronomical observations for latitude and by triangulation as described further on. Rai Sahib Ram Singh, Sub-Assistant Superintendent, Survey of India, worked with me from the time when we entered Chinese territory in May, 1906, on the Taghdumbash Pamir, down to September, 1907, when he had to be invalided to India from An-hsi. His place was then taken by Sub-Assistant Superintendent Rai Bahadur Lal Singh, who shared in my subsequent explorations until we re-crossed the Chinese frontier in October, 1908, on the Kara-koram. Both, before joining me, had a record of many years' surveying experience over wide and varied ground, Rai Ram Singh having previously worked in Chinese Turkestan and Tibet with the expeditions of Captain Deasy, Majors Ryder and Rawling, and myself, while Rai Bahadur Lal Singh's twenty years' surveying labours had extended practically over the whole of the Trans-frontier regions within the range of Indian interests from the Yemen to China proper. For the trained skill, devoted industry, and unflagging zeal which they brought to bear upon their tasks, carried on often under extremely trying conditions, I feel bound once more to record here my high appreciation.

The plane-table work was done throughout on the scale of 4 miles to 1 inch, and in accordance with the methods employed by the Survey of India for "reconnaissance survey" work. On mountainous ground no efforts were spared to establish plane-table stations on commanding heights above passes and route lines, elevations up to close on 20,000 feet being climbed by us in the Kun-lun for this purpose. In the desert plains of the Tarim basin, where it was often difficult to fix positions by intersections or triangles, the exact measurement of the marching distances, invariably made with a cyclometer, proved particularly useful in traversing.

For the purpose of securing points to check the plane-table traverses, astronomical observations for latitude were made by my assistants with a 6-inch transit theodolite wherever the available time and the weather conditions permitted of them. A list printed below shows those 72 points for which the computed latitudes were utilized by the Trigonometrical Survey Office in the compilation of the map sheets. In addition to these use was made also of the latitude observations which had been obtained

in the course of my journey of 1900–01 for numerous positions in the western and south-western portions of Chinese Turkestan then surveyed.

The work of securing these observations was beset with serious difficulties, both on account of the climatic conditions prevailing and the rapidity of movement necessitated by considerations for my other scientific tasks and by the wide extent of the area to be covered. In and along the deserts of the Tarim basin and of the Su-lo-ho drainage the frequent periods of dust-haze proved as great a trouble in this respect as the cloudy and rainy weather encountered during most of our work in the Nan-shan ranges. The rapid succession of daily marches, often over 25 miles in length, may be gauged from the fact that during the two years and four months actually spent on Chinese soil there were 488 shifts of camp, the aggregate of the marching distances for the same period amounting in my own case to close on 8300 miles. In addition, it must be remembered that what time could be spared for prolonged halts had to be devoted mainly to exacting archæological labours, generally at desert sites. Observations for longitudes were practically precluded by such conditions of travel.

In order to extend the area covered by our surveys, I detached the topographical assistant from my own party for independent work whenever the available routes, means of transport, etc., and considerations of other tasks allowed this. During these periods of detachment, which on occasions extended to over two months, I carried on the plane-table work along my own routes myself. The comparison of the positions indicated by our traverses at the points where the surveyor's and my own route-lines crossed or joined, furnished a useful means of checking the results. Wherever we moved together, the work on the plane-table was done under my direct supervision and with my assistance. The record of local names along our common routes was invariably effected by myself. For routes followed only by my assistant, I used every effort to check and correct the record of local names brought back by him through the independent examination of natives acquainted with the ground.

In this connection it may be stated that in the transcription of Turki and Iranian names I have followed the system of phonetic transliteration approved by the International Congress of Orientalists, and used, in a simplified form, for Indian Government publications. No use, however, has been made of diacritical marks. In each case I endeavoured to record the form of the name as actually pronounced by the local inhabitants, refraining from any attempt to spell the name in accordance with its correct Turki etymology. I am aware that this method of record has led in some instances to obvious inconsistencies; but I considered it the safest in the case of a geographical student like myself, who, though an Orientalist and familiar with the spoken language of Eastern Turkestan, do not profess to be a Turkologist. In the case of Chinese local names, I took the precaution of having them written down on the spot also in

Chinese characters by Chiang-ssŭ-yieh, my Chinese literatus. For the subsequent transliteration of the names thus recorded, according to the officially adopted Wade system, I am indebted to the kind help of Mr. L. Giles, of the British Museum.

For the purpose of obtaining a framework of triangulation for at least portions of the ground surveyed, bases were measured by Rai Sahib Ram Singh, first in the Tash-kurghan valley below the Taghdumbash Pamir, and subsequently in the outer hills of the Kun-lun, south of Keriya. These were connected with trigonometrical points accepted by the Survey of India and originally determined by the Pamir Boundary Commission and Captain Deasy, respectively. The very inaccessible character of the ground encountered in the Tash-kurghan river valley lower down prevented, in the first instance, any further extension of the triangles. But the work started about Polur proved very successful, and enabled Rai Sahib Ram Singh to extend a series of triangles in direct connection with the Indian triangulation system eastwards along the northernmost range of the Kun-lun to a point well beyond the Charchan river, *i.e.* from circ. 81° 40′ to 86° 48′ E. long. This triangulation was carried out in the late autumn (of 1906), when, as usual, the atmospheric conditions of this region were better than at other seasons. But the great cold then prevailing at the high elevations where the triangulation stations had to be established, severely taxed the surveyor's physical endurance, and renders the success achieved by him all the more creditable.

It was hoped by me at one time to carry this triangulation right through to Tun-huang and the westernmost Nan-shan. But the rheumatic illness contracted by Rai Sahib Ram Singh in the course of the operations just referred to, and other reasons obliged me to keep my whole party with me when travelling in the winter of 1907 from the Lop-nor region to Tun-huang, and the desert route then followed precluded any attempt at further triangulation. Mischance of another sort—damage to a theodolite level, which could not be repaired at the time—prevented Rai Bahadur Lal Singh, in the spring of 1908, from effecting the intended triangulation along the southern main Tien-shan range from the neighbourhood of Aksu westwards to Kashgar, for which I had deputed him. We were, however, more successful in the rugged high range of the Kun-lun, near the previously unexplored headwaters of the Khotan river, where a number of elevated stations could be connected by triangulation with the Ladak series of the Indian Trigonometrical Survey. A chart of observed bases and triangles, along with a complete list of trigonometrically fixed points, will be published with the maps on the scale of 1 : 253,440.

Apart from heights measured by theodolite vertical angles in the course of triangulation, elevations were obtained from observations of two Watkin mountain aneroids of the Survey Department, which were checked at regular intervals with mercurial barometers and, as judged by this test, preserved a very uniform rate of index error. Neither of the mercurial

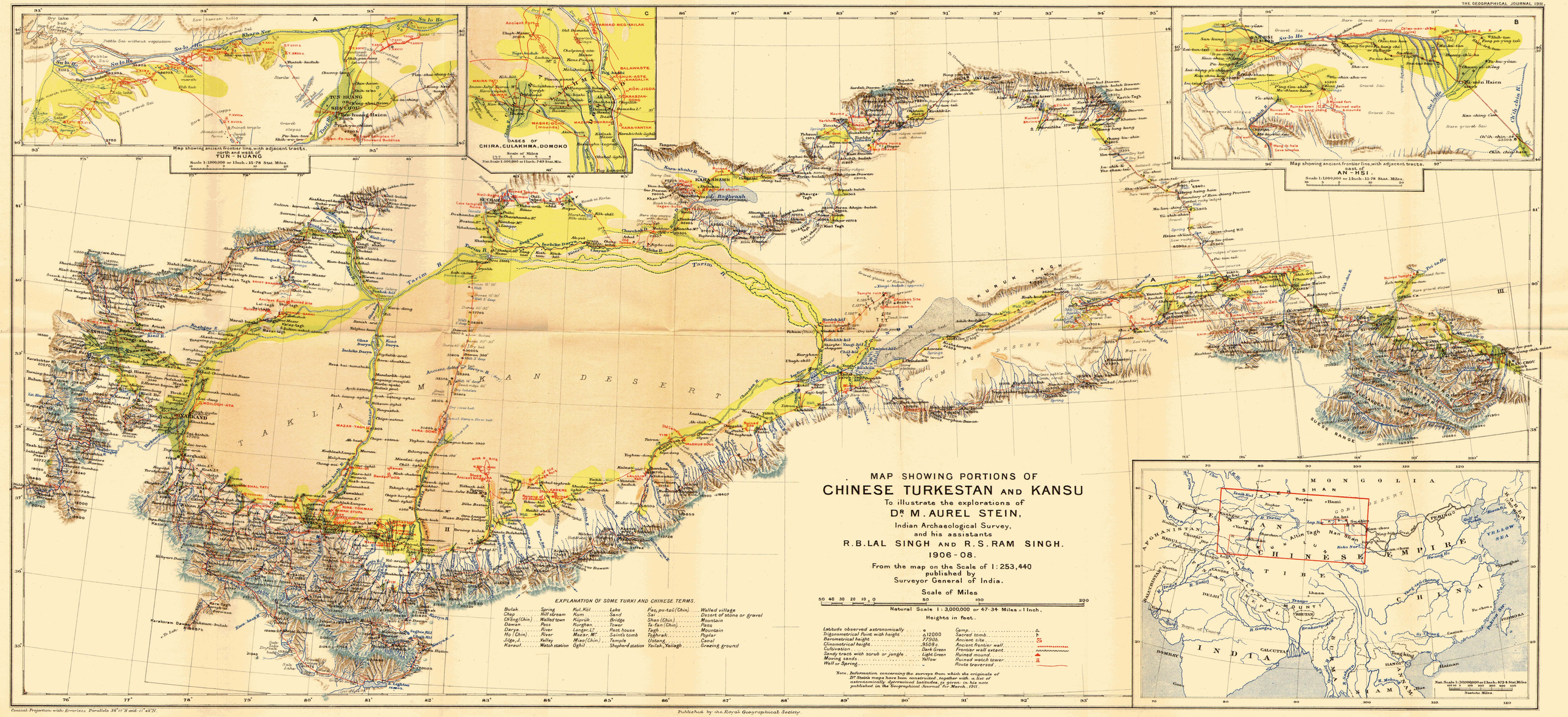
barometers survived the journey; the second, however, remained in working condition to within two months of the conclusion of exploratory work. In addition hypsometrical observations were made by me with two boiling-point thermometers, which, along with a mountain aneroid and half-chronometer, had been kindly lent to me by the Royal Geographical Society's Council. Clinometrical readings to prominent heights were regularly taken in the course of plane-table work on mountainous ground, care being taken on high elevations to obtain clinometer readings with preference from points where the use of the mercurial barometer was practicable for observation of absolute heights. The clinometric heights recorded in Map III. for the Nan-shan are based largely on such observations.

According to information kindly furnished to me by Mr. J. Eccles, M.A., Superintendent, Survey of India, who, in succession to Captain H. H. Turner, R.E., supervised the compilation of the original map sheets from the above materials, the representation of the area south of the line Kashgar—Yarkand—Khotan—Charchan is based on the trigonometrical points secured by Captain Deasy's work and on my journeys of 1900–01 and 1906–08. As regards the north-western portion of the area shown in Map I., the compilation rests on the position previously determined for Kashgar and that newly obtained for Aksu by our plane-table traverses from Khotan, Kashgar, and Yarkand. The values given by these three traverses differed so slightly from each other that it was decided to adopt their mean, though this implies, for the position of Aksu, a considerable shift in longitude to the east as compared with the position accepted in former maps. In compiling the rest of the area, it was found that the plane-table traverse between the easternmost point fixed on a trigonometrical base and Kan-chou required considerable correction in longitude, for over-estimated measurement of direct distances (here mainly on a line from west to east), in order to agree with the longitude of Kan-chou, as hitherto accepted by the Survey Department. Another plane-table traverse made from Keriya to An-hsi to close the circuit gave a somewhat more satisfactory result. It was decided to retain the old longitude of Kan-chou and to adjust the intervening topography accordingly, with due regard to the astronomically determined latitudes.

In conclusion, I wish to express here my sense of deep obligation to the Survey of India Department, which, under Colonel F. B. Longe, R.E., Surveyor-General, by its generous help in the matter of trained assistants, instruments, and money grants rendered possible the execution of my geographical tasks on the scale above recorded. I owe much gratitude in particular to Colonel S. G. Burrard, R.E., F.R.S., Officiating Surveyor-General, who, as Superintendent, Trigonometrical Surveys, by his unfailing interest and experienced advice, greatly facilitated both the work in the field and the elaboration of its results in his office.

List of Astronomically Observed Latitudes.

Camp.	Latitude.	Place.	Camp.	Latitude.	Place.
	° ′ ″			° ′ ″	
1	37 51 27	Chushman.	197	39 53 35	Temple of Ch'ing-tsao-an-tzŭ.
5	37 50 40	Udurghuk.			
7	38 5 42	Toile-bulung.	200	39 48 16	Chia-yü-kuan, outside east gate.
11	38 30 42	Karghai-aghzi.			
12	38 40 9	Ighiz-yar.	201	39 45 6	Su-chou, Chiu-chüan temple outside east gate.
19	38 23 59	Chini-bagh, Yarkand.			
21	38 28 17	Bagh-jigda (Beg's house).	203	39 25 27	Chin-fo-ssŭ, garden 1 mile to south of east gate.
24	37 24 1	Kŏk-yar.			
26	37 3 20	Kosh-yüz-öghil.	207	38 59 54	Ta-pên-ko, gold-miners' camp.
42	36 26 50	Pusha (Shamshel Mazar).			
44	36 30 4	Tashte-öghil, Kurat Jilga.	211	38 54 54	Spring in side valley of Pei-ta-ho.
46	36 39 5	Camp below Ashpak.			
49	36 15 46	Foot of Kashkul glacier.	223	38 38 31	Camp on river-bank below Fêng-ta-fan.
57	36 21 8	Jigatal, Kochkar-bashi.			
60	37 1 12	Kotaz Langar, Sampula.	227	39 9 24	Sha-ho-kou, river-bank outside east gate.
63	36 34 50	Toghrak Langar.			
68	36 21 49	Sokterek.	228	38 55 41	Kan-chou, temple outside S.E. corner of city.
69	36 24 41	Camp near △ station above Achchan.	231	39 20 3	Chien-ch'uan-tzŭ.
72	36 30 53	Kara-bulak.	237	40 5 34	Ch'ih-chin-sê, rest-house near N.W. end of village.
75	36 36 21	Malghun.			
89	36 36 29	Kuchkach-bulaki.	245	41 33 40	Ma-lien-ching-tzŭ.
99	37 14 5	Ile-dong, Kapa.	248	42 2 50	K'u-shui.
99	37 14 53	Gold-pits, Kapa.	252	42 48 44	Hami, garden on west bank of river.
103	38 8 21	Charchan Bazar.			
106	37 52 24	Kara-tash Sai.	259	43 6 33	Taranchi.
110	38 20 2	Camp on Yol-Sai.	262	43 29 10	Tung-yen-tzŭ.
124	40 31 14	Stupa of ruined site, "Lou-lan."	265	42 51 56	Pichan, Beg's house outside west gate.
125	40 34 30	Camp near temple ruin, "Lou-lan."	267	42 39 7	Chong-Hassar ruin.
			274	42 55 39	Turfan, S.E. quarter of Chinese town.
147	39 59 31	Panja springs.			
152	40 29 41	Besh-toghrak well.	287	41 44 32	Korla, main bazar.
154	40 19 35	Toghrak-bulak.	288	41 55 48	Ruined site of Ming-oi, Shikchin.
159	40 8 9	Tun-huang town, garden outside south gate.	295	41 14 38	Camp Jigda-sala.
164	40 25 45	Ruined watch-tower, T. XXVIII., of ancient *Limes* N.E. of Tun-huang.	299	41 14 39	Inchike-gumbaz (ruined tombs).
			309	41 42 58	Kuchar city (near Ya-mên).
168	39 54 39	Nan-huo, central hamlet.	322	39 18 19	Dead tamarisk cone 4 miles N. of Camp 323, ancient delta of Keriya river.
172	40 8 16	Springs south of ruined watch-tower, T. VI. b.			
178	40 2 37	Ch'ien-fo-tong; monks' residence near south end of cave temples.	327	38 41 43	Camp on new Keriya river-bed.
181	40 22 7	Kua-chou-k'ou.	330	38 23 13	Tonguz-baste, shepherds' hut.
182	40 31 38	An-hsi, temple outside west gate.	350	37 14 18	Ulugh-Mazar.
184	40 19 40	Chiao-tzŭ, large temple within walls.	367	38 3 5	Camp Malghun on Kara-kash river.
188	39 49 3	Camp ½ mile north of Shih-pao-ch'êng.	369	38 27 12	Mazar-tagh, left river-bank below hill.
193	39 51 45	Ch'ang-ma, temple within main village.	371	39 0 4	Camp Ayak-östang.



Conical Projection with Errorless Parallels 36° 17′ N and 41° 43′ N.

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Map showing ancient frontier line, with adjacent tracts, north and west of
TUN-HUANG
Scale 1:1,000,000 or 1 Inch = 15·78 Stat. Miles
A
Low barren hills
Dry lake bed
Rows of eroded clay terraces
Dunes
Sandy ridge 40'
Dunes 30-40'
Pebble Sai without vegetation
Dry river bed
Bare gravel Sai
Khara Nor
Su-lo Ho
Gravel Sai
Pebble Sai
Toghrak bulak
Salt marsh basin
Salt lake
Spring
Lake
Salt Lakes
Springs
Bare gravel Sai
Old hut
Salt marsh
Ancient Fort
Large Ruin
Shu-yu-tou
Yantak-kuduk
Spring
Sterile Sai
Dry bed without vegetn
Dry bed with reeds
Bare clay steppe
Ruined temple
Abandoned farms
Canal dry
Gravel slopes
Pa-lun-tun
Shih-wu-tou
Tang Ho
3700
3110b
3490b
3390b.
3670b
KASHGAR
Kashgar R.
Kizil Su
Tumen R.
Yangi-shahr
Yangi Hissar
YARKAND
Yarkand R.
Tarim
Maral-bashi
Uch Turfan
Taushkan D.
Kelpin
Turug-art Dawan
Terek Dawan
Kara-tagh
Astin Artush
Tashmalik Fort
Muztagh-ata
Tash-kurghan
Karghalik
Khushabad
Sai-kichik
Shor-arik
Jai-terek
Mazar-tagh
Kalap-tagh
Charbagh
Ancient Fort
Ruined site
Ruined fort
Sultan-karmish-ata
Sairam-bulak
Kara-bagh
T A K L

A
Su lo Ho
Ruins
Old river course
Dunes 15'
Salt encrusted steppe
Abandoned fields
Shih-pan-tung (deserted town)
Chuang-lang
Tien-shui-ching-tzŭ
Chin-hsien
Shih-ts'ao
Kung-hsin-tung
Dry bed
TUN-HUANG
OR
SHA-CHOU
Ch'ing-shui-Hsien
Lo-ta-ching
Tun-huang Hsien
3610 b
Yüeh-ya-chüan
Tang Ho
4720 b
Cave temples of Thousand Buddhas
Ch'ien-fo-tung
95°
Ancient fort
Ulugh-Mazar
3750 b
Old Domoko
Deserted village
FARHAD-BEG-YAILAK
Cholpang-ata Mazar
Tüge-kuduk
Lachin-ata Mr.
Kone Ponak
Malakalagan
BALAWASTE
Sand ridges
Kök-köl
Tüwen-ponak
MAIRA-TATI
Imam Jafar Tairan Mr.
Gulakhma-yar
Hungatlik
Kara-yagach
Sarigh
RAWAK
Jar
Mahmal
Qi-bashi
Bilma
Akilak
Kan-kat
Chira Bazar
Gulakhma Bazar
Domoko Bazar
Domoko Lr.
Dash
MASHE-DONG (mounds)
MAZAR-TOGHRAK
KARA-YANTAK
Akin-huya
Katlash Mazar
Karakichik
Karanghu-togrok
Okshal-öghil
Tug Langar
CHIRA
GULAKHMA
DOMOKO
OASES OF CHIRA, GULAKHMA, DOMOKO
Scale of Miles
Nat. Scale 1:500,000 or 1 Inch 7·89 Stat. Mls.
81°
80°
82°
83°
84°
85°
Road to Aksu
Ruined Temples
Kizil-Kaghe
Cave temples Ruins
KUCHAR
3150 b
Simsim
Chöl-abad
Yangi-abad
Gumbaz
Bugur
Road to Korla
Kizil R.
Springs
Yaka-arik Bazar
Marshes of Kök-chöl
Kök-chöl
Doshamba Br.
Pailu
Charshamba Br.
Bostan Br.
Kambar Mr.
Langar
Yakshamba Br.
2810 b
Shahyar
Sang-tam Köl
Inchike Darya
Ak-yol
Charchak
Achal
Old Tombs
Tarim R.
Lr. Shahid Ali Mazar
Kosh-tam
Kötek-köl
Tütür D.
Chayan D.
Samsak-daryasi
Peres 2900 b
Arpalik
Luk-chikle
pools & well
Dunes 15'-20'
Well
Dunes 15'-20'
Well 5' deep
Dunes 20'-30'
2770 b
2930 b
Dawan 40'
3000 b
Low dunes
Dunes 20'-30'
Dunes 40'-50'
Dry bed
3080 b
3180 b
Dawan 300'
Well 5' deep
Ancient delta of Keriya R. (dry)
3330 b
3350 b
Well 14' deep
Sand ridge 60'
Dead Forest
Dry lakelets
3380 b
3510 b
Dry river bed
Actual Keriya River bed
3480 b
KARA-DONG
Old river bed
Yoghan-kum
Tonguz-baste 3940
Bilangan
Dawan 100'
T A K L A M A K A N   D E S E R T
Kara-bulak
Bogha-ishka Dawan
Fakalik
Kizil-bulak
Koshka-yol-koton
Dabzi-yar
5740 b
Kone Langar
Yaqda-bulak Dawan
Taghak
Kum-arik Darya
Kuchche
Taushkan D.
Kone-shahr
Jam 3440 b
Tümen
Aksu
Kizil-üstang
Yangi-shahr
AKSU
3370 b
Chuktal
Pakhtalik
Yak-shamba Bazar
Achal
Kum-bash
Aksu R.
Böchche Shamba Bazar
Tüwen-sat
Matan
Guru-chal
Tarim R.
Chinese Colony
Tushek-köl
Deserted houses
Sairam Mazar
Achal (new colony)
Kara-dong
Zil
Danish-aral
Yalghuz-kum
Kosh-aral
Ghaz Darya
Kone Darya
Inchike Darya
Jigdalik-aral
Bora-chushkan
Roza-bai-tumshuki
Mandarlik-öghil
Gungning-masjidi
Korla-ayaki
Hedin's pool
Ayak-östang
Bash-östang-aghzi
Ayak-östang-aghzi
Böksam-öghil
Tonguzluk
Chiga-satma
MAZAR-TAGH
4130 b
Khotan R.
Ak-bash
Chiga-satma
Koshlash Langar
Momen

C
86°
87°
88°
89°
90°
91°
85°
BALAWASTE
KÖK-JIGDA
KARA-YANTAK
Domoko Lr.
Karakichik-öghil
Datun Dawan
Tsagam-usun
Kirik-ote
Kara-shahr R.
Stony Sai
KARA SHAHR
L. Baghrash (approx. position)
Khora Ruins
Ming-oi Ruins
Baghdad-shahri
Shikchin
Yam-bulak
Gor Dawan
7200 b.
Khan-khora
Chorchuk
Road to Kucha
Uzgen-bulak
Yantak-shahr
Korla
Bare clay steppe with dunes
Dry Old river bed
Tazkhan
2540 b
Konche D.
Konche Mt.
2530 b.
Charchak D.
Mukhtar-chöl
Achal
Old Tombs
Jigda-sala
Inchike D.
Toghrak-bulak
Ruined Fort
Chokkur
Uskaktal
Hsin-ching-tzŭ
Topa-dong
Kara-Kizil
Kumush 3070 b.
Tarim-bulak
Ujme-dong
Arghai-bulak
Low rocky ridges
At-ölgan Dawan
4300 b.
Arpash-bulak
2090 b
Khaurga-Tagh
Altun-ghol
Dibge-bulak
Osman bulak
Sumkagö
Tunur-bulak
Persa-khoja-bulak
Singer 4070 b
Kizil Tagh
Shidasea Tagh
Jobi-shan (Sulphur mine)
Eljigan Dawan
Dashito
8150 c
Altun Dawan
Toksun
Springs
Subashi
Bejan-tura
Kum Dawan
Achchik-bulak
2180 b
Yarkhoto
Turfan
Yamshe
Kara Khoja
Murtuk
Kazma
Singim
Pichan
Lukchun
Toyuk
Gunshang
Yankche
Aidin-köl
Temple ruins
Chong Hassar
Degar
Flat ridges covered with dunes
Sardak Dawan
Buyuluk Dawan
Kara Dawan
Chiktam Fort
Kiriklik Lr.
Kerche
Bare Stony Sai
Tarim R.
Gravel glacis of Kuruk Tagh
Yangi-bulak (approx.)
Temple ruin
Ancient Site
Ancient debris
Dead trees
Merdek-köl
Ruined fort
Dead Toghraks
Tokun (Huts)
Sadak-köl
Dry lake
Salt pool
Köteklik-köl
Shirghe-chapgan
Yangi-köl
Chöl-köl
Chainut-köl
Dry salt encrusted lake bed
Kurghan
Ulugh-chöl
Lop
Tarim R.
Kara koshun
Abdal
Lop River (1907)
Kokol
Kara-sakal
Naji-bajin
Miran
Pakhta-bulak
Donglik
Lowaza
Springs
Steep terrace
Chindailik
Stony plateau
Bare Sai
Tatran
Charklik
Yandash Kak
Bash-kurghan
Ruined fort
Kash-bulak
Charchan R.
Tatlik-bulak R.
Lashkar-satma
Ak-ilak
Hoshu-kuduk
Yillik
Ruined Site
Chingelik
Pailu
Yaka-toghrak
Yash Shahri
Old Cemetery
TIM
YALGHUZ-DONG
Patma-ölgan
Tatran
Yoghan-dong
Sope-dong
E S E R T
KUM

91°
92°
93°
94°
95°
95°
96°
44°
43°
To Urumchi
To Bar-kul
Koilak-otun Pass
Tung-yen-tzŭ
Chi-ku-ching
Bar-kul Dawan
Chagan-bulak Dawan
Tür-kul Dawan
Karlik-Tagh
13070 c
12930 c
Hui-ching-tzŭ
Hsi-yen-ch'ih
Shotu-bulak
Tash-kiser (Coal pits)
Kashute Karaul
Liao-tun
Taranchi
Alli-kul
Toguchi
Astine
Toruk
3040 b
Ruined Shrine
Lapchuk
Kumul
or Hami
1730 b
Karadöbe
Karmukchi
Ara-tam
Khotun-tam
Shota Dawan
Hoang-lung-kang
Chang-liu-shin
1680 b.
Spring
Gravel plateau
1730 b
Yen-tun
Dry bed
Dry bed
Lu-shih-li
Yao-chan-tzŭ
Isolated clay terr
Low gravel terraces
Ku-shui
Gravel Sai
Yao-chan-tzŭ
Sha-ch'üan-tzŭ
Bare stony slopes
Huang-lu-yüan
6940 c
Hsing-hsing-hsia
Boundary of Hsin-chiang Province
Eroded rocky ledges
Ma-lien-ching-tzŭ
5380 b
Yü-shih-shan
Gravel Sai
Spring
Ta-ch'üan
Hsiao-ch'üan
Chien-chung Hill
Low rocky ridges
Hung-liu-yüan
5530 b
6090 c
Low ridges of detritus
Pei-tan-tzŭ
Dry water course
7690 c
Kiriklik Lr.
K U R U K   T A G H
4006 c
3760 c
4153 c
Steep eroded banks
Dry lake bed
Besh-toghrak
2620 b
Kosh-kuduk
Pebble Sai
Kum-kuduk
Achik-kuduk
Springs
Salt marsh
Steep clay terraces
Sand ridge
broad dunes up to 400' High ridge of coarse sand
Panja
2400 b
Koshe-langza
2450 b
Lowaza
Springs
Steep terrace
Kara-Nor
A
Su-lo Ho
Toghrak-bulak
Shu-yu-tou
Yantak-kuduk
Shih-pan-tung
Kua-chou-cheng
Tien-shui-ching-tzŭ
Ruins
Gravel Sai
Tun-huang
Hsien 3610 b
Cave temples of Thousand Buddhas
Nan-hu
Sand-covered slopes
Tang Ho
Somoto
Low ridges
3700 b.
Bare stony Sai
Bare Sai
D E S E R T
K U M   T A G H
Khulastai
8230 b.
Waterless pebble Sai with scrub
Yam-bulak
10520 b
Khan-ambal (Anembar)
Elghan-bulak
7790 b
Nawa-chang
Koshi-kha
Spring
Tash-kul
Kash-bulak
Iu-bulak
9750 b.
Ruins
An-hsi
4180 b.
B
Hsiao-wan
Ta-shih
Old wall
Springs
WANG-FU-HSIA
Cave temples
Ying-tsui Shan
Kung-cha-kou
Shih-pan-tun
Kashkar Pass
P'in-ta-fan
Old river bed
Sang-tu-yüan
San-kung
40° 30'
Lei-tun-tzŭ
Ruined Town
(To-po-cheng)
Kua-chou-cheng
Deserted
Pa-kung
Canal
Lui-kung-p'o-cheng
Kua-chou-kou
3930 b.
Ch'eh-shan-miao
Lu-ts'ao-kou
Bare gravel slopes
Shui-hsia
Old wall
40°


Map showing ancient frontier line, with adjacent tracts, east of
AN-HSI.
Scale 1:1,000,000 or 1 Inch = 15·78 Stat. Miles.
B
Bare Gravel slopes
Gravel Sai
AN HSI
4180 b
Su-lo Ho
Sang-tu-yüan
Ruin
Lao-chün-miao
Ch'iao-wan-ch'êng (ruins)
Salt marsh
Shih-tun
Fang-pa-ying-tzŭ
Shih-êrh-tun
Chiu-tao-kou
Shang-ta-pao
Pu-lung-chi or Bulunjir
Hsiao-wan
Wang-shan-tzŭ
Ruined Town
Deserted Town
Canal
Ma-ku-tan
Huang-ch'ü-ho
Ta-ku-yüan
Pa-tao-kou
Su-chia-tan
San-tao-kou
Sha-wo
Marshy nullah
Chuan-pi-ch'êng
Yü-mên Hsien
5180 b
Wu-chia-sha-wo
4520 b
Ch'iao-tzŭ
Springs
Abundant vegetation
P'ing-t'ou-shih
Ma-ch'uan-hsien
Gravel Sai
Ta-shih
Ta-shih R.
Ruined fort
Ruined walls & mounds
Ruined town
So-yang-chêng
Ruined mounds
Ch'ih-chin R.
Kao-ching-tien
Bare gravel Sai
Chorten
Mo-ku-tai-tzŭ
Old wall
Wang-fo-hsia Cave temples
Ch'ih-chin-sê
5350 b.
Ch'ih chin-hsia
96°
97°
40°
40° 30'
41°
40°
38°
Pei-ta Ho
Ruined Temple
Isolated farm
Êrh-tung
T'ou-tun
Bare gravel slopes
Chin-t'a
III.
CH'IAO WAN-CH'ÊNG
Shih-êrh-tun
Chuan-pi-ch'êng
Yü mên Hsien
5180 b
San-tao-kou
Kao ching-tien
PO-CH'ÊNG-TZŬ
SO-YANG-CH'ÊNG
WANG-FU-HSIA
Cave temples
Ch'ih-chin-pao
Yeh-ma-wan
Flat ridges
Salt marsh
Steppe
SU-CHOU
Hsüeh-ho-ch'ang
Dunes
Hsiao-kou
Ch'ing-shui
Kan-chou R.
KAN-CHOU
5100 b
Ming-hu-pao
Mu-wang-chih-miao
Shan-kuan
To Lan-chow
RICHTHOFEN RANGE
ALEXANDER III RANGE
TO-LAI-SHAN RANGE
SUESS RANGE
17053 c.
18123 c.
17644 c.
16019 c.
16597 c
17708 c
17025 c
15834 c
17130 c
20818 c
20315 c
96°
97°
98°
99°
100°

Conical Projection with Errorless Parallels 36°17'N and 41°45'N.

Tarim R.
Kum-bash
Achal
Böchche
Shamba Bazar
Tuwen-sat
Matan
Guru-chal
Sairam Mazar
Chinese Colony
Tushek-köl
Deserted houses
Arpalik
Luk-childe
pools & well
Dunes 15'-20'
Well
Dunes 15'-20'
Well 5' deep
Kara-dong
Zil
Dunes 20'-30'
2770 b
Danish-aral
2930 b
Yalghuz-kum
Dawan 40'
3000 b
Low dunes
Kosh-aral
Ghaz Darya
Kone Darya
Dunes 20'-30'
Dry bed
Inchike Darya
3030 b
3180 b
Dawan 300'
Jigdalik-aral
Bora-chushkan
Well 5' deep
Roza-bai-tumshuki
Dry bed
Ancient delta of Keriya R. (dry)
Mandarlik-öghil
3330 b
Gungning-masjidi
Korla-ayaki
3350 b
Well 14' deep
Sand ridge 60'
Hedin's pool
Ayak-östang
Dead Forest
Dry lakelets
3380 b
Bash-östang-aghzi
Ayak-östang-aghzi
Böksam-öghil
3510 b
Tonguzluk
Dry river bed
Chiga-satma
Actual Keriya River bed
L A
M
A K A N   D E S
Khotan R.
MAZAR-TAGH
4130 b
3480 b
KARA-DONG
Old river bed
Ak-bash
Chiga-satma
Yoghan-kum
Tonguz-baste 3940
Koshlash Langar
Momen
Bilangan
Malghun
Dawan 100'
Misalai-öghil
NIYA R. SITE
Chong-sai
Otur-öghil
Chöl-öghil
4140 b
Rawak
Kara-köl
Dandan-oilik
Kiak-chakma
Gharib-chakma
Stupa
Ancient bridge
Yartungaz-tarim
Ruins of old village fort
Mirawit
Kosh-satma
Kara-kash R.
Yurung-kash R.
Basuk-öghil
Tülkuch-köl
Kokul-toghrak
Shudan-öghil
Tailik-tutkan
Yantak-kuduk
LALULIK TATI
Kalasti
Islamabad
Kochkar-öghil
Tarim
Ziarat
Arik-dahan-öghil
ENDERE
Chingelik
Hong
Tawakkel
Takagh-öghil
Imam Jafar Sadik M.
Kara-sai Br.
Kalama L.
Chigit-korghan
Remains of old dwellings
Ruined fort
Jigdalik
Patal-öghil
Ak-jüje-ölgan
Tokuz-köl-öghil
Kiyik-toshan
Kadir-kum
Kara-muran R.
Tarishlak Langar
KINE-TOKMAK
RAWAK STUPA
Döbe Bostan
Kara-kash
4360
Burhanuddin M.
KERIYA R.
Bilek-lik Lake
Well
Haidil-shah Jakri
Kök-jigda-öghil
Otra Langar
Musa Begim Langar
Moleche R.
KHOTAN
Ulugh M.
Farhad beg yailak
Kenk-kiok
Old river bed
Sazlik Lake
Endere R.
Kashalch R.
Yurung-kash
Lop B.
II
Turning-bulak
Kum-chaklik
Yartungaz R.
Kara Sai
Mölcha
Kapa
Kaznak
Bizil
Chira
Domoko
Achma
Kizil Kum
Hassanatim
Shitala Padshahim
NIYA
Malghun
(Goldfield)
Bostan
Chira B.
Shivul
Bostan
Kalmak kuduk
4400
Dalai Kurgan
Gravel Sai
Otru-kar
Tug L.
Yaka L.
Keriya
Gravel
Ovraz L.
Toghat L.
Arpelik Chakil
Toghrakudang
17742
Yangi L.
Yes-yulghun
Yulghun bulak
Kara-sai
Tash-bulak
Ulugh-Dawan
Oi-toghrak
TATI
Ulugh Sai
Tolan ghuja Sai
Tisnaf
Ulugh-kar
Yol-arish
Yangi-arik
Pebble Sai
Tolkanlik
Suget
Yuvgh
Tolan-ghuja
Kök-kir
Bazil-yar Dawan
Tikelik
18780
Kone-bagh
Kapa
Malghun
Sanpu
Chakar
Bashkurghan
Toghrak L.
Pishkan
Surghak
Chighlan
(Goldfield)
Nura R.
Ulugh Sai
H769
16606
7900
Yulchun L.
Kochkar-bashi
NURA
TIM
Arkchan
Karabulak
Pisha
Kochkar-bashi
Dawan
Chatash
Kirk-imam M.
Sorghak
18970
19992
Tope
Khungar R.
Polur
20400
20490
Karangbu-tagh
Mustagh (K.5)
23890
Bokodong
21630
Busang
21350
Ghazi-kunghak
21680
20330
20420
21840
21820
Keriya R.
23303
Zokputaran Pk.
22639
Yurung-kash
Zuak
16517 b
Art Dawan
Seghiz Köl
Ulugh Köl
21250
Mandarkol
Dawan
Keriya R.
21240
21160
Chimtik
Kangre
Chimtik
Baba Hatim
Gravel slopes
23490
17200 b
Gravel slopes
Gravel slopes
L. Lighten
16120 b.
80°
81°
82°
83°
84°
85°
EXPLANATION OF SOME TURKI AN
Bulak.........Spring
Chap.........Hill stream
Ch'êng (Chin.)...Walled town
Dawan.......Pass
Darya.........River
Ho (Chin.).....River
Jilga, J.........Valley
Karaul.......Watch station
Kul, Köl.........Lake
Kum..........Sand
Küprük.......Bridge
Kurghan.......Tower
Langar, L.....Rest house
Mazar, M.....Saint's tomb
Miao (Chin.)...Temple
Öghil.........Shepherd station

MAP SHOWING
CHINESE TURKE
To illustrate the
Dr. M. AUR
Indian Archaeol
and his as
R.B. LAL SINGH AND
1906
From the map on the
publishe
Surveyor Gener
Scale of
50 40 30 20 10 5 0 50
Natural Scale 1 : 3,00
Heights i
Latitude observed astronomically
Trigonometrical Point with height ... △12000
Barometrical height ... 7790b.
Clinometrical height ... 9508c.
Cultivation ... Dark Green
Sandy tract with scrub or jungle ... Light Green
Moving sands ... Yellow
Well or Spring
Note. Information concerning the surveys from wh
Dr. Stein's maps have been constructed, togethe
astronomically determined latitudes, is giv
published in the Geographical Journal for M
SOME TURKI AND CHINESE TERMS.
..Lake
..Sand
..Bridge
..Tower
..Rest house
..Saint's tomb
..Temple
..Shepherd station
P'ao, pu-tzŭ (Chin.) ..... Walled village
Sai ..... Desert of stone or gravel
Shan (Chin.) ..... Mountain
Ta-fan (Chin.) ..... Pass
Tagh ..... Mountain
Toghrak ..... Poplar
Ustang ..... Canal
Yailak, Yailagh ..... Grazing ground
Tarim R.
Gravel glacis of Kuruk Tagh
Yangi-bulak (approx.)
Temple ruin
Ancient Site
Ancient debris
Dead trees
Merdek-köl
Ruined fort
Tokun (Huts)
Sadak-köl
Köteklik-köl
Shirghe-Yangi-köl
Chainut-köl
Chöl-köl
Kurghan
Ulugh-chöl
Lop
Kara-koshun
Abdal
Dry salt encrusted lake bed
Lowaza
Springs
Steep terrace
Chindailik
Stony plateau
Lop River (1907)
Kokol
Kara-sakal
Naji-bagin
Miran
Pakhta-bulak
Bare Sai
Charchan R.
Tatran
Charklik
Yandash Kak
Bash-kurghan
Ruined fort
Lashkar-satma
Ak-ilak
Hoshu-kuduk
Yillik
Ruined Site
Chingelik
Pailu
Yaka-toghrak
Vash-Shahri
Old Cemetery
TIM
Tatran
Patma-ölgan
YALGHUZ-DONG
Sope-dong
Yoghan-dong
Pebble Sai
Kalasti
Charchan
LALULIK TATI
Yaka-akin
Yantak-kuduk
Kara-kum
Muna-bulak
Khadalik
Gold field
16900
△18407
15859
Kadir-kum
5800b
Achchan
Kaznek
Bostan
Dalai Kurghan
19728
△17742
E S E R T
KUM
85°
86°
87°
88°
89°
90°
Published by the Royal Geographical Society.

OWING PORTIONS OF
URKESTAN AND KANSU

trate the explorations of

M. AUREL STEIN,

Archaeological Survey,

and his assistants

GH AND R. S. RAM SINGH.

1906-08.

ap on the Scale of 1:253,440
published by
yor General of India.

Scale of Miles

50 100 200

Scale 1 : 3,000,000 or 47·34 Miles = 1 Inch.

Heights in feet.

⊕	Camp. △
△12000	Sacred tomb. ⊼
7790b.	Ancient site. ⊏⊐
9508 c.	Ancient frontier wall.
Dark Green	Frontier wall extant.
Light Green	Ruined mound.
Yellow	Ruined watch tower. H
	Route traversed.

surveys from which the originals of
nstructed, together with a list of
latitudes, is given in his note
al Journal for March, 1911.

91° 92° 93°

95° 96°

CHINESE TURKESTAN

STEIN

Map showing portions of

KUN-LUN RANGE, CHINESE TURKESTAN,

to illustrate the explorations of

DR M. AUREL STEIN

and his assistants

R.B. LAL SINGH AND R.S. RAM SINGH,

Survey of India.

1906-8.

From the map on the Scale of 1:253,440 published by the Surveyor General of India.

Scale of Miles

10 5 0 10 20 30 40 50

Nat. Scale 1:1,000,000 or 15·78 Miles = 1 Inch

Heights in feet

(For symbols and explanations see Map I.)

Published by the Royal Geographical Society

CHINESE TURKESTAN

STEIN.

Map showing portions of

KUN-LUN RANGE,

CHINESE TURKESTAN

79°
80°
Ali Akbar Mr.
Takhtuwen Lr.
Ak Lr.
Duwa R.
Odek bashi
Lamus-kir
Lamus
Duwa Bazar
Jaibagh Mazar
Kochkar-bashi
Kök-boinak Dawan
Sanjagiz
Hasa Hill
Kum-rabat Padshahim
Tarbugaz
Kumuchakar
Gulbagh
Zawa Kurghan
Yangi-arık
Lasku
Kotaz-mahalla
Imam-Asim Mr.
Suya Mazar
Jiya Bazar
Ruins
Stupa
Sultan Waiskaram Mazar
ARKA-KUDUK TIM
Arik-kenti
Kuchcha
AK-TEREK
Jigda-kuduk spring
Yar-bagh
YOTKAN
KHOTAN
Yurung kash
Hangnya
Hanguya Bazar
Imam-aptar Mazar
Tamlak
Potakla
Kosa
Jalalbagh
Rahmanpur
Sirawushun Mr.
Eshme Lr.
Jamada
Sampula
Lop Bazar
Chakmak
Kotaz Lr.
Ak Lr.
Beshtoghrak Langar
Kizil Dawan
Tozakche
Budiya
Ujat
GOSRINGA
Nussia
TATI
Bizil
Elekhan-ata
Tushkan-kulak Mr.
Bostan-toghrak
Uzun-aral
Faizabad
CHALMAKAZAN
Kazmalik-kumat
Achik-aghzi
Siriktoghrak
Pujiya
Langhru
7246
7530
7633
Kotaklik
Achchik J.
Zak-tokai
Khushboilak
Bare gravel
Saki Jilga
Otro-kir J.
Yetti Sukya
Otro-kir Langar
Achchik
Tashlik Boyan
Kumat
Burhan Mr.
Karatash Mr.
Achchik Dawan
Yar-yut
Yar-yut Dawan
Duwa-akin
Horulung
Kichik-yailagh
Ulughat Dawan
9881
8516
Yangi Lr.
Kissel-aghzi
Uyaz
Kapak-aste Mr.
Ekin-buya
10815
Kunat Dawan
YURUNG
KARA-KASH R.
Ashpak R.
7560
Elengut Dawan
Ashpak
11486
Poram-aghzi
8730 Tarim Kishlak
Suwagh J.
Go J.
Ruined Town
Bilbagh
Suget
Chumbe-oghil
8530
Kobuga Dawan 11580
Karai Dawan 12090
Tashte-oghil 10340
Chash Jilga
Ulugh Dawan
12780
Tikelik 18780
14904
Choke
Kizil-laike
Langsa
Shamshel Mr.
Topsuz Dawan
Mathan
Chong Karaz
Kichik Karaz
Brinjak Dawan 13500
Mujache-tagh 17220
Pisha R.
Buya R.
Buya
Kutoren
Jaile
Padshahim Mr.
Chizgani-boine
8920
16542
Koldosun J.
Halalung
Kochkar-bashi
Saskan
Kochkar-bashi Dawan
Kaugh
Alma
Otraki
KHUNGAZ RANGE
Chakilu sulagh 8910
18845
17885
Kara-takal atila
Nissa
Sarigh-kir
Kokech-aghzi
Tuzluk
Pisha 8950
Tam-oghil 10250
Pom Dawan
Boinak Dawan
Ak-oghil 13480
Kash-kul
Karadong 13350
Ushlash
Kök-tash
Tope 13949
Kara-kar
Yolbash 10260
Igin Dawan
Chong-kol 11220
Karanghu-tagh
Khushlash Lr.
Omsha
Pish J.
Korgach-oghil
8470
Pass
Ak-Sai Jilga
Snow-Col 19850
23071
Kochkorum
22510
YURUNG-KASH R.
Muztagh 23890 (K.5)
Yangi Dawan?
21750
21960
Chomsha Valley
YURUNG-KASH R.
22590
23310
23309
Zokputaran Pk. 22639
Kara-kash R.
Haji Langar 14695
Obo
Carn
Khitai Dawan 16586
Cairn
21250
Traces of old route to Leh
Salt Marsh
Bare gravel Sai
Brostan terraces
15300
21240
21160
20980
Dry salt bed


81°
82°
37°
36°
Yoghan-toghrak-yailak
4540b
KIZIL-KUM DESERT
KERIYA R.
Baghyigde
Shakin-yailak
4510b
Saghizlik-yailak
Hassan-atim
Bostan
Yes-yulghun L.
Yol-arish
Keriya
Ghadghan
4430b
Ara-üstang
Oi-toghrak
Dashman
Kök-yar
Yeti-tungluk
Yangi-arik
Sharike
Kone-bagh
Toghrak L.
Laika
Kismak-kum
Bash-kurghan
Yol-arish
Tashkalik Chap
Khoja Yakub Bayaban M.
Ara-sai Dash
7380b
Yulchin L.
Yulchin M.
Adunga
Yalghuz-bagh
Suba
Astin-üstang
Yaxgul
Chatash
Badoghan
Karadöba
Saskan
Kochkar-bashi
Kizil-vailak
Alatligh
Hamba
Endere
Kök-ayak
Chakar
Kakshallik
Kang-tokai
Hasha
Ruined Town
Bulbagh
Genju R.
Suwash J.
Go J.
Chira R.
Yeti Sukva
Otra-kir Langar
5520b
Otra-kir J.
Pakhlalik J.
Uyaz
Kapak-aste M.
Ulugh-art
Beshtoghrak Langar
Eshme L.
Imam Jafar
Khalpar L.
China Bazar
Ancient Fort
Ulugh Mazar
3750b
Old Domoko (Desert Rd.)
Tuge kuduk
Lachin-ata M.
MAIRA-TATI
Tilwen-porlak
Gumbadma Mazar
Domoko Bazar
Ruins
BALAWASTE
Malukalagan
KHAOALIK DARABZAK DONG
MAZAR
TOGHRAK
KARA YANTA
Masjid Dong (mosque)
Akin-buya
Katdash M.
Okstial-oghil
Tug Langar
Yangi-arin
Laisu
Karaz-kir L.
Achma Bazar
Shivul L.
Yaka L.
Pondru
TATI
FARHAD-BEG-YAILAK
Shirul R.
Karakir R.
Domoko R.
Kiria R.
Kuduk
Waiskaram Mazar
Kizil-tatke
Langsa
Choke
Inglik
Kushga
Kizil-vailak
Kochkar-bashi
Saskan
Tullike
Chakilmak sulagh
8910b
Yulchin M.
Karaköba
Yaxgul
Chatash
Badoghan
Adunga
Yalghuz-bagh
Suba
Astin-üstang
Ara-sai
7380b
Yulchin L.
Tim
Sai with low scrub
Stony
Kara-kol Sai
Koldusun J.
Araulik J.
Kara-kol R.
Ulugh Sai
Nura R.
Burgandi R.
Khungaz Range
Yarukash R.
Ulugh-kiria R.
Kiria R.
Kapa
6926
Achchan
8320b
8807
3961
9637
13505
16266
14595
18606
21660
20400
Pishkia
9850b
11053
12885
Karabulak L.
Kizilbulak Sai
Tuiluk
Chighlehgaz J.
Oshaklak Sai
Kohrak Sai
Chughum-kol J.
Aksaikit Sai
Yaghingh Sai
Akgun Sai
Pishkia Sai
Achchan Sai
Kara-kol Sai
Kök-beyik
Chap-oghil
Tarl-imam-Zabir-allah M.
12462
3470b
Tausha
13552
Ughyark
Boshkai
Pshuutung
15600
Ghazi-lunghak
16650
16400
Khan-yailak
20080
21840
18290
Sarik-koram
Khan Langar
Kishwashai (gold pits)
Are Dawan
17420
17580
18530
18310
Kuchkach-bulak Dawan
16694b
16377b
Seghiz-köl
15824
Ulugh-köl
16490b
Mandar-kol
Dawan
18812
16789b
Tuge-tash
Kara-kunde
Shalgan Dawan
Zailik
Zailik-kosh
Gould pits
Chelma
Impassable Gorge
Hard Chap
Scanty grass
Fresh water
Broad desolate slopes
Gugrüge Gl.
19830
17300b
20280
20850
18930
Kaba-Hatim
17860
17570
21910
20250
21040
21850
21270
22150
23490
17200b
20850
Sources of Mirzakash R.
Akchakil Gl.
Kokdalang-kar Gl.
21430
21360
20420
19320
20470
Boko-dong
Ukutagh Hill
13570
12270
9630b
Zingik-arad
Khoja Kutbuddin M.
Domsun L.
Azun
Aktash
Ladung J.
Saruhung J.
Burgandi J.
Konup Da
Ishak-art L.
Afajgi
Kiriuk-kol Jilga
Kiriuk-kol J.
Ara-kiz
Pomaz-kir
Kiriuk-kol R.
Keriya R.
Tiznaf-tolak
Yarukash R.
Ulugh-kiria R.
Kungaz R.
Chakilmak R.
Tiznaf-kol J.
Akchakil J.
Kokdalang-kar J.
Tiznaf-kol R.
Zailik J.
Zailik R.
Chira R.
Otra-kir J.
Pakhlalik J.
Kara-kunde R.
Mirzakash R.
Sources of Mirzakash R.
Broad desolate slopes
Gugrüge Gl.
Keriya R.

Map showing portions of

KUN-LUN RANGE,

CHINESE TURKESTAN,

to illustrate the explorations of

Dr M. AUREL STEIN

and his assistants

R.B.LAL SINGH AND R.S.RAM SINGH,

Survey of India.

1906-8.

From the map on the Scale of 1:253,440
published by the
Surveyor General of India.

Scale of Miles

10 5 0 10 20 30 40 50

Nat. Scale 1:1,000,000 or 15·78 Miles = 1 Inch

Heights in feet

(For symbols and explanations see Map I.)

Published by the Royal Geographical Society

CHINESE TURKESTAN

STEIN.

Map showing portions of the WESTERN AND CENTRAL NAN-SHAN to illustrate the explorations of DR M. AUREL STEIN and his assistant R. S. RAM SINGH, SURVEY OF INDIA. 1907.

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WESTERN AND CENTRAL NAN-SHAN

STEIN.

97°
98°
40°
39°
5350b
Ch'ih-Chin R.
Ch'ih-chin-se
Ch'ih-chin-hsia
Wan-t'u-ta-fan
8805c
Shang-ch'ih-chin
Ch'ih-chin-pao
So-ma-ch'ien
Huang-tsao-ying
Shih-li-pao
Hao-shao-kou
Yeh-ma-wan
Hui-hui-pao
Gravel plateau
Tung-yüeh Shan
Shuang-ching-tzŭ
Chia-yü-kuan
Thick Toghrak jungle
Scanty Scrub
Stony steppe
Tao-lo-ho
6250b
Pei-ta Ho
SU-CHOU
Yao-mo Shan
15504c
Po-yang Ho
Shui-chü-kou
Po-ch'êng-tzŭ
Tu-han-chuang
Yin-pai
Lo-chia-yai-t'ou
Shih-hui-yao
Hsiao-kou
Ssŭ-yu-kou
Hung-shan
13672c
16273c
15131c
14833c
15646c
15600c
12380b
13268c
14126c
18582c
17152c
19155c
17053c
16676c
18498c
RICHTHOFEN RANGE
18123c
17833c
Pei-ta Ho
12150b
13580b
TOLAI SHAN RANGE
12060b
Su-lo Ho
Grassy steppe without water
12610b
18291c
Pass 15180b
17643c
12380b
18103c
18421c
ALEXANDER III RANGE
19431c
SUESS RANGE
20315c
20261c
20818c
19822c
18858c
19298c
17831c
18226c
Su-lo Ho
12730b
18161c
18954c
Scrub-covered sand & bog
12190b
Small Lakes
Dunes
16019c

99°
100°
Chin-t'a
Bare gravel slopes
Ta-hsi Miao
Low flat ridges
Huang-tsao-ying
Yeh-ma-wan
Stony Steppe
Hsin-ch'êng-tzŭ
An-yüan-kou
Dunes
Hsia-kou-chêng
Ai-ming
Ning-shui
Chia-yü-kuan
Pei-ta Ho
SU-CHOU
Tao-lo-ho
Stony steppe
Tsui-chi-pao
San-chi-pu
Chin-tsai
Shih-hui-yao
Huang-tsao-ying
Hsüeh-ho-ch'ang
Lo-chia-yai-t'ou
Shih-hui-yao-miao
Hsiao-kou
Ssŭ-yu-kou
Hung-shan
Hung-shan-pao-tzŭ
Kuei-yin-ssŭ
Lung-hsin-pa
Yang-tzŭ-chuang-tzŭ
Shuang-ching-tzŭ
K'u-shui
Steppe with scrub
Salt marsh
Ma-lang-ching-tzŭ
KAN-CHOU R.
Ho-hsi-p'u
Gravel plateau 100-120 ft above river.
Hua-chuan-tzŭ
Dunes 30-40
Hsien-kou
Po-han Ho
Ho-chuan-tzŭ
Sha-shen
T'o-to-ch'ang
Ch'ang-shui-ch'üan
Ma-yang
Kao-t'ai
Tung-chia
Ma-yang Ho
Kang-yai-tzŭ
Yiech-shan-tzŭ
RICHTHOFEN RANGE
TO LAI SHAN RANGE
Pei-ta Ho
Kan-chou R.
ALEXANDER III RANGE
Su-lo Ho
Pass
Grassy steppe without water
Scrub-covered sand & bog
Small lakes
Boggy basin many lakelets
Ch'ang-tzŭ-kou Pass 14880b
Ta-pin-ka (miners camp)
Shan-ling-tzŭ Pass


Map showing portions of the
WESTERN AND CENTRAL NAN-SHAN
to illustrate the explorations of
DR. M. AUREL STEIN
and his assistant
R.S. RAM SINGH, SURVEY OF INDIA.
1907.
From the map on the Scale of 1: 253,440.
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100°
101°
40°
39°
KAN-CHOU R.
Ku-shui
Salt marsh
Ma-lang-ching-tzŭ
Gravel plateau 100-120 ft above river.
Hua-chuan-tzŭ
Dunes 30-40
Ho-chuan-tzŭ
Hsien-kou
Po-shan Ho
Low barren range
Sandy slopes
Sha-shen
Ma-yang
Ma-yang Ho
T'o-to-chung
Kao-t'ai hsien
San-chi-chüan
Kang-yai-tzŭ
Fu-yeh
Ku-tsai-p'u
Ch'a-ling kuan
Coal mine
Sha-ho-kou
Sha-ho
Huang-chia-wan
Ming-hu-pao
Ma-wang-chih-miao
Ping-yen-pao
Sha-ching-tzŭ
Hei-shui kou
Ruined fort
Li-yüan
Lan-t'ai-tzŭ
Li-yüan Ho
Tung-ta-shen
Wang-ma-kuang
KAN-CHOU
To Lan-chou
Shan-kuan
Hung-shui
Barren rocky range
Chiang-kou
Lao-tu-kou
RICHTHOFEN RANGE
Kan-chou R.
Ch'ung-kan Ho
Kazan gol
Mongol Camp
Shen-ling-tzŭ Pass
Pass
17130c.
16067c.
15430c.
15834c.
15299c.
15634c.
Ta-tung R.

Scale of Miles

10 5 0 10 20 30 40 50

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1 Inch.

Heights in feet

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WESTERN AND CENTRAL NAN-SHAN

STEIN.

A JOURNEY INTO THE ABOR COUNTRY, 1909.

By Colonel D. M. LUMSDEN, C.B.,* and the late Mr. NOEL WILLIAMSON.

[THE following brief and hitherto unpublished account of a visit to the Abor country, made by the late Mr. Noel Williamson and myself in company with the Rev. W. L. B. Jackman, of the American Mission, in January, 1909, may tend to throw some light on the reasons for Mr. Williamson again renewing his visit, and for the trust he placed in the people who have so treacherously murdered him and his fellow-traveller, Dr. Gregorson, with a numerous following.

The object of my visit was to unveil, if possible, the mystery still surrounding the falls of the Tsanpo; but Mr. Williamson's main object, as political officer, was to establish friendly relations with the Bor Abors, while the padre undoubtedly had his mission work at heart. Had Mr. Williamson on his second visit followed the route we then took, no doubt he would have been met once more at Kebang by Maddu gam of Reu and had some excuse made, as was done to us, for preventing him crossing the river. To avoid this, and placing faith in the invitation the Gam of Reu then gave him to return next year and all would be well, he crossed the Dihong lower down and marched for his village, encamping for the night within a few hours of the place. That evening a number of Abors came from the Reu village and offered him presents. This no doubt strengthened his belief that he would be welcomed on arrival, and on getting there next morning and being met by Maddu gam he unhesitatingly followed him to his doom, his trusted servants and followers sharing a similar fate. Poor Dr. Gregorson (whose aims were similar to my own, viz. the falls!), who had to camp further down the river to look after some sick coolies, while attempting to join him, was also killed by the same treacherous gang, as well as those with him.

Some may think that Mr. Williamson was rash in venturing again on the mission he did. But when it is considered how we were received on our previous journey and the invitation given us to return, he cannot be blamed in endeavouring to maintain the friendly relations which were seemingly then established. As a frontier officer, Mr. Williamson at Sadiya was the right man in the right place, and has justly earned the kindly tribute paid to his memory in the last number of your *Journal*. When the time arrives, no doubt the Assam Government (who are the best judges) will take the needful steps to deal with the situation. But I may say, from the close of April to the end of October, Nature's barrier, in the shape of the swollen waters from the melting Himalayan snows, confines the Abors and other tribes along the frontier to their mountain-tops as they do us to the plains below.]

January 25, *Camp on the Dihang River.*—Left Sadiya this morning at

* Colonel D. M. Lumsden's diary of his recent attempt to reach the Tsanpo falls.

7.30, the party consisting of Williamson, myself, and our surveyor, Pertab Singh (kindly lent by Colonel Longe), four Miri *kotokies* (interpreters), and 48 Naga coolies. Including servants, we totalled 111 souls. It is only a mile from the Political Officer's bungalow to the Brahmaputra, where we found eleven dug-out boats with all our belongings on board. We drifted down-stream, passing the mouth of the Debang at 12.30 and reaching our camp on the Dihang two hours later.

January 26, *Camp Sesiri Mukh.*—It is hard and slow work pushing up-stream, and although we got off in good time, did not reach camp until 4.30 p.m.

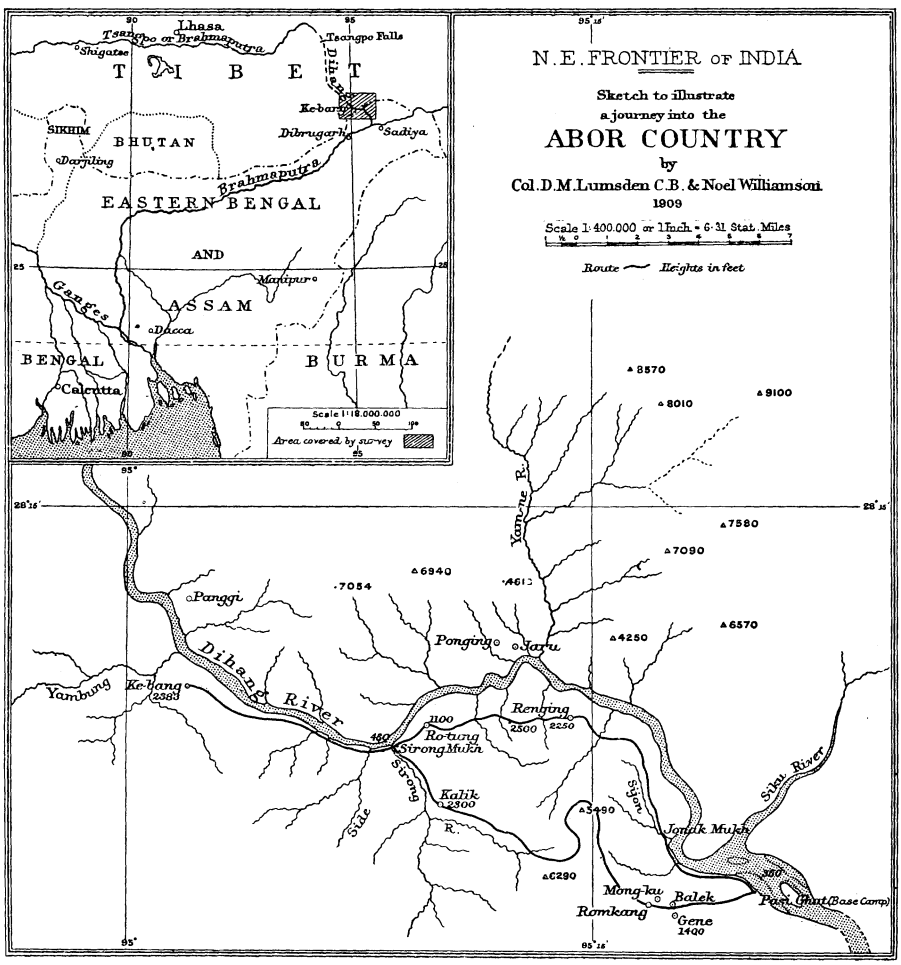
January 27, *Sibiya Mukh.*—Another day's pushing and pulling got our small fleet here by sundown.

January 28, *Pasi Ghat.*—Williamson and self in our small boats reached here (the end of our water transit) by noon. But the others did not put in an appearance until 5 p.m. The rapids were many, and heavily laden boats could make but slow progress. *En route* we passed the camp of the Rev. W. L. B. Jackman of the American Mission, but found him away visiting some of the Miri villages. Williamson had often spoken of asking him to accompany us, he having a perfect knowledge of the Abor dialect, and, with Williamson's permission, already visited two of their lower villages on the Debang river. I was delighted at the suggestion, as, apart from what I have stated, I knew he would be an excellent travelling companion. Unexpected delays kept us at Pasi Ghat, our base camp, until February 5. Meantime, the *padre* had gleefully accepted Williamson's invitation to accompany us, and joined our camp on the evening of the 4th Like ourselves, he had heard rumours of an inter-tribal war amongst the Abors; but such things being of common occurrence, we paid but little heed to the story. I would here mention that about a mile above our camp the Dihang emerges from the hills, and from the gorge there blows what seems a never-ceasing cold gale. Our marching gear was now cut down to the lowest possible scale, taking but one small tent for the three of us to sleep in.

February 5, *Camp Romkang.*—We got off at 8 a.m. The first 4 miles of our march was quite a level path through the forest and easy walking for our coolies. We then crossed a small stream and were in Abor Land. There is quite a group of villages about here, named as follows: Bokung, Mong-ku, Balek, Gene, Yagrung, Romkang, and we were soon met by several of their *gams* (headmen), who suggested our camping at the nearest village, Balek, saying Romkang was distant from water, etc. Williamson, however, by his *kokoties'* advice, pushed on, getting to where he wanted at 2 p.m. Height 1400 feet. We had soon a gathering of *gams* from every village. Williamson now asked them for guides to show us the way to Ke-bang. This, they said, was impossible. The war, which turned out to be no myth, would render the journey a dangerous one, and they would not be responsible for our safety, etc.

February 6, *Romkang.*—The morning broke dark and gloomy, and our

prospects of getting on seemed equally so. The *gams* were still unanimous in their efforts to dissuade us from advancing. The difficulties of transport and the dangers of the road were added to the war scare. *Apropos* of the latter, we were told that two moons ago the Punggees from the northern bank had raided on their southern neighbours, killing six tribesmen. Now the villages between here and Ke-bang were joining their forces to



retaliate. Still obdurate, close on to noon they made Williamson the present of a pig, which he wisely declined, to show his displeasure at their not agreeing to his request. This rather took them aback, and later in the evening Williamson approached them with the offer of Rs.100, when they began to think the matter over. After consultation, they said that if each village was given Rs.100 they would accede to his request.

This Williamson firmly declined to do, but said he would add another Rs.50 on to his previous offer. This they finally agreed to take. We now endeavoured to get them to assist our coolies in the matter of transport, but beyond getting four men, to whom we paid Rs.4 each for the journey to Ke-bang, we could do no more.

February 7, *Romkang.*—Got an early start 8 a.m. Our march was a stiff one, having to cross the range in front of us at a height of 5650 feet. As we ascended we had several fine views of the Dihang valley, one in particular of the gorge where the river flows into the plains. Our descent on the other side was bad going, steep and slippery, and our coolies being about done, we camped at the first small stream we came to. Height 4500 feet.

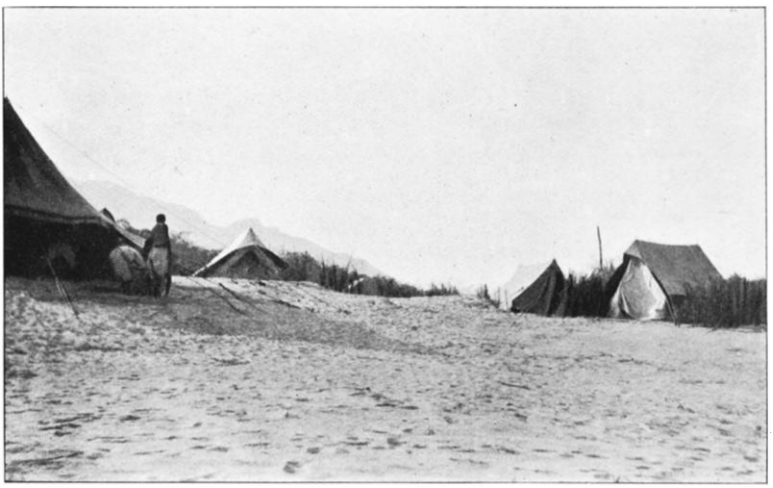
February 8.—Start at 8.30 a.m. and continued our downward course. Temperature at leaving registered 38°. On each side of our narrow and winding path the undergrowth had been recently cut to a width of 10 to 12 feet on to a small village named Kalik, containing, some thirty houses. Here we camped for the night. It is situated near the Sirong river. Height 2450 feet. Few of its inhabitants had ever seen a sahib, and the curiosity of men, women, and children knew no limit. Our little tent was continually surrounded, and it was with great difficulty we could keep them outside. They were all keen on Burma *cheroots*, of which, fortunately, I had brought a large supply and was able to gratify their taste.

February 9.—Got off at 8 a.m., and, following the same steep, slippery path, soon came in touch with the Sirong river. From here, however, our march was anything but pleasant, our guides at the finish taking us a couple of miles over slippery boulders, and glad we were when 2 p.m. found us once again on the banks of the Dihang. Two of our coolies had, I regret to say, very nasty falls over the latter portion of our route.

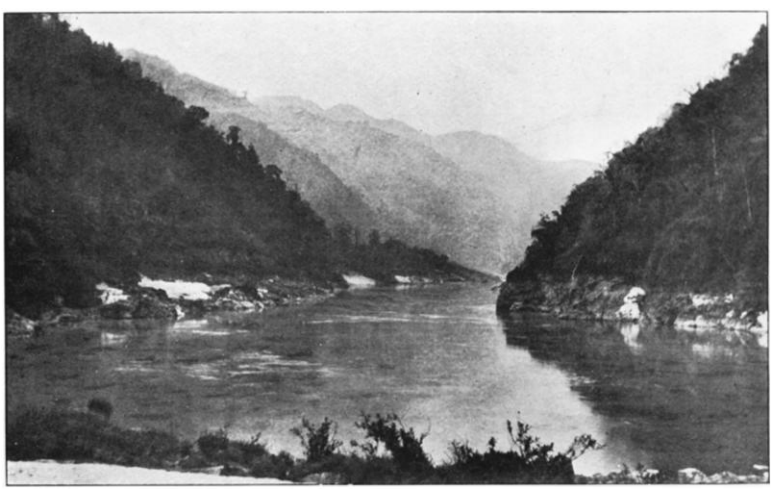
I would add that from the village we had just left, the so-called war-path had been cut throughout the journey. After four days' marching through the gloom of the forest, it was a relief to find one's self once more in sunshine. The outlook, too, was magnificent—Dee-side, or the banks of the Deveron, only on a much grander scale. From the sandy patch on which we stood, there was a gentle slope of some 80 yards to the river; then came a deep blue silent pool nearly 200 yards in breadth, while on its further side the cliffs rose to a height of 50 or 60 feet. Below, it might be some 400 yards, we could both see and hear a rush of water. Later in the afternoon we walked down and found a swift and deep rapid, with a huge upstanding rock in its centre.

At sundown we had a visitor—the *gam* of Ke-bang. He was a tall, bent, aged specimen, and wore for a helmet a metal dish cover, while on his body hung a long sack-like garment of Tibetan texture. He was very polite, and offered to lead us to his village next morning. Then followed a request for rum. This we were able to indulge him in, and wished the old gentleman "good-night."

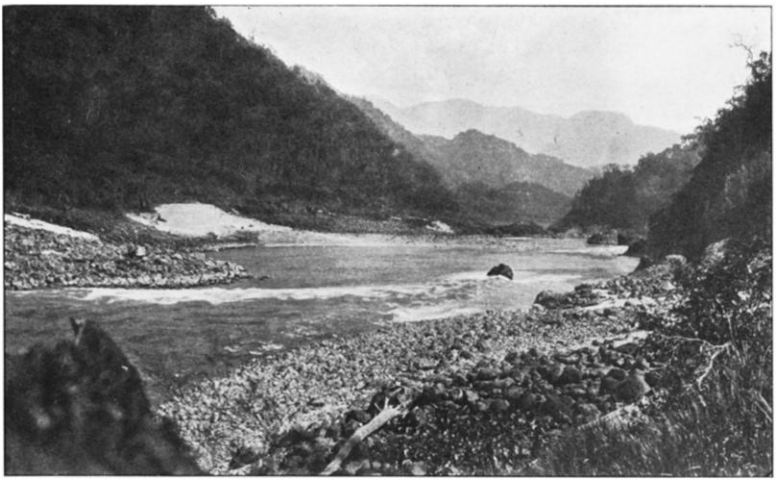
February 10, *Sirong Mukh.*—Up at 7 a.m. Packed and ready to go,



BASE CAMP AT PASI GHAUT, ON THE DIHONG RIVER.



THE DIHONG RIVER AT SERENG MUKH.



THE DIHONG RIVER BELOW SERENG MUKH.

THE GAM OF KEBANG WHO MET US AT SERENG MUKH AND ESCORTED US TO HIS VILLAGE.

but no *gam*. We waited for nearly an hour, but as he did not appear, Williamson went to his hut and found him slumbering peacefully. He soon woke up and took the lead. The morning was simply ideal, and I longed for a boat and my fishing-rod.

About a mile from camp we found our path blocked by a perpendicular rock quite 20 feet in height. There was no way round as far as we could see, only a steep cliff on one side and deep water the other. This we surmounted by felling a big tree, in which we cut notches, placed it against the rock and scrambled up, our coolies one by one following suit. But worse was to come. Scarcely another mile onward ere we had to feel our way along the edge of a steep precipice, holding on to tufts of grass and with barely a foothold. It was ugly going, as a single false step would have landed you in the pool below—a drop of 50 feet. I was indeed thankful when I saw all our coolies safely over. Only hillmen could have done it with loads on their backs. It took two hours to get the last of them over. Soon after we were again in the gloom of the forest climbing up toward Ke-bang. A steep and weary climb too, and I was far from sorry when 4.30 p.m. ended our day's march. Height 2383 feet.

From the river to the village the so-called war-path had been widened as before. Here the coming strife was again placed prominently before us. At dusk the *gam* of Reu crossed by bamboo raft (the only mode of water conveyance in these parts) and entered the village. He said he had been forewarned of our coming, and asked us to visit him. This was decidedly cheering, and pleased us immensely. He was, we were told, a man of much importance, namely, the minister of war. Both he and his attendant wore tall round hats made of *sambhur* skin and long coats also of Tibetan texture. He soon gathered an audience around him, and spoke for quite an hour. He had a short beard and moustache, held a spear in his left hand, gesticulating throughout with his right, and frequently pointing towards the enemies' country. Darkness ended his harangue to the villagers. Then came a select gathering of *gams*, but held out of ear-shot of our *padre* and Miri interpreters.

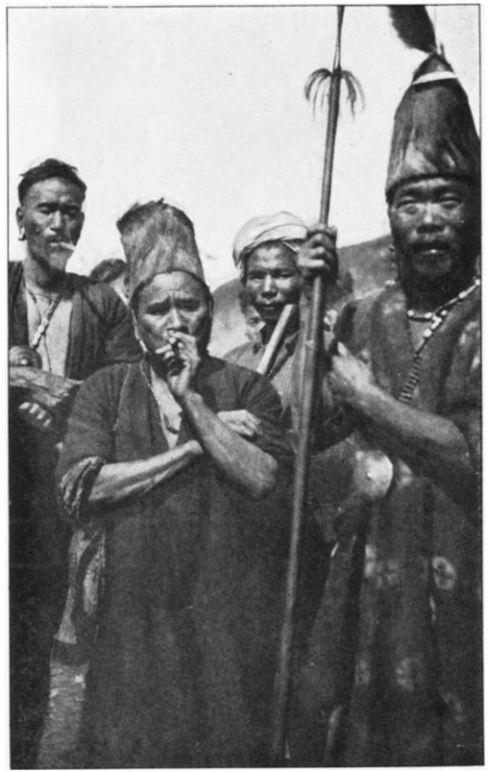
Early in the morning of the 11th we were again approached by the minister of war, but this time with quite another story. He now agreed with the eight *gams* who had accompanied us as guides from the villages before named, that for us to cross the river and proceed onwards in the present unsettled state of the country would be very dangerous; that he himself would be away on the war-path and unable to look after and assist us, ending by asking us to come back next year, when all would be well. "Yes," as the *padre* quaintly remarked, "next year if there is no war, sickness will probably be the excuse." However, in spite of all, we were still hopeful and continued to make various offers both in money and presents. We now trotted out the gramophone, placing it at some distance from our tent so as to give us some breathing space. "Harry Lauder" was soon in great request, his Laughing Song being continually encored. The great

difficulty was to keep the surging crowd from handling the instrument. Towards evening the *padre* and I took a stroll through the village, which they seemed very proud of and keen to show us, especially from the high range of houses which looked down on the river and the valley beyond. The view from here was magnificent.

February 12.—An early audience before we were out of our beds, the medicine chest being in great request. This the good *padre* took under his care and no small task either. We had brought a large stock of useful stuff with us, skin diseases and eye-sores being very prevalent, while many suffered from goitre. Quinine, too, was much sought after. Towards noon we learned from our *kotokies* that the war minister had gone back to Reu early in the morning, also that 200 of the braves had crossed the river on bamboo rafts at daybreak, and were off on the war-path. This showed us that a forward move from here as things stood was hopeless, so we reluctantly made up our minds to retrace our steps next morning.

During the afternoon the *padre* and I walked to the northern inlet to the village, and found the path strongly palisaded with bamboos. At the entrance gate we met several men from a village beyond. They wore no clothes beyond a small apron of grass hanging behind them. They had a long chat with the *padre*, telling him they were going to join the fighting force. Like all the others, they were much impressed at hearing a white man talk their language. On our return we found poor Williamson simply hidden by a crowd of men, women, and children clamouring for presents and shouting for the gramophone and more medicine. He and I moved the gramophone to some distance, took the crowd with us, and left the medicine-seekers to the *padre*. When darkness fell Williamson gave them a magic lantern show. This amused and interested many of them, but some were frightened, looked and bolted. Next morning, the 13th, we were on the downward track by 10 a.m. Before leaving we made a final distribution of presents, consisting mostly of needles and coloured thread. These were in great request, and the struggle to get them out of our hands was most amusing, the women being the worst scramblers. I omitted to mention that, when we entered the village, there was a dead young pig suspended over the gate—this to protect them against any sickness we might bring with us—an offering to the spirits of evil. On leaving, we were again treated to another phase of demon worship. The young men of the village followed us for nearly 2 miles, throwing tiny shreds of bamboo at and over us. This to ensure us taking the evil spirits with us.

Prior to leaving, our *kotokies* learned that the path we came by from Sirong Mukh on the 10th was not the right one, and we were now being taken by another. This took us by an easy march to our previous camping site, and avoided all the dangers of our upward journey. Here we spent the night of the 13th, as well as the day and night of the 14th. The spot was a lovely one, and we all wanted a peaceful day.



THE GAM OF BEU AND HIS A.D.C. WITH OUR INTERPRETER.

ABOR WARRIORS ON THE WAR PATH.

THE GAM OF REU ADDRESSING THE VILLAGERS AT KEBANG.

February 15.—Started by a down-river path and then struck upwards through the forest, getting to a small village called Renging about 3 p.m. Here we camped and gave the villagers a treat on the gramophone.

February 16.—Left at 8.30 a.m., Williamson not feeling fit and suffering from a nasty cough which had been troubling him for some days. Our march was a very stiff one until noon, when we struck the Sijon river. This we followed for an hour until we made a close approach to the banks of the Dihong. As Williamson was feeling worse, we decided to camp in the shelter of the forest. Fortunately we did so, as he was now expectorating blood. We also sent off word to Pasi Ghat to send up as quickly as possible three of our smallest boats.

February 17, 9 a.m.—Williamson worse and matter looking serious. Luckily the boats arrived at 11 o'clock, and we were able to carry him down to where they were lying about a mile distant. It was a dangerous game to risk boating down the rapids to Pasi Ghat, but something had to be done. We were all nearly upset in the last rapid, but luckily just got through.

February 18, *Pasi Ghat.*—Rested here to-day, Williamson feeling little better.

February 19.—Got Williamson and his camp-bed safely into the boat and left at 8 a.m. for Dibrugarh. Had to stay one night *en route*, pushing on as we did till dusk.

February 20.—I started at daybreak ahead of the *padre* and Williamson to secure the doctor and get him to meet Williamson on arrival. I reached Dibrugarh at noon, and fortunately found Major Leventon in the station, the *padre* and Williamson arriving three hours later. They were met by Major Leventon, who had Williamson taken to his bungalow. The doctor said he was suffering from acute pneumonia, and his case a most serious one.

I waited in Dibrugarh until the 28th, when the doctor pronounced him practically out of danger, although for some time to come, he said, he would require to take very great care of himself. He also added that, had we not returned when we did, Williamson must have succumbed in the jungle, so after all it was very fortunate we had to turn back at Ke-bang.

Conclusions drawn from our Tour to Ke-bang.

We were blocked at Ke-bang, but by passive resistance only. On this occasion they had a valid excuse for their conduct, namely, their war. Leading us too by the most difficult parts they could, throughout our journey, showed us they were none too keen to facilitate our movements. For instance (as we afterwards discovered), the old *gam* of Ke-bang, when he faced us with a rock and the precipice *en route* to his village, slipped quietly away by another path, the entrance to which he had hidden by cutting down branches of trees.

There are two ways by which the Dihong river might be explored :—

(*a*) Say the party consisted of two sahibs and a native surveyor, with twenty picked carriers and two or three light canvas boats. A company on this scale should stick by the river and follow its course the entire way, using the boats to cross from one side to the other as necessity arose.

As far as I have seen, in nearly every place where there is a precipitous bank on one side, the opposite is sloping and offers a reasonably good path. If in places the party could proceed along neither bank, it would be comparatively easy to cut a way through the forest, carry your belongings with you, and rejoin the river when opportunity permitted. Proceeding as above, the day's march could be made long or short as desired, there being always water and a good camping-ground at hand. The want of both of these necessities caused us considerable trouble on several occasions on our upward march. Villages too could be visited when desired, and food stuffs bought or bartered for. They could also be desirably avoided at times and save dealing out the usual quantity of presents which they are continually on the lookout for. With only twenty coolies as carriers, presents would have to be reserved for state occasions and when necessity demanded only.

Regarding presents, we find coloured thread and needles in great request, while with the elder generation a little rum was ever welcome. Medicines too were always in great demand. But for any little service rendered, such as carrying your gun, etc., they had no hesitation in asking for Rs.2 or Rs.3 *baksheesh*.

(*b*) By taking, say, 200 coolies and a force of native troops sufficient to guard them on their marches to and from your base of supplies, *i.e.* should the country happen to be in the state we found it. If at peace and they made no objection to the movement, a military force might be dispensed with. With such a force of carriers and sticking to the native paths and villages as we did, would necessitate taking most of the supplies for coolies as well as the rest of the party from the plains, as it would be practically impossible to procure the needful amount of rice in the country.

Beyond intense curiosity, common to both sexes (which got rather boresome at times), we found the Abor much easier to handle than we expected. But travelling with two such diplomats as Williamson and the *padre* made the path an easy one, and no doubt smoothed over many things which might otherwise have proved stumblingblocks and stopped our tour at the start. Williamson himself has a fair knowledge of the Abor tongue, while the *padre* speaks it like one of themselves.

We found the country almost void of bird or animal life. Scarcely did we see a butterfly, while pig, judging from the number of skulls hanging in the guest-houses and placed over the graves of the Abors who killed them, must be fairly numerous. Tame mithon abound in every village, but we came across no wild ones in the jungle.

In conclusion, if little has been achieved, a good deal has been done to pave the way for the next attempt.

A JOURNEY FROM ANGORA TO EREGLI BY KAISARIE.*

By R. CAMPBELL THOMPSON, M.A., F.S.A., F.R.G.S., F.R.A.I.

On August 20, 1909, my friend Joseph Weissberger and I left Angora, with a caravan of five horses, to work eastwards towards Boghaz Keui, the ancient Hittite capital. Here my friend's leave gave out, and he left me, returning home by Amasia to Trebizonde, while I continued by Kaisarie to Eregli. As the archæological side of our journey is published in the *Proceedings* of the Society of Biblical Archæology (June, 1910, p, 181), I shall deal only with the more geographical points.

The map which accompanies this paper was made with a sextant, a large prismatic compass, and an improvised plane-table. There were, however, few opportunities for using the latter, and consequently the sextant was of the greatest help in checking the compass work. By working in long zigzags, or making the route directly north and south as much as possible, we were able to control in some measure the unavoidable errors of the prismatic compass.

The following latitudes were obtained with the sextant:—

	°	′	″
Elma Dagh top (not a good observation)	39	49	47
Top of hill near Ismail Dagh, west of Hajjilar on the left bank of the Kizil Irmak (see map)	39	46	38
Euyuk (300 yards north of mound and village)	40	14	44
Erkekli (tumulus about 1 mile north-west of village)	39	41	2
Ali Dagh (by Kaisarie: the most eastern cone of the three)	38	42	16
Everek (khan near west end of the town)	38	23	7
Eregli (khan)	37	30	34

The variation of the compass was obtained from an azimuth at Everek, where the magnetic bearing of a point $54\frac{1}{8}°$ E. was made to be 57° 27′ 29″ by the sextant.

Our first ten days were spent in mapping the course of the Chikurjak between Sulimanle and Kilishler, and after that, the Kizil Irmak between Yashan and Cheshme Keupri (Keupri Keui), as both of these rivers are represented by dotted lines on Kiepert's map. The road from Angora is only a track, crossing the great mass of the Elma Dagh to the north-east of the peak, and thence past Tekye Keui across the great basin on the far side, and through the Gôk gorge, which is chiefly of black rock or serpentine. Here, in an undulating valley, broad towards the south-west, and narrowing to ravines at the north-eastern end, the Chikurjak runs to join the Kizil Irmak below Kilishler. Opposite Sulimanle it is called the Balaban Ozü,

* Map, p. 700.

ASIA.

China and Tibet.

'Adventure, Sport, and Travel on the Tibetan Steppes.' By W. N. Fergusson. London: Constable & Co. 1911. *Maps and Illustrations.* 16*s. net.*

Here is a book written by a man on behalf of a friend, and it says much for the quality of the friendship that "Jock" Brooke (the hero of the story) should have found so sympathetic and so able a biographer as Mr. W. N. Fergusson. Brooke's heart from the very first was in adventure and travel. Nature was the book which he loved to read, and from the early days when he (and his sister) spent their rough and rocky, but intensely happy, holidays as gull-catchers on the north coast of Ireland, his whole soul reached out towards the wild. Once free from the irksome trammels of military life in times of peace, he set himself to qualify for the solution of some of the geographical problems which yet remain to be unravelled. His latest ideal was the determination of the Brahmaputra question. It can hardly be called a problem, for it is perfectly well known how the Brahmaputra finds its way from the plateau of Tibet to the plains of India, but its course has never been mapped, and beyond its great elbow or bend there is hidden in the gigantic hills of the Tibetan frontier much of mystery geographically, and of intense interest ethnographically. This was just the "call" for Brooke. He found an unknown wilderness quite after his own heart, and the only difficulty was to get there. The road by India he soon proved to be barred. Indeed, recent events in the valley of the Dihong amply justify the caution exercised by the Indian Government in not permitting the adventurous traveller to pass that way into Tibet, for fear of the almost inevitable "complications." So Brooke tried the way that is really straightest—*viâ* the Tibeto-Chinese frontier. His first venture was by the well-known route from the north-east, from Koko Nor over the Tangla to the districts more immediately under Lhasa domination. Here, of course, he was met with the usual *non possumus*, and after various attempts to evade the vigilance of the aggressive Tibetan guards, he had, like others before him, to give up the hope of further advance and retrace his weary footsteps through the salt-caked deserts and windy steppes of Northern Tibet. It was a sore disappointment, but keenest of all his miseries was that of losing one by one the faithful animals that shared his march and his privations. Camels, mules, ponies, and dogs—he loved them all, and they were all his friends. The strange affinity with living Nature which would arouse an ecstasy of admiration for a new poppy, extended itself even to things inanimate. Clouds and mountains, ever-varying light and shade, the misty distance or blazing colour of the entrancing landscapes (not, certainly, of high Tibet, but) of the wonderful mountain districts which lie below Tibet in Western Sechuan—all appealed to him in a manner which might be deemed quaint and unusual in an ex-subaltern of Hussars. Without understanding this it would be impossible to understand Jock Brooke.

He left Shanghai on this, his first, journey in August, 1906, returning in October, 1907, and it was on this journey that, in company with the missionary Mr. Ridly, he interviewed the Dalai Lama at Sining. Brooke's impressions of that interesting potentate are not very flattering. He found him as wooden as one of his own idols. It was on this journey, too, that a rough-and-tumble fight occurred with a Goluk robber when Brooke was absolutely unarmed, which might well have ended his career a year or so before that end actually came. It illustrates a certain carelessness, or thoughtlessness, in his methods as regards

his own personal safety which was certainly characteristic, but which is hardly to be commended to travellers in the rougher regions of Asia.

On his second journey he left Shanghai in December, 1907, and he lost his life at the hands of the Lolos in December, 1908. On this second journey he was accompanied by Mr. C. H. Meares (now with Scott's Antarctic Expedition) and by the writer of the book, Mr. Fergusson, and from this point the story of sport and adventure is told at first hand. Regarding it simply as a record of mountaineering and sport, it is a thrilling tale of strenuous endeavour. We know now something of the extension of the haunts of ibex, *Ovis ammon* (burhal), serow, and of that rare beast the takin, of which a specimen is for the first time to be seen in the Regent's Park Zoo.. But incidentally this work is a great deal more than a sportsman's record.

Brooke stepped over the border into the dangerous Lolo land without consulting his colleagues, and there he met his fate with all the traditional pluck of his race (a Yorkshire race), doing his best for his party and himself, till all were struck down by the Lolo following of the chief, who himself struck the first blow, and was promptly shot by Brooke. Two much-damaged survivors were subsequently found, sold into slavery, and their story is the central interest of the book. They were recovered by the Chinese officials of the frontier when, eighty days after the murder, the still frozen bodies of the leader and some of his men were recovered and identified by Mr. Fergusson. Now the brave heart of the young explorer lies at rest in the little cemetery near the mission station of Chentu, and one more is added to the long tale of sacrifice which geographical adventure claims from its devotees.

And now a word for the author of the book. I have once before had the pleasure of calling attention to the excellent geographical work of Mr. Fergusson. A map of Mr. Fergusson's will be found in the December number of the *Journal* for 1908, which illustrates the skill and success with which an amateur can wield the plane-table. To this, with Brooke's assistance, he has since added an extension southward which includes Lolo-land, and is sufficiently in detail to show its general character.* Who are these remarkable people, worshipping fire and oak trees, who defy Chinese authority, and hold their own by right of their extraordinary capacity for hill fighting? As mountaineers they seem to rival the Kafirs of the Hindu Kush, and as mountain strategists they could give the Kafirs many points. Are they really the representatives of the last drift of the ancient Assamese, driven across the mountains, as Mr. Fergusson supposes? There are still strange secrets to be unearthed in the deep valleys of the rivers of Tibet seeking the ocean by way of Burma and China. Who are the cross-bowmen of the upper Salwin, for instance, and where did they learn the use of the weapon? Again, there are the Miao referred to in the Chinese annals translated by Mr. Fergusson, said to date from 2500 B.C., who occupied "the country of Salung." Are the cave dwellings and terra cotta images of Omai, together with the Lolos themselves, to be associated with them? Reading Mr. Fergusson's suggestion of a certain connection between Lolo and Korean, one instinctively thinks, a little farther east, of the Maya and his terra cotta images in Mexico. Apparently these latter are not unlike the Omai specimens. There is food enough and to spare for the ethnological speculator in this book. And there is something more. Mr. Fergusson is not exactly a missionary. He is an agent for the British and Foreign Bible Society for the distribution of our Scriptures. Incidentally we learn a good deal

* Mr. Fergusson's second map was also originally published in the *Journal* (October, 1910).

about Western Chinese missions, and we learn it in a useful way. A book like this, telling a plain, unvarnished, and withal most interesting tale, appeals to a far larger public than the most devotional outpourings of the ordinary missionary pamphlet or report. No one can scoff at Chinese missions after reading Fergusson's book. Scoffers, perhaps, are rare nowadays. It is not gentlemanly to scoff; but doubters there are in thousands, and to all of them is this book to be commended. In view of the fact that a Christian mission existed and flourished in Lhasa in the middle of the eighteenth century, it is most interesting to learn that the frontier mission outpost in Western China is to be advanced from Tachien-lu (the great eastern gateway of Tibet) to Batang. It will be the missionaries, after all, who will show the way from China to India. If the British and Foreign Bible Society has many agents like Mr. W. N. Fergusson, then indeed will the Royal Geographical Society be right glad to know who they are and where they are at work. T. H. H.

Through Asia from South to North.

'Across the Roof of the World.' By Lieut. P. T. Etherton. London: Constable & Co. 1911. *Map and Illustrations.* 16*s. net.*

Mr. Etherton's story of his journey northward from Srinagar across the Pamirs to Chinese Turkestan, and thence by Kulja across the steppes beyond to a final junction with the Russian trans-Siberian railway, is a story of sport and adventure rather than of geographical research. Incidentally, Mr. Etherton did certainly exploit one or two unknown passes about the upper reaches of the Yarkand river, the exact location of which is hardly intelligible without a detailed map; but, generally, he adhered to routes which are geographically well known, although always interesting to students of Central Asian topography. The impression derived from the description of the well-known route *viâ* Gilgit and Hunza over the Mintaka pass into the Tagdumbash Pamir is that Mr. Etherton increased the difficulties of the journey by starting too early in the year. This, no doubt, was due to his anxiety to be on the *Ovis poli* ground at a time when the chances of good sport are supposed to be best. His experiences are a useful indication of the abnormal variation in the conditions which govern those highland routes, where one traveller may find an open highway and the next be blocked by almost insuperable difficulties. Once in the lowlands of Chinese Turkestan, there is nothing more than the incidents common to Central Asian travel to record. His journey over the Tian Shan and across the snow-bound Siberian steppes to the railway must form a most delightful reminiscence, and the story of it should prove a sound encouragement to other young officers of the Indian army to extend their knowledge of the Asiatic world (especially where Russia touches China) by similar feats of activity and intelligent observation. Mr. Etherton writes a straight and unvarnished narrative of the incidents of a real good sporting holiday. There is nothing specially thrilling even in the realms of sport, although it is possible that if the two bears who combined to charge the gallant officer had really meant business, it would have fallen to some one else to describe a Pamir funeral. Perhaps the most remarkable episode was the rapid descent of one of the yaks down 2500 feet of snow-slide and declivities. That a yak should lose its footing in the snow is almost unheard of. This yak did so, and the subsequent search for, and picking up of, the pieces is most graphically described. Mr. Etherton is to be congratulated, not only on the success of his "bag," but on having written a very useful and readable book from the sportsman's point of view—a book which should form a standard record in the library of his regiment, the 39th Garhwal Rifles. T. H. H.