REPORT ON THE PROCEEDINGS

OF THE

PAMIR BOUNDARY COMMISSION.

BY

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CONTENTS.

PREFACE.

INDEX TO LIST OF ILLUSTRATIONS.

CAPTAIN E. F. H. Mc SWINEY, D. S. O. LIEUT. ORAKOLOV. Dr A ALCOCK. CAPTAIN KRUTOROGIN. Dr WELMAN.

Photo-etching Survey of India Offices, Calcutta, October 1896

MONS. PANAFIDINE GENERAL M.G GERARD, C.B., C.S.I. GENERAL POVALO SHVEIKOVSKI.

COLONEL (NOW MAJOR GENERAL) GALKIN. COLONEL T. H. HOLDICH, C.B., C.I.E., R.E.

THE BRITISH AND RUSSIAN OFFICERS.

Photo etching

Survey of India Offices, Calcutta, October, 1896.

THE LITTLE PAMIR. LOOKING ACROSS THE RIVER AKSU TOWARDS AKTASH.
GENERAL GERARD AND CAPTAIN McSWINEY EXAMINING OVIS POLI HEADS.

Photo-etching. Survey of India Offices, Calcutta, October, 1896.

LITTLE PAMIR. BRITISH CAMP BELOW URTABEL PASS

Photo-etching. Survey of India Offices, Calcutta, October, 1896.

THE LITTLE PAMIR. THE JOINT ANGLO-RUSSIAN CAMP AT MIHMANYOL.

REPORT ON THE PROCEEDINGS

OF THE

CORRIGENDUM.

Page 58, line 40, *for* October, *read* September.

Careful ex[illegible] have proved the impossibility of [illegible] hardiest grains, roots, or shrubs anywhere in the Pamir region; whilst the propagation of the human and some of the commoner forms of animal life, if it does not entirely cease, progresses here at a slower ratio, and at rarer intervals than elsewhere.

At this point therefore our frontier garrisons of Gilgit and Osh will probably long remain separated by an almost complete desert of 400 to 500 miles.

It is worthy of note that the conqueror Baber, starting for the invasion of India from Andijan—due north of the Chitral-Gilgit region—avoided the Pamirs and marched *viâ* Kabul.

The Agreement of 1872, concluded at a period when Chinese Power had temporarily disappeared from Yarkand and Kashgar, and the discussion of exact limits in these regions seemed outside the range of practical politics, proved twenty years later difficult of application to the actual geography, where three, or perhaps four, sources might each claim to be regarded as the fountain head of the mighty Oxus.

Though two of these streams rise within a short distance of one another at Chakmaktinkul, and the remainder within a 15 miles radius of that spot, yet, ere uniting at Kala Wamar, the outermost arms encircle a space of little less than 200×100 miles—a territory equal in area to Holland and Belgium combined.

Judging from the respective sizes of the Wakhan Daria at Sarhad, 200 miles, and of the $\frac{\text{Aksu}}{\text{Murghab}}$ at Pamirski Poste, 150 miles from their point of junction, I should be disposed to say that the former, whose source is at Wakhjir, below the Wakhjir Pass, is the more important stream. So the choice of the intermediate Victoria branch was the best possible compromise under the circumstances. The $\frac{\text{Aksu}}{\text{Murghab}}$ River, flowing as it does successively to three points of the compass, could never throughout its length form a continuous boundary.

The frontier having been fixed diplomatically up to Lake Victoria, it remained for the two Boundary Commissions to trace its subsequent course eastward to the Chinese border.

This apparently simple task might have been really so, had the agreement been based on a correct map, but a variety of conflicting views was possible when our surveys showed a wide discrepancy between the topography as it really is, and as it was supposed to be when the convention was drawn up.

Preliminaries once arranged, work proceeded apace. The 1st and 2nd pillars were fixed on the 28th July and the 3rd on the crest of the Benderski Pass on the 5th August. The intermediate range from Lake Victoria to this point proving impassable, further definition than the line of the watershed was superfluous. Materials and workmen for the erection of permanent masonry pillars were provided from the Russian detachment in camp. Their commission being furnished with a French Secretary, the "projet" of each "Protocol" was drafted by him on the lines verbally settled between us, sent to me for additions, alteration or discussion, and when we were agreed on all points, fair copies were drawn out and formal meetings were held for their signature. All documents, correspondence and discussions were conducted in French. The sites of the 4th and 5th pillars at the Urta Bel Pass were fixed, and the 3rd Protocol signed, by the 14th August. Up to this point the real and the supposed topography being in accord, it had been all plain sailing, but as henceforward they widely diverged, the difficulties of a delimitation in accordance with the terms of the agreement began to manifest themselves.

It had apparently been assumed that Kizil Robat was some definite position, such as a village, situated southwards of Lake Victoria, and the agreement seemed to accept as beyond question that the mountain chain in which are the Benderski and Urta Bel Passes ran generally west and east up to a point whence a line due east would cross the valley of the Aksu at right angles, and gain the Sarikol Range, forming the westerly Chinese Frontier.

Instead of this, Kizil Robat—so called from a conspicuous seam of red clay on a detached mountain to the north—is merely a plain frequented by nomads whose *locale* may be taken as anywhere within some miles, but whose extreme southern limits being slightly but decidedly to the north of the latitude upon which all hinged, saved at least the complication of a dispute as to the point from which the latitude should be reckoned.

Moreover the range, assumed to run eastwards, not only turned northwards, within a few miles of the Urta Bel Pass, but shortly after practically ceased before reaching Kizil Robat at all; whilst a line produced eastwards on the latitude of Victoria instead of crossing the Aksu Valley, followed it up diagonally.

The necessity of awaiting the work of our topographers delayed the selection of sites for pillars Nos. 5 to 8 till the 24th August, Protocols Nos. 5 and 6 being signed on the 26th; and the difficulty between keeping to the text of the agreement, and the advisability of departing from it to obtain a suitable boundary, led to an interruption of work pending reference to our respective Governments. It was at this juncture that the admirable services rendered by the Hunza-Nagar levies employed by me for our dâks were so conspicuous, and by allowing us to keep in touch with Government, so largely contributed to the ultimate success of the Convention.

The 200 miles of awful roads, or rather tracks, to Gilgit were accomplished generally in five days, and in one instance I received telegraphic instructions from London through Simla in a fortnight after having referred the question from the Pamirs. On the 28th August the Russian Commissioners despatched a telegram asking for permission to withdraw from the Pamirs before snow set in, whilst we had ordered up fresh supplies, hired kibitkas, and prepared for a prolonged stay.

Thanks, however, to instructions received, we were able on 8th September to agree as to final pillars Nos. 9 to 12, as far as they could be erected up to the line of perpetual snow, and with reference to the position of the Chinese Frontier at this point. On the 10th the final Protocol was signed, and on the 13th September the Commissions separated on the same friendly terms as had existed throughout.

Geographically, politically, and ethnographically, watersheds and not rivers are the only true and stable boundaries in these regions; and whether in the

higher valleys for nomad grazing, or in the lower where cultivation is dependent on irrigation, the possession up to the head waters of each system by one people constitutes the only frontier that has survived the lapse of time.

The general Report of the Proceedings of the Pamir Boundary Commission, furnished, owing to my absence in Russia, by Colonel Holdich, R.E., is so complete as to obviate the necessity of any further remarks from me on this subject, but I would like to place on record that for the three chief difficulties of the expedition,—*viz.*, the choice of route, the selection of carriage, and the arrangements for supplies—I was indebted to the report of Mr. Littledale, and the information supplied by Lieutenant G. K. Cockerill for my choice of the former, whilst the success of the Mission in the latter respect was entirely due to Captain Yeilding of the Commissariat.

As to the "advantages of sowars taking their own horses," it is worthy of note that the troop horses of Ressaidar Zahirulla Khan and an orderly of the Central India Horse, a Waler and an Arab, as well as two Arabs I took for myself, all stood the march and climate perfectly.

No mounted escort had been sanctioned, and the other members of the Mission made their own arrangements for themselves and personal orderlies but preferred employing hill ponies.

There is absolutely no comparison between the ease of the Russian line of communication with the Pamirs, and that from Kashmir followed by our party. There is just about as much difference between scrambling up a cliff and walking a similar distance on the downs at the top, so far as natural obstacles are concerned; largely reduced though the latter now are by our new Gilgit and Gupis roads. From the point where the Commissions separated near Kizil Robat, *their* road may be divided into three sections—

(*a*) Mihmanyol to Pamirski Poste	. . .	80 miles.
(*b*) Pamirski Poste to Alai Valley	. . .	130 „
(*c*) Alai *viâ* Gulcha to Osh (made road)	. .	116 „
		326

From Osh, there is a post road and horses, *viâ* Margelan, Khokand, and Khojent to Samarkand, about 400 miles (passable in three days and nights' travel). Thence by rail to the Caspian, 900 miles (1,344 versts), whence 36 hours by steamer land one at *Petrovsk*, where there is direct railway communication—1,364 miles (2,647 versts)—with Moscow—a journey of three to four days.

The (*a*), first section of the route, follows the Aksu-Murghab River, which it crosses and re-crosses several times. There is no perceptible track, but though somewhat heavy in parts, it is everywhere perfectly easy for wheeled traffic, and the fords are very good. After passing Aktash, the last portion, 50 or 60 miles, is absolutely without grazing, and for nearly half its length seems to have once formed an enormous lake, which had eventually burst northwards through the range at Azu Kuzi. With reference to this I may mention that Monsieur Benderski told me that since 1873 the level of Lake Victoria had very sensibly fallen, and that he believed it was destined to dry up, its depth being inconsiderable.

The Pamir Post is a mere field work. It forms a square of about 100 yards, demi-bastioned—the earthwork unrivetted—save with sods on the interior slope, and the profile and command—save on one face for the latter—extremely slight. There are rude, but comfortable, mud-built barracks for 6 officers and 200 men, the latter half sunk in the ground, but at the time of my visit the garrison was only of about 80 infantry with 2 machine guns and 12 Cossacks, and I recently read in a Russian paper that this had been since further reduced. Lieutenant Miles from Hunza, at the Russian Commissioner's special request, came to visit this "fort," in order, as the Russian General put it, "to make acquaintance with his Russian comrades."

Detachments here are relieved annually and receive extra pay and rations. They seemed in an admirable state of efficiency and, like the entire Russian

army now, have the new ·303 Magazine Rifle. All appeared cheerful and contented. There is also a band of 14 musicians, 2 being drawn from each of the 7 battalions in the Ferghana Command. All supplies come from Osh, nearly 250 miles distant, and large stores are kept here, and are purchasable by the Kirghiz at less than cost price. There is good grazing in a marsh of 2 to 3 square miles in extent below the fort, but on 17th September this was already partially frozen over. Three detachments, each of an officer and 8 or 10 men, were out at Kizil Robat, Rangkul, and towards Kala Bar Panjah.

The "blizzard" encountered on the 18th September by our returning party at Langar burst upon us the same day on our march northwards. This (*b*) section of the road runs for 40 odd miles up a tributary of the $\frac{\text{Aksu}}{\text{Murghab}}$ River; for some 60 through the basin of the "Karakul," a "dead sea" with no outlet; for about 20 across the head waters of the Markasu, flowing eastwards into the Kashgar River and Chinese system of drainage, and for another 10 down a side stream of the Alai Valley, which though at an elevation of 11,000′ is absolutely distinct both as to climate and vegetation from the Pamirs, whose limit we reached at Bordaba on the 22nd September, where we were again in the Oxus basin.

The road, or rather track, is very easy in itself, though running at an average elevation of 13,000′ and crossing the Ak Baital and Kizil Art passes of over 15,000′. Except at the end of Lake Karakul, which is decidedly brackish and has been fathomed to 400′ without finding bottom at one spot, there is absolutely no grazing, at this season at least, and consequently the country was quite uninhabited.

The sole difficulties for wheels are near the northern foot of the two above-named passes, but they are slight, and empty carts even now can, and occasionally do, cross with help; while a single Pioneer battalion would make the entire road easy for wheeled traffic in a month.

I was told that the road is rarely closed for more than a few days at a time to the mounted "Jigits" carrying the post throughout the winter.

However, even in September, we had continuous high gales and almost incessant snow storms, so we hurried across this desolate section (130 miles) in 5 marches, not meeting a single Kirghiz camp *en route*. In fact, save at the Pamirski Poste, from Aktash up to the Alai all appeared uninhabited. If one can picture somewhat narrow valleys bounded by the Red Sea hills covered with snow, one has a very fair idea of this part of the country.

The Kirghiz at both ends had been ordered to pitch yortas for us, to facilitate our movements, and but for this precaution we should have had to camp in deep snow daily.

The cheerfulness and usefulness of the Cossacks throughout the march were above all praise. As we marched off in the mornings their "Vakhmeister" (N. C. O.) struck up some song in which the whole detachment joined in chorus, and though the singing may not have been of a very high order, still amidst these wild solitudes it had a sort of weird charm that was very attractive. Whether one dismounted, took off one's cloak, or started to shoot at some neighbouring lake, some one of them always was at your side unasked, to hold your horse, carry furs or gun, and make himself generally useful; and nightly, no matter in how severe a snow storm, they all formed up bare headed in front of their yortas, and sang the evening prayer. Their rations, save bread and tea, were solely soup—an excellent thick hotch-potch, of which we often partook ourselves, and to which they could help themselves "*à discretion.*"

The few punishments inflicted on the march, usually for neglect of horses or accoutrements, were somewhat comical. The Cossack in full marching order, with his saddle strapped on his back, had to stand with sword at the carry for an hour or more in front of his Captain's tent.

Though trees do not appear in the Alai Valley, still the change from the desolation of the Pamirs is most marked. Instead of the rare patches of marshy pasture in the latter, there is one continuous sheet of undulating, down-like grazing ground, 15 miles wide, which, though at the end of September much withered and sun-dried, had evidently in the earlier months been a mass of

grass and wild flowers. Vast numbers of Kirghiz migrate here in summer, when it is said up to 200,000 ponies alone are to be found in the valley. In winter the nomads retire to the small and sheltered nullahs northwards in the basin of the Syr Daria, where they have even a considerable amount of wheat cultivation. There crops are sown and left to take care of themselves throughout the summer, being harvested in September when their owners return from the Alai.

There is an easy road from it to Kashgar, about 150 miles from where the Pamir route crosses the valley; and an outpost "Irkeshtam" with ½ a sotnia of Cossacks about 30 miles eastwards upon it. There are remains of an old cantonment on the northern edge of the Alai, which once contained all three arms, but this was abandoned five or six years ago. On the southern side, at the foot of the trans-Alai Range, the camping ground Bordaba is regarded as the Pamir frontier, from which point extra pay begins, though two or three travellers who penetrated this region always erroneously talk of their "visit to the Pamirs" when speaking of the Alai. The final section (*c*) of the road needs scant description. Up to Gulcha, save that the foliage is chiefly juniper, willow, and a species of thorn, with an absence of pines, the road exactly resembles many of the Kashmir vales, as, for instance, Gurais.

The rise from the Alai to the crest of the Taldik is about 1,500′, very gradual, and the road in perfect order. From the crest (about 12,000′) there is an abrupt descent by 34 zig-zags constructed in 1893 by Colonel Grombchevski, into the Syr Daria basin, and since leaving Wakhan the first trees are seen at an altitude of about 9,000′.

A halt of three days to rest the camp was now made, and a detachment of "Okhotniks (chasseurs) from the 16th Turkestan Battalion at Osh appeared, sent out "in my honour," as I was informed, to arrange sport for me. Hard-working and willing as they are, they knew nothing of wood craft, and the result of two days' beating was 3 roe deer bagged.

Their officer told me they find the new small bore of little use for game, and prefer using the old Berdan which, as we saw on the Pamirs, shoots just as well as our Martini.

At Yangi Kurgan we passed the scene of one of Skobelev's victories over 15,000 Kirghiz, whose flank he turned across the neighbouring range. The Sart "Jigit," who acted as his guide on this occasion, wears the St. George's Cross for it, and being of our party was able to point out the line taken, which seemed a fairly easy though probably tiring one.

There are numerous wooden bridges on the road, all on the usual cantilever principle. Gulcha, where we arrived on the 30th September, is a picturesque looking walled encampment, rather than fort, with a 9′ wall and banquette, ditch of slight profile, and practically no glacis, and two semi-circular bastions at the diagonals, each with three embrasures for field guns.

The interior space is densely shaded by poplars, and the pretty red-painted, iron-roofed barracks inside would accommodate a considerable force. Quite 1,000 could comfortably encamp also in the fort, but the present garrison is now one sotnia only of Cossacks with three officers. The first telegraph station is here.

The small islands in the river bed swarm with game, and besides a wild boar killed after general firing, I, in a few hours, with only 8 or 9 soldiers as beaters, shot 33 brace, chiefly pheasants. There are large Kirghiz winter camps here, and we also passed the recently relieved detachment returning from the Pamir post.

As an instance of the treatment of natives I may mention that the Governor of Ferghana had fixed 7 roubles as the price of sheep [at the present exchange about 13 or 14 rupees]. One officer of Cossacks at Kizil Robat having refused to pay more than four, was given a week's arrest by the General though he vainly pleaded that he had paid a fair price for the specimen in question.

From Gulcha to Osh, about 50 miles, numbers of "arabas" ply daily. These are light 2-wheeled carts, carrying about half a ton, but, unlike Europe, the

driver rides the horse. The wheels, which as a rule have no metal tyres, are 8′ or 9′ in diameter, and are able to cross ditches that would check most vehicles. Though there were as yet no houses, the country was densely inhabited, each side valley having numerous yortas, and large stubble fields. Many camps seemed arriving daily, the bulk of the population migrating for the summer months to the Alai.

Osh, which we reached on 7th October, is a charming little town, the native portion much resembling Islamabad in Kashmir. There is everywhere the same mass of clear running water in small canals, bordered with willow, poplar and mulberry; picturesque bazars, and flat-roofed mud houses standing in detached walled gardens, and almost hidden by fruit trees and vines. The Russian Cantonment on the opposite bank of a bright, stony trout-stream is, like all other Turkestan cantonments, precisely on the model of an Indian one, substituting poplar and willow for peepal and neem, and wooden outhouses for the Indian mud quarters.

I had received a hint that the troops would be in full uniform, and on arrival at the bridge across the Akburra found it and the streets decorated with English and Russian flags; was invited to ride down the front of the infantry formed up, give the usual greeting "*Zdrafstey Rebiata Molodtsey*," and receive the salutes and reports.

The 16th Turkestan Battalion is quartered here, and, as seems invariably the case, has a very good band, and mess house, or "club" as they term it, both kept up entirely at Government expense. Here, as elsewhere, I was invited to "*dejeuners*" and dinners, with many speeches and more toasts, that of Her Majesty the Queen being usually drunk first, while it was left to me to propose that of the Tsar. The climate here is somewhat like that of Kashmir; and from Osh onwards, though snow mountains are generally visible up to Khokand, you travel across a plain rather than through valleys, varying in elevation from about 4,000′ at Osh to less than half that at Tashkent.

Upon the Turkestan post roads, you have to make your own arrangements for a vehicle, and obtain from the authorities a "podorojnaya" or road passport, on the production of which the Postmasters at stations 12 or 15 (to even 25 in the more desert tracts) miles apart are bound to provide horses. In mine I was described as travelling on Government service, and as entitled to precedence of all other travellers. The horses are harnessed in the usual Russian "Troika" style, three abreast, and the charge for the team is 9 kopeks per verst besides an unfixed but obligatory *pour boire* to the driver. These amount roundly to £2 each hundred miles, though practically one somehow expends at least double, but even then it is not dear. From Osh to Margelan I travelled with the Russian Commissioner, who is both Governor and Commander-in-Chief of the province of Ferghana. The distance is about 75 miles, divided into five stages of from 16 to 26 versts, and including an hour or two's halt to breakfast with the 4th Turkestan Battalion at Andijan, took 11 hours. Of the entire distance I do not think there are 5 miles of uncultivated land, and, save on a few miles of rising ground, there was running water everywhere, bordered by trees throughout; and there were magnificent crops, so far as the somewhat close country allowed a view, amongst which cotton, maize, and lucerne were the most prominent.

The valley, or rather plain, seen from a rising ground appeared a continuous forest, though all were artificially planted trees, either of the species mentioned as found at Osh, or the usual orchard fruit kinds, often festooned with vines. The water channels belong to an ancient order of civilisation, and, like the more recent ones, were originally planted with cuttings of willow and other trees, to preserve the course. Being very winding, shaded in, and with a profusion of ferns and flowers on their banks, they generally resemble natural brooks. We were accompanied throughout by a mounted escort of local notables and officials, each to the limits of their respective districts; many of their horses showing decided traces of Arab blood. At each change we had to partake of tea and fruit, the latter of which was piled up in endless profusion, the grapes and water-melons especially being of excellent quality. The road for quite a sixth of its length traverses villages, built in one long straggling street, the middle bazars often roughly roofed for shade, and the flanks of detached flat-roofed cottages buried in walled gardens and orchards. Judging by the quantity

of Chaikhanas bright with charming Turkoman rugs and alive with gaily attired natives, the roast Kabab shops, and the amount of meat, bread, fruit and vegetables for sale, the people seemed in most easy circumstances, and I believe as a rule delegate most of the hard work to their women. Bundles of lucerne 3 feet long were everywhere for sale and seemed the sole fodder used.

Save in the garrisons, Russians are as rare as English are in the mofussil districts of India. Really under military law, all civil and most criminal cases are disposed of by native officials in their own language and by their ancient codes; but capital punishment can only be awarded by Russian Court-Martial and is very rarely indeed applied. Beyond two or three officers in each district acting as Commissioners and District Superintendents of Police, the above restriction as to the death penalty, and the prohibition to carry arms, the people are left as absolutely to themselves, I believe, as in days prior to the Russian conquest; and this, combined with the present state of absolute security, seems naturally most popular.

The only tax levied is that of one-tenth of all crops valued annually in the settled districts. Kirghiz and other nomads irrespective of cultivation, being taxed 4 roubles 75 kopeks per "yorta," of which in a family there are generally as many as there are wives.

On the 9th October, on nearing Margelan, which we did shortly after dark, we found the officers and society of the place assembled at an *impromptu fête champêtre*, with illuminations, fireworks, several bands, and a very elaborate supper, when speeches and toasts kept us till a late hour of the night; the ladies expressing great regret that Court mourning prevented our winding up with a dance.

The General's residence at Margelan is a splendid building, the principal saloon of which will compare in size with the Viceregal Ball Room at Simla; it has a considerable walled park and ornamental water, and is, as well as a villa outside and a cottage in the mountains 40 miles distant, furnished and kept up entirely at Government expense. There are 4 battalions, 2 batteries and a Cossack regiment (6th Orenburg) quartered in the cantonment which has such spacious roads and gardens, and is so overplanted with trees in which poplars predominate, that it is even more "countrified" than the most spread out Indian station. The native city is about 7 miles to the north. I was invited to inspect whatever troops and barracks I liked and saw a battery, a battalion, and the Cossack regiment. It was explained that they could not give a grand review "in my honour," as most of the troops had just returned from their autumn manœuvres, and were enjoying a ten days' rest.

From what I saw I must say that it was almost impossible to pick a single fault, and that the men seemed not only of splendid material, but perfectly equipped, disciplined and trained, as well as comfortably quartered and well fed. The bulk of the men were Poles, who here are kept five, instead of the usual four, years with the colours, and their physique seemed superior to that of our linesmen, though possibly this is due to their looser knickerbocker style of uniform, which sets a man off better than our "skin-tight" khaki.

Barracks were one-storeyed detached blocks for each company or sotnia. They were most clean and comfortable, though patterns varied in different corps; all had good camp beds, bedding and clean sheets, but the rooms were much overcrowded according to our notions. As all regiments spend the entire summer in camp, this, however, is of little matter in their eyes. Here as before, I had invariably to give and receive the usual greetings. The artillery was a "horse mountain battery" as they term it. The gun—a non-screw one—of about our screw mountain gun bore, and with a shell of what seemed about 3 diameters in length, has carriage and limber of the usual pattern, though far smaller, and wherever possible marches—detachments and wagons complete—as a horse artillery one. Where roads become impracticable, the detachments become mountain battery gunners, and the horses carry gun, ammunition boxes, and all, exactly as ours. The way in which all can change from draught to pack carriage is very ingenious. Their spare harness was in excellent order, and all stores, mobilisation clothing and ammunition ready for instant issue.

The march from Tashkent to Orenburg is so long and desert—1,300 to 1,400 miles—that Cossack reliefs are sent *vid* the Caspian and by rail.

There is a very good military "cercle" at Orenburg for the garrison, which is in fact an officer's station mess, but maintained and furnished, down to glass and linen, by Government. As the entire staff of servants are soldiers, nothing but the bare cost of food has to be paid for, and receiving as officers do in Turkestan 60 per cent. higher pay than in Russia, they can live very comfortably.

I was overwhelmed with hospitality and attention during my stay, had to do justice to the usual number of toasts, and before leaving was waited on by all Commanding Officers in full dress; whilst on my departure, I found a guard of honour and band to help my start, and the troops from the barracks lining my route drawn up to shout out in chorus their wishes for my well-being. It is impossible for me ever to acknowledge adequately the many kindnesses I received from General Povalo Shveikovski, my late colleague on the Pamirs and host in Ferghana.

An eight hours' drive landed me at Khokand, where the 18th Turkestan Battalion entertained me at dinner. This is the true commercial capital of Ferghana and has the largest population, which I have heard given as 110,000, though another informant put it at half that number. The water, however, is bad, and the place being decidedly unhealthy, the Russian capital was transferred to Margelan. Goitre seems common amongst the population and extra tea is served out to the one battalion composing the garrison to encourage the men to avoid plain water as much as possible. The town is meanly built, chiefly of unbaked bricks, and uninteresting, but the traffic in the bazars is most active. I was told that a branch of the Imperial State Bank had been established here a year since, and now did business to the extent of 10 million roubles monthly or, say, £120,000 a year. Cotton is the chief wealth of the country, and Khokand is its chief centre. The American seed introduced by Russians has proved an enormous success and the cotton-fields are not only more luxuriant than those generally seen in India, but the plants bear larger pods, of a much longer staple.

They say that they already export 3,000,000 poods annually to Russia, roughly 48,000 tons—one-third of the entire wants of their manufactories—and they hope within ten years to supply the whole Russian market. So great are the profits upon this, that the cultivation of corn is being relinquished to an extent that threatens to render the import of grain necessary. By one estimate I heard peasants can make a profit of £7 an acre annually from the second year of starting cotton (240 roubles the deciatine). From here westwards both the direct and the Tashkent-Samarkand roads were blocked with caravans of camels and "arabas" laden with cotton heading for the railway. All I spoke to on the subject say it is now regretted that the trans-Caspian line was ever made, as one from Tashkent northwards to Orenburg would have been far better; and to save the expense and delay of transhipment at the Caspian it will have to be made eventually for purely commercial considerations. As it is, work has commenced on the extension of the line eastwards from Samarkand *vid* Khokand, and Margelan to Andijan, with a branch to Tashkent, and if some heavy rock-cuttings near Jizak, the "gates of Timur," can be overcome, they hope to have it working in 1898. That this line is imperatively required for trade purposes, no one who has seen the country can for a moment doubt. I was throughout my onward journey accompanied by the local native officials, whom I vainly prayed to spare me the honour, but who replied they had orders to do so, and could not disregard them. At nights a couple of their "Jigits" galloped in front with lanterns, and as I woke up from time to time the sight of these lanterns bobbing up and down had a curious effect. At Khojent, where I arrived in 12 hours from Khokand, I found a telegram from Count Rostovtsov, the Acting Governor-General, inviting me to stay with him at Tashkent, so I diverged from the main road, crossing the Syr Daria by a wooden bridge, and after a journey of about 60 miles across far wilder and less cultivated ground than I had seen since Gulcha, reached the plain of Tashkent, where rice cultivation seems to flourish, at the lower altitude of 1,500′, and arrived at the capital itself during the night. Though far larger, the cantonment here is on exactly the same lines as that of Margelan, wooded streets, barracks and boulevards are precisely similar,

and there are a few decidedly handsome shops. There were, I think, seven battalions in garrison besides artillery, and an Orenburg regiment of Cossacks. The "cercle" was a large and handsome building, where I was given a big dinner by all the Commanding and chief Staff Officers of the garrison. The native city is decidedly mean and disappointing, and there is not a single striking building or view to be seen. Some of the bazars are crowded and animated. With the Governor's sanction I went to visit the Hindu Colony. There were about 30 Hindus living in houses opening on to a large common courtyard. All are Sowkars from Shikarpore, and usury their sole occupation. They were reticent to me as to the nature of their transactions, but the chief of the police informed me that it was nothing unusual for them to realise at the rate of 300 or 400 per cent. per annum, all their loans being for short terms of a few months. They told me that customs duties made trade prohibitive from India, and that they travel to and fro *viâ* Herat and Kandahar. There is a larger colony of them in Bokhara—600 or 800, I think, they said. The tombs of the Russians killed at the taking of the town by General Chernaiev in 1864 are just inside the gate stormed. Both in and outside the ground is so wooded and walled in that your view is limited to one or two hundred yards, and it is terribly cramped for the movements of troops. There is not a single minaret of any height in the town, nor any point whence a bird's eye view is possible, the reason assigned being the frequency of earthquakes in this part of the country.

My courteous host gave me *carte blanche* to inspect what barracks I pleased; but what I have said of Margelan applies equally here. Amongst other things he enquired very cordially after the 87th (I think) Foot, whose colours he said he had known so well at Sevastopol, and as he expressed it "when we saw them coming forwards, we knew there would be wigs on the green." He as well as the Countess and his children spoke English faultlessly.

There is a very fine observatory maintained here with all the most recent appliances, and the second biggest telescope in Russia. In the Government schools here English has recently been substituted for German. Turkestan is divided administratively into three military districts—Ferghana, including the Pamirs, Samarkand, and Syr Daria, with a General holding both Civil and Military Command in each, whose head-quarters are at Margelan, Samarkand, and Tashkent, where is also the seat of the Governor-General of the entire province. After a farewell dinner with five officers of the late mission, who had returned to their permanent posts here, I started on the 19th from Tashkent for Samarkand, 280 versts.

A five hours' drive brings you to Chinaz on the Syr Daria, a former frontier post in the days when Samarkand was under native rule, and Russian communications were with distant Orenburg. There is now a poor-looking Russian colony here. The river, about 800 yards wide, is crossed by a flying bridge capable of carrying 8 carts with horses harnessed, and many foot people, and the rope on which it swings is supported on a long line of 11 small boats, acting as floats to the rope. It crosses entirely by the action of the current and the manipulation of the rudder worked by an ordinary ship's wheel. There was a regular block of cotton at this ferry, which must have taken a week to clear off. From Chinaz to Jizak you cross a dreary sand desert of 110 versts with only two post houses in it; at one, water was raised by a wind-mill, from a depth, according to the Postmaster, of 420 feet, and a large iron reservoir is kept for the benefit of caravans. In winter sleighs are much used on this part, there being no made road. Cultivation was again met on nearing Samarkand, the only picturesque town I saw *en route*, though it is very inferior indeed to ordinary Indian cities.

"Timur's Tomb," the great Tamerlane's resting place, still indeed bears traces of its former magnificence, and when completely covered with the inimitable blue tiles which formed its real glory, must have been as striking as the Taj at Agra. The polish they retain is still as bright as the day they were first made, and the effect of the deep blue Arabic inscriptions burned into the pale blue ground work is most beautiful. Earthquakes, even more than time, have however removed a large proportion of this external covering, and the dull, apparently unbaked, bricks below enormously spoil the effect of the building whose general design we see reproduced in

most Indian mosques or tombs. In the crypt below, the black standard, said to be the same that was carried before the conqueror five centuries ago, still hangs, dusty and worn, and in the twilight of the dome makes one ponder on the scenes it must have witnessed in the various invasions when seventeen million human lives are said to have been sacrificed.

The Russian cantonment of the same pattern as former ones is situated close to the city, which is commanded by a modern fort. The bazars abound in locally-made silk, which appears cheap and good. Two entertainments being given by the Aksakal and city notables to Count Rostovtsov's son, to which he begged me to accompany him, I had a good opportunity of observing the people. Very plentiful repasts were provided to which all sat down, and the chief interest of the audience was concentrated on the "batchas" or dancing boys who were dressed as, and much resembled, the opposite sex. I found few even of native officials, such as the Chief Kazi or Judge, knew a word of Russian, though many did Persian.

There are large vineyards in this district, and very good light wines are now made and extensively used in the garrisons throughout Turkestan.

General Pankarov, Commanding the Garrison, came to see me off by the railway on the night of the 22nd October. The station is situated five miles from city and cantonment, and passenger trains run three times a week taking nearly 60 hours—three nights and two days—to do the 1,344 versts to Uzun Ada on the Caspian. There are only 2nd class carriages on the line, but a very tolerable restaurant car, to which, as all carriages are inter-opening, passengers can render themselves for meals whenever they please. By the Governor-General's orders a special carriage was attached to the train for me. Leaving Samarkand at 8 P.M. on 22nd, we passed Bokhara about 8 A.M. the next day, and the Amu Daria or Oxus the same afternoon. Its bridge, 2½ versts long (1⅔ mile), of which I had heard a great deal, is disappointing. At this season, and I believe generally, there were only two channels with any water at all, the bigger of about 400 yards, and something like four-fifths of the bridge ran across dry sand banks. It is entirely of wood, and the level of the rails 15′ to 20′ over the water. A paddle steamer, the *Tsarevitch*, flying the man-of-war pennant, was anchored just above the bridge. I was told that General Yonov's brigade was stationed at Kerki about 100 miles up the river (south-eastward of this point), and some 50 from the Afghan Frontier at Khoja Saleh.

From Charjui on the left bank the Province of Trans-Caspia begins, General Kuropatkin, whose head-quarters are at Askabad, being quite independent of the Governor-General of Turkestan. The very worst bit of sand desert begins from this point, and despite numerous stations of Railway Battalions, and the encouragement of the growth of saxaoul, and other shrubs, such as tamarisk, it is difficult to keep the rails clear of drifting sand. All water is brought to these outlying stations in tank wagons, and a wagon filled as a sutler's shop, wanders up and down the line to enable people to make purchases.

Merv is passed by night, and on nearing Askabad at 10 A.M. on the second day, the railway skirts the foot of the Persian Frontier mountains, and cultivation and even villages are scattered about, although the kibitka or yorta is still the most common form of residence.

Askabad, though only 700′ above sea level, is well watered by running canals; trees are everywhere springing up, and in a few years' time it will certainly be as pretty a station as most Indian ones. The Cantonment seems quite new, regularly laid out, and many new buildings, in which a Greek Church is conspicuous, are proceeding apace. Much as I should have liked to have made the acquaintance of General Kuropatkin, any stoppage here would have made me miss the weekly steamer to Petrovsk, which was rather too long a period to trespass upon even Russian hospitality.

The celebrated Geok Tepe is the second station westward of Askabad. Though situated within seven miles of the mountain range, it is a mere mud enclosure, in a dead plain, commanded from the north-west by sand hills, absolutely destitute of flank defence, and apparently its garrison had occupied

kibitkas, without even the mud walls of an ordinary village that would act to a certain extent as traverses or retrenchments. The enclosure is a square of about 1,600 yards on each face, dotted with grazing camels as we passed, and the wall of slight thickness, and without a ditch, more resembles that of an orchard than one intended for serious defence. On the adjacent railway platform, a typical Turkoman, in his national dress with the addition of Russian shoulder-straps, was contentedly doing duty as gendarme, and showed the change wrought in the preceding 14 years. Uzun Ada on the Caspian was reached at 7 A.M. It certainly justified its reputation, which at Tashkent was described as "a God-forsaken spot, where you go to bed with a sandhill at your back door, and wake to find it has moved round to the front." The low straggling line of chiefly wooden houses is quite dominated by a back-ground of loose shifting sand drifts. A severe earthquake occurred here last July which wrecked the railway at several points from here to Kizil Arvat, 160 miles, the eastern terminus of the line at the time of the Panjdeh incident of 1885, but which had the gratifying result of deepening this inconveniently shallow port. Five or six wooden piers permitted steamers to come alongside at this season, but the depth of water is very variable and generally insufficient in the winter months—for what reason is not known—but on this account the harbour and railway terminus will shortly be transferred altogether to Krasnovodosk. There were 6 steamers, and 26 sailing vessels in port, the latter of 80 to 250 tons and generally brigantine rigged. The Caucasus and Mercury line of mail steamers was represented on this occasion by the *Constantine*, a London-built boat that had done 33 years' service and was still, they said, one of the best they had. It is noteworthy that, built in England, she had been successfully floated from the Baltic and Neva to the Volga and Caspian. Her interior fittings were quite "up to date," with electric light, and a far more expensive table service than is seen on a Peninsular and Oriental ship. All her officers were from Finland, and they told me it was much the same on the other boats.

A somewhat stormy voyage of 36 hours landed us at Petrovsk on the night of the 26th October, and starting by rail the next morning, travelling *viâ* Rostov on the Don (where, during a ten hours' delay, I found one of the best hotels I have ever seen), Kharkov and Warsaw, I reached London on the 3rd November.

In conclusion I may say that, whilst recently in St. Petersburgh, when thanking His Excellency General Vannovski, Minister of War, for the permission he had given me to travel through Turkestan, he replied to the effect that "he was only too glad to let English officers travel, to disabuse our minds of the erroneous notions propagated by our Press;" that Prince Lobanov, the Foreign Minister, expressed his entire satisfaction with the amicable settlement attained; and that His Imperial Majesty the Emperor did me the honour of telling me that the good relations which had subsisted between the two Commissions had given him more pleasure than the actual result.

BOLARUM,
The 23rd April 1896.

M. G. GERARD, *Brigadier-General,*
late Commissioner for Pamir
Boundary Delimitation.

CHAPTER II.

NARRATIVE OF THE PROCEEDINGS OF THE PAMIR BOUNDARY COMMISSION.

THE following is a general narrative of the proceedings of the Commission which left India on the 20th June 1895, for the purpose of demarcating the Pamir boundary between Russia and Afghanistan. The work of the Commission was compressed into four months, of which two were occupied in marching to and from the Pamirs, and the other two in demarcating about 90 miles of boundary line extending from Lake Victoria in the Great Pamir to the Chinese frontier on the Sarikol range.

The staff of officers composing the Commission was as follows:—

Major-General M. G. Gerard, C.B., Commissioner.

Colonel T. H. Holdich, C.B., C.I.E., R.E. } Survey Officers.
Major R. A. Wahab, R. E. }

Captain E. F. H. McSwiney, D. S. O., Intelligence Officer, Camp Commandant, and Secretary to the Commissioner.

Surgeon-Captain A. W. Alcock, Indian Medical Service (Bengal), Surgeon and Naturalist.

Ressaidar Zahirulla Khan, of the Central India Horse, accompanied the Mission as Attaché, and Khan Sahib Abdul Ghaffár, with two Native Surveyors, was added to the strength of the survey party as topographer.

The escort consisted of 10 Native non-commissioned officers and sepoys of the 20th Punjab Infantry, which, with the officers' orderlies, and the soldier surveyors of the Intelligence Department, amounted in all to a fighting force of 19 men.

The selection of means of transport was a question which demanded much consideration. It was not quite clear that pack animals could be used under all the conditions that might apply to the work of the Commission, and the collection of an adequate supply of coolies from the sparsely-inhabited valleys leading to the Hindu Kush presented an apparently insuperable difficulty.

Food supplies for three months for a party which numbered 5 European officers and less than 100 native followers had to be collected and placed on the Pamirs, and although this may not appear to be a very large commissariat enterprise, it is doubtful if all the resources in coolie labour of the valleys north of the Gilgit river would have been equal to the emergency. Kashmir ponies were eventually decided on as the means of transport, and the decision was one which no member of the Commission had reason to regret. The Kashmir pony is a small but hardy animal with a very large capacity for dealing with stiff gradients and bad roads, and of keeping up a reasonable rate of progress. Under his own saddle (the ordinary Punjabi pahlán) and a load not exceeding two maunds, he can march 3 miles an hour over fair roads, and is only reduced to 2½ miles per hour by the worst conceivable hill-tracks. He can also for the most part feed himself. Here and there on the outward and homeward track it was impossible to avoid camping grounds in which grazing was scanty, but this difficulty was entirely limited to camping grounds within the limits of Kashmir territory, comparatively close to the base of supply, and consequently easily provided with grain. On the Pamirs, and indeed throughout the newly-defined Afghan districts, the excellent grazing forms the chief source of wealth in the country, and our transport ponies grew fat in the rich green pasturage of the Pamirs, and were not infrequently lost for days on the hill-sides, where miles of grass bordering the mountain streams offered fresh fields for their investigation.

It may be interesting to note that in order to procure and locate the three months' supply which it was considered advisable to have in hand on the Pamirs for the use of the Mission party, no less than 800 Kashmir ponies, with their drivers, were requisitioned for duty, from first to last.

NORTHERN END OF BURZIL PASS.

Photo etching Survey of India Offices, Calcutta July 1896.

LOOKING SOUTH FROM FOOT OF BURZIL PASS

Photo-etching

NORTHERN APPROACH TO THE BURZIL PASS

Photo-etching

Survey of India Offices, Calcutta, October 1896

THE BURZIL PASS

The selection of the outward route was not really a matter of much consideration. There were two routes open to mule traffic, and apparently only two. One lay through Swat, Chitral, etc., by the Baroghil to Sarhad; and the other (of more doubtful practicability) reached the same point *vid* Gilgit, the Yasin valley, and the Darkot pass. There were obvious objections to the selection of a route passing through districts occupied by a field force still engaged in active operations, so the Darkot route was chosen for the outward march. After most careful investigation of other lines and routes, which was conducted during our stay in the Pamirs, the Darkot was again found to offer the only practicable road back to India; thus a description of the route followed in the one case will answer for that taken in the other.

All camp equipment was of the lightest possible description consistent with efficiency. The largest class of tent that it was found possible to carry was the 10′ "Swiss Cottage," two of which were taken in order to include a mess large enough for the contemplated entertainment of the Russian staff. Officers contented themselves with light "Kabul" or "shikar" equipment, and the native followers of the Mission were camped in 40lb field service sholdaris. On the whole, the camp was compact and workmanlike, and quite sufficiently effective for a summer residence on the Pamirs.

The survey equipment was on "mobilisation" scale for an army corps, with the addition of an extra theodolite and a few meteorological instruments.

On the 20th June the Commission party met at the rendezvous at Bandipur, north of the Wulur lake in Kashmir, and two days were employed in arrangement for transport and the equipment of the escort and camp followers. Warm clothing was obtained from Srinagar, and particular attention was paid to the item of shoe leather. Warm coats, felts, and blankets are obtainable from Yarkand or Kashgar, but the whole resources of Central Asia seem unequal to the production of a boot that is suitable for hard wear over bad roads and mountain sides. During the summer months it may be doubted whether thick woollen socks and the ordinary native shoe is not the best equipment for the native of Hindustan in the Asiatic highlands. The Kashmir "chapli" with felt socks is more easily repairable, is a better protection against frost-bite, and a better combination for the dry snow of winter than the shoe, but it is not suited to the wet slush of summer snow. For winter wear in the Pamir regions the long leather* boot invariably worn by Russian, Kazzak, Kalmuk, or Kirghiz, with the felt stocking inside, is doubtless the most perfect foot protection yet devised; but it must be remembered that none of these people ever walk habitually. The boot is a riding boot, very imperfectly adapted to long marches over bad roads, or to hill-climbing.

All preparations were completed by the 22nd June, on which date the Commission party, numbering something less than 100 souls (besides the transport drivers, who may be reckoned at 1 to every 4 of the 200 ponies employed with the head-quarters camp), made their first march to the foot of the Tragbál pass on the road to Gilgit. About a week previously, the first Mission convoy, with commissariat supplies and grain for the transport, had left Bandipur by the same route. This convoy included about 400 ponies, and was not overtaken till we reached the Darkot pass.

No difficulty was experienced in crossing the Tragbál (11,400 feet). Snow still lay in patches, and where advancing summer had withdrawn the white veil of winter from the smooth rounded slopes that formed the saddle-back of the pass, there was a spread of many-coloured flowers, chiefly primulas and orchids, forming a carpet as rich in variety as it was in intensity of hue. The scenery throughout this part of the route was magnificent. The weather was clear and the mountains were full of the beauty of summer.

There is little to record of the progress of the Commission party through the valley of Gurais to the foot of the Burzil pass, where it was expected that the first real route difficulty might possibly be encountered. The Burzil (13,500 feet) is not, as a rule, open so early as June, but it had already been reported practicable, and our first convoy had crossed it some days ahead of us. It is never safe

* The Charak.

to predict of any of these passes that they will be practicable on any given date either in the spring or fall of the year. Vicissitudes of weather are responsible for the uncertainty, and the degree of difficulty experienced in negociating them may almost be said to be a meteorological problem. On the 26th June we were so far fortunate that a wet and stormy morning was succeeded by a fair though cloudy day. The rain had rendered the ascent from the southern side exceedingly slippery for the first mile or two. It was indeed almost impossible to ride up the muddy slopes of the made road; but once on the snow, we found that the foothold was comparatively secure, and little further difficulty was experienced. A foot or two of snow made no difference to our transport ponies, neither did the total absence of any recognisable road. They clambered up, or slid down, the slopes with equal facility, and had all arrived in camp at Chilam by an early hour of the afternoon. This comparatively easy passage of what is at times a most dangerous pass gave us confidence in our transport—a confidence which we never found misplaced.

From Chilam through the valley of Astor to Bunji and Gilgit our progress was unmarked by any incident worth recording beyond the interest that attached itself to meeting with the returning heroes of Chitral, some travelling Indiawards, and others content to take a well-earned rest after the vigorous activity of the preceding months. We reached Gilgit on the 4th July, and halted there a day to supplement our equipment and arrange for the future of our postal arrangements. The dâk was finally laid on two lines, one *viâ* Gupis and Yasin over the Darkot to Sarhad and the Pamirs—the route, in short, which we ourselves followed,—and the other more directly through Hunza and over the Kilik to our Pamir camp. The arrangements were made through the local chiefs on either line, posts of runners being established at intervals, and letters run straight through. Nothing could have worked better. At Lake Victoria the average length of postal communication was fourteen days from Simla, which time was reduced when the Hunza line came fairly into action. The record on this line was less than four days from Gilgit. The slowest rates maintained on any part of the line were those between Baramulla and Gilgit.

From Gilgit we continued for four marches to follow the mule-road to Gupis. The severe gradients on this road and the perilous nature of some parts of it which wind over "paris" (or precipitous hill-sides) on the right bank of the river are sufficient to give a very fair idea of what the nature of that road must have been ere it was engineered into its present form. It is now easily practicable for anything not on wheels. At Gupis the camp was joined by Lieutenant Gough, of the Gurkhas, who was acting as commandant of the fort and local political officer. He accompanied us as far as Darkot.

A little above Gupis it was necessary to cross the Gilgit river in order to enter the Yasin valley. A somewhat rickety wire suspension bridge answered this purpose, though, on first appearance, it seemed doubtful whether the baggage ponies could use it safely. The passage of the river by the bridge brought us to the right bank of the Yasin valley, not far from its junction with the Gilgit river. A short but steep climb over an intervening spur carried the track to the Yasin river banks. Here another bridge had to be crossed, and the party was transferred to the left bank of the Yasin, along which the route ran, winding its crooked way amidst the *débris* of a mighty mass of fallen rocks till close on Yasin village. Another bridge and a mile or two of cultivation concluded the day's march.

Yasin has been often described. When we saw it in July the green of summer was all about it, and for many miles on either side, and still further up the valley about Handur and Darkot, the track leading from village to village ran through close-set lanes bordered with hedges of wild rose, clematis, and passion-flower. The blue cornflower and scarlet poppy were in full force in the wheat-fields, and each little orchard, with its soft green turf and banks sloping to the river edge presented to us an almost English picture.

Darkot village, two marches beyond Yasin, is specially picturesque. It lies just beyond the edge of a thick jungle growth extending for several miles, which closely fills up the valley with a tangle of trees and brushwood. The jungle is intersected with numerous rivulets, offshoots of the main stream, which afford the

ASTOR VALLEY DASHKIN VILLAGE.

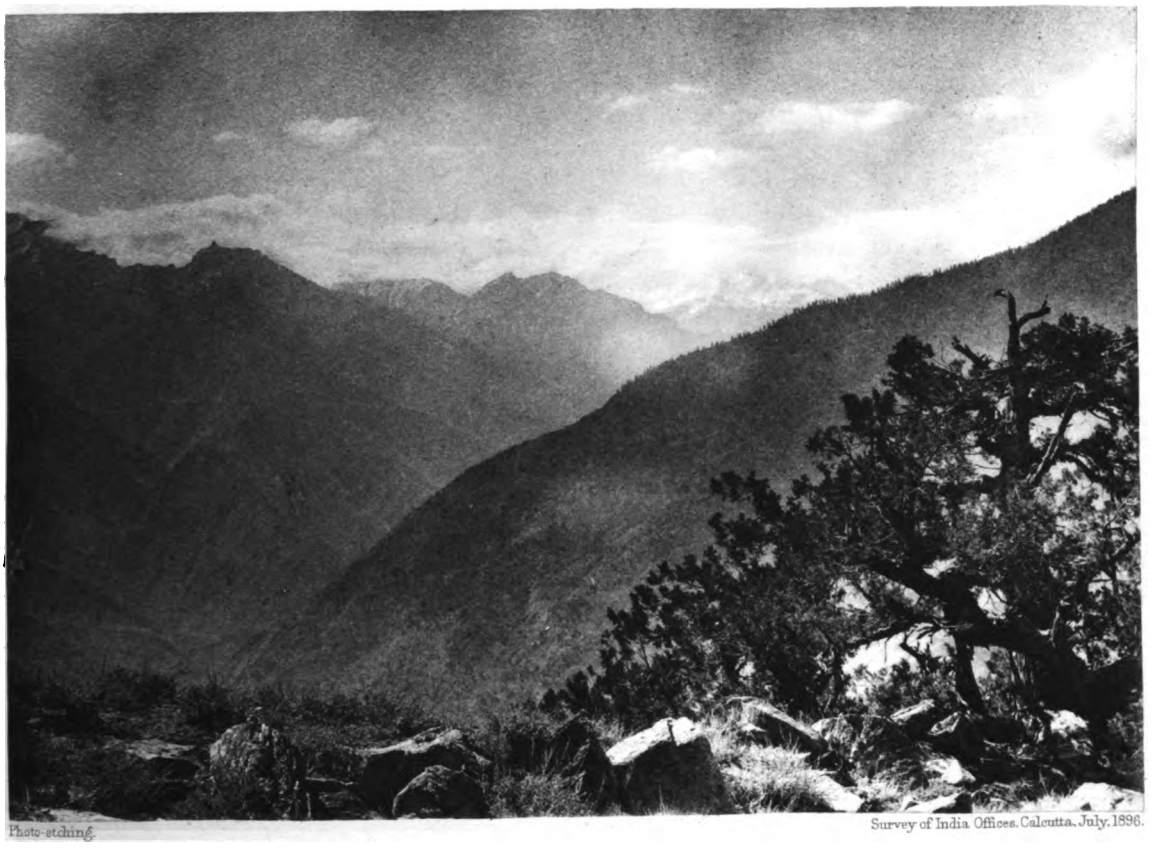


Photo-etching. Survey of India Offices. Calcutta. July. 1896.

ASTOR VALLEY NEAR DASHKIN.

INDUS VALLEY FROM BUNJI, LOOKING NORTH.

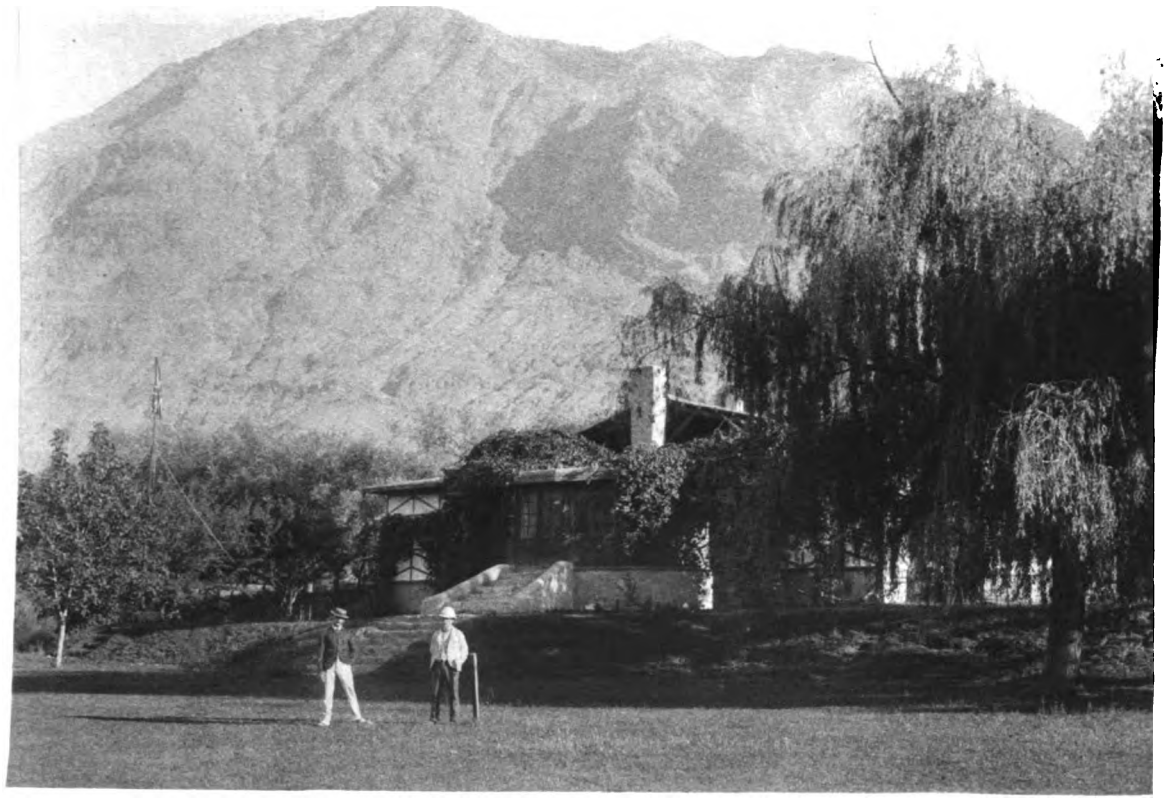
Photo-etching

Survey of India Offices, Calcutta, July, 1896.

INDUS VALLEY FROM BUNJI, LOOKING SOUTH TO NANGA PARBAT.

GILGIT RIVER. ROSHAN FORT AND VILLAGE.

GILGIT RIVER. NEAR SINGAL.



AGENCY RESIDENCE, GILGIT.

Photo-etching. Survey of India Offices, Calcutta, July, 1896.

ASTOR VALLEY, GODAI CAMPING GROUND.

only practicable means of traversing its close thickets; and the traveller has to wade knee-deep in ice cold water for a weary hour or two before emerging into the green fields of Darkot. Here are all the colour and luxuriance of well cultivated fields and orchards enclosed in a mighty grey surrounding of granite and lime-stone cliffs. Up the rugged sides of these there wind, at intervals, the grandest glacial staircases that the world can have to show. One of these is the glacier which leads to the pass known as the Darkot, and to the foot of this we moved forward, passing the scene of Hayward's murder, till we reached a small cultivated patch on the mountain-side called Rawat.

Very early on the morning of the 14th, after an unpromising night, we started for the Pass. At the top of the pass we found a few of the Kashmir drivers huddled under a rock, awaiting the last moments of some of their ponies who were evidently in hopeless case. With true Kashmiri indifference and want of "grit," they had let the scattered loads lie where they fell, and could hardly be persuaded to help themselves into better quarters.

In the deep snow at the summit of the pass the surveyors made their first round of observations for the purpose of carrying the Indian triangulation across the Hindu Kush. It appeared probable at the time that this might be the last opportunity which they would have of counting the white pinnacles of the Himalayan and Gilgit ranges, or of obtaining anything like an exact starting point for the Pamir Boundary Survey. It was a glorious opportunity. The clouds of the last few days had drifted southward, and the white-headed peaks that surround Darkot were revealed in full majesty. Now and then the thunder of an avalanche could be heard, and a gray smoke went up to the blue sky showing whereabouts the mass of falling snow had subsided. From this point the Darkot pass runs either to the north west over a glacier to Baroghil, or over the surface of another glacier trending east of north, to Showar-shur in the valley of the Yarkhun river. We followed the latter route. The broken surface of the glacier at this time of year was completely hidden by the smooth slopes of the snow fields. There was little indeed to indicate the mass of moving ice beneath the snow except the occasional muffled sound of an opening crevasse, in gentle intimation that our way downward was not quite so solid as it appeared. The surface of the smooth slopes of snow that completely covered and hid the glacier from side to side was broken here and there by huge boulders and misshapen fragments of rock which were being carried by the slow but sure progress of glacial action into the Yarkhun valley. There was nothing else to break the uniformity of the downward view, or to interfere with the reflection of the rays of the July sun from the surface of the newly-formed snow-fields.

Most of the Commission party were more or less accustomed to travel in regions of glacier and snow, and knew that under a bright sun the effects of snow-glare could be very unpleasant. We were therefore well provided with goggles, and the native followers had been warned to make use of them also. They did not in all cases accept the warning, and the results were almost disastrous. None of the European officers of the Mission lost their eyesight, but all of them lost every inch of skin that had been exposed to the sun's reflected rays. Indeed the painful effects of that day's march lasted them until the Darkot pass was again at their backs, on the homeward journey. Amongst the natives the plight was far worse. More than 100 cases of snow-blindness were reported to Dr. Alcock, and the next day's halt was expended in medical treatment of the blind, and in the retrieving of fallen loads lying in the snow-fields or in the crevasses of the Darkot glacier. One day was deemed sufficient to put the camp into marching order again, and the next (16th July) was spent in crossing the Yarkhun river (12,000 feet) and in negociating the Sarkhin pass (12,950 feet) a few miles from the Baroghil, over the main watershed of the Hindu Kush.

To reach Sarhad we had to cross the Wakhan river, at this time presenting much the same characteristics as the Yarkhun. The camp was passed over without difficulty and pitched on the green slopes of Sarhad. Here a small and singularly ragged guard of Afghan troops was turned out for inspection. It consisted of twelve sepoys under a havildar, armed with sniders and equipped in a fashion which indicated that they belonged to none of the crack regiments

at Asmar. They were all of them Tajiks from the Tagao valley east of the Kabul plain, and closely bordering Kafiristan. Their periods of duty at this farthest Afghan outpost, and of relief, appeared to be absolutely uncertain.

Full advantage for bathing purposes was taken of the hot sulphur spring which bubbled to the surface a few yards from the village.

The evening of 18th July found us all safely camped in the little wooded ravine of Shaor at 11,500 feet elevation, not very far above the Wakhan river level.

The Wakhan valley presented a fine spectacle of rugged snow-peaks bordering it to the south. Towering cliffs and precipices crowned by rough snow-capped pinnacles rested on long sweeping slopes of grass-covered *débris*, which formed the home of numerous herds of ibex—at least, so we were told; and the magnificent specimens of ibex horns that decorated the local ziarats seemed to confirm the tale. On the northern slopes there was a fair sprinkling of juniper, birch, willows, and wild roses, some of the glens being exceedingly pretty. This was the last growth of wood that we encountered; thenceforward the barrenness of Pamir desolation was unbroken.

At Langar we found a good spread of excellent grass amidst thick clumps of dwarf willow, and here, too, we first encountered the Pamir hares which afterwards figured so largely in our *cuisine*. Here the survey party was detached from the head-quarters camp. So far, the hopelessly inaccessible nature of the ranges bordering the narrow valleys, besides the very uncertain weather conditions, had rendered the task of keeping up continuous triangulation a work of great difficulty. Bases had to be measured at intervals, and astronomical as well as terrestrial observations reduced daily. There was no apparent chance, at that time, of reaching any altitude that could give us direct sight of Indian survey peaks, and the slow process of connecting independent bases at intervals was found to be incompatible with the rapid marching necessary to reach the rendezvous within the allotted time.

Between Langar and Bozai Gumbaz the comparatively easy marching requires no comment beyond the statement that the Warram pass, marked in some of our maps as forming a direct connection between Langar and Lake Victoria, is not regarded as a practicable pass.

At Langar the white sheepskin hat and baggy overalls of a Russian Jigit (mounted Kirghiz orderly) first apprised us that we were on ground that had not always been reckoned as Afghan territory. The first Russian officer, Captain Kutitonski, of the Horse Artillery, appeared the following day (20th July) when the Mission party marched into Bozai Gumbaz. Captain Kutitonski with a detachment of 6 Cossacks accompanied the head-quarters of the British Commission to Lake Victoria, having first despatched a mounted messenger by the Burgutai pass (between the Warram and the Benderski) to announce the arrival of General Gerard at Bozai. The messenger thus despatched arrived at the Russian camp by a route which is reckoned hardly practicable for a horseman, in a single day; but the Commission party were obliged to follow the longer and more circuitous route which leads through the Benderski pass across the Nicolas range to the great lake of the Pamirs.

The march of the 21st was along the comparatively level Little Pamir to the southern foot of the Benderski pass. It was on this march that the first Kirghiz encampment was encountered, a few miles west of the lake which forms the head of the Aksu river. A few akois, or circular felt huts, of exactly the same pattern as the kibitka of the Turkoman, or kirgha of the Kalmuk, formed the encampment; and a considerable herd of goats, sheep, and yaks were scattered about the rich grass of the plain, grazing in contented security. The lake of the Little Pamir is called by Trotter, Oikul. Another name which appears in many maps is Gazkul or "Goose Lake." The only name which we could obtain for it from Kirghiz nomads was that adopted by the Russians,—*viz.*, Chakmaktin,—and it is by this name that it will in future be designated in our maps.

The topography of the Little Pamir about Lake Chakmaktin has been already very faithfully described by Trotter. The lake is a long, shallow

Photo-etching. Survey of India Offices, Calcutta, October 1896.

GUPIS FORT, TAKEN FROM THE S W.

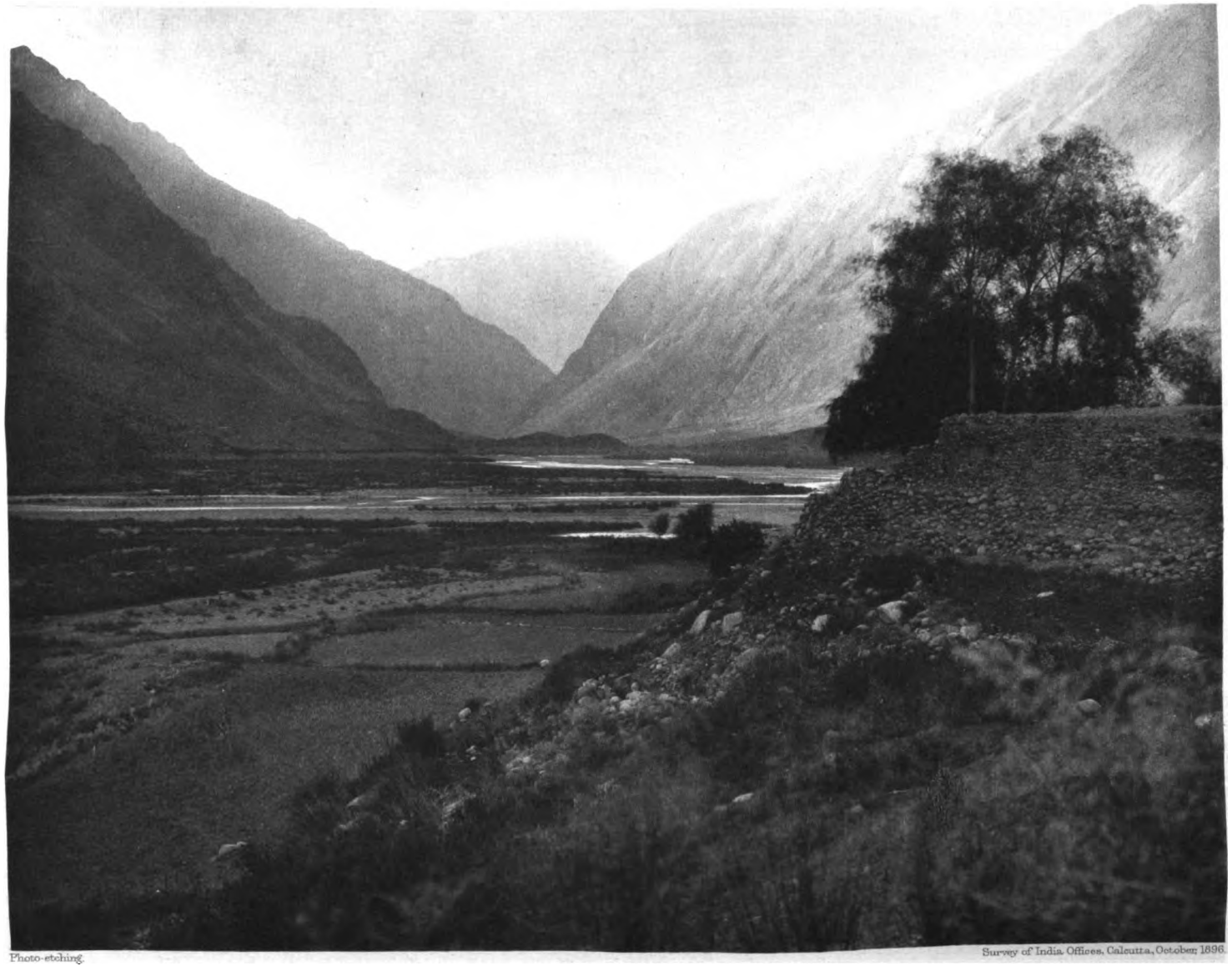


Photo-etching. Survey of India Offices, Calcutta, October 1896.

YASIN VALLEY FROM THE FORT.

Photo-etching. Survey of India Offices, Calcutta, October, 1895

MIR WALI FORT NEAR BARKULTI, YASIN VALLEY.

Photo etching

Survey of India Offices, Calcutta, October 1930

DARKOT-I DARBAND AND GLACIERS IN THE DISTANCE LOOKING SOUTH FROM THE DARKOT PASS

Photo-etching. Survey of India Offices, Calcutta, October 1895.

THE FIRST GLACIER ON THE SOUTHERN SIDE OF THE DARKOT PASS WHICH IS REACHED AT 14,000 FEET.

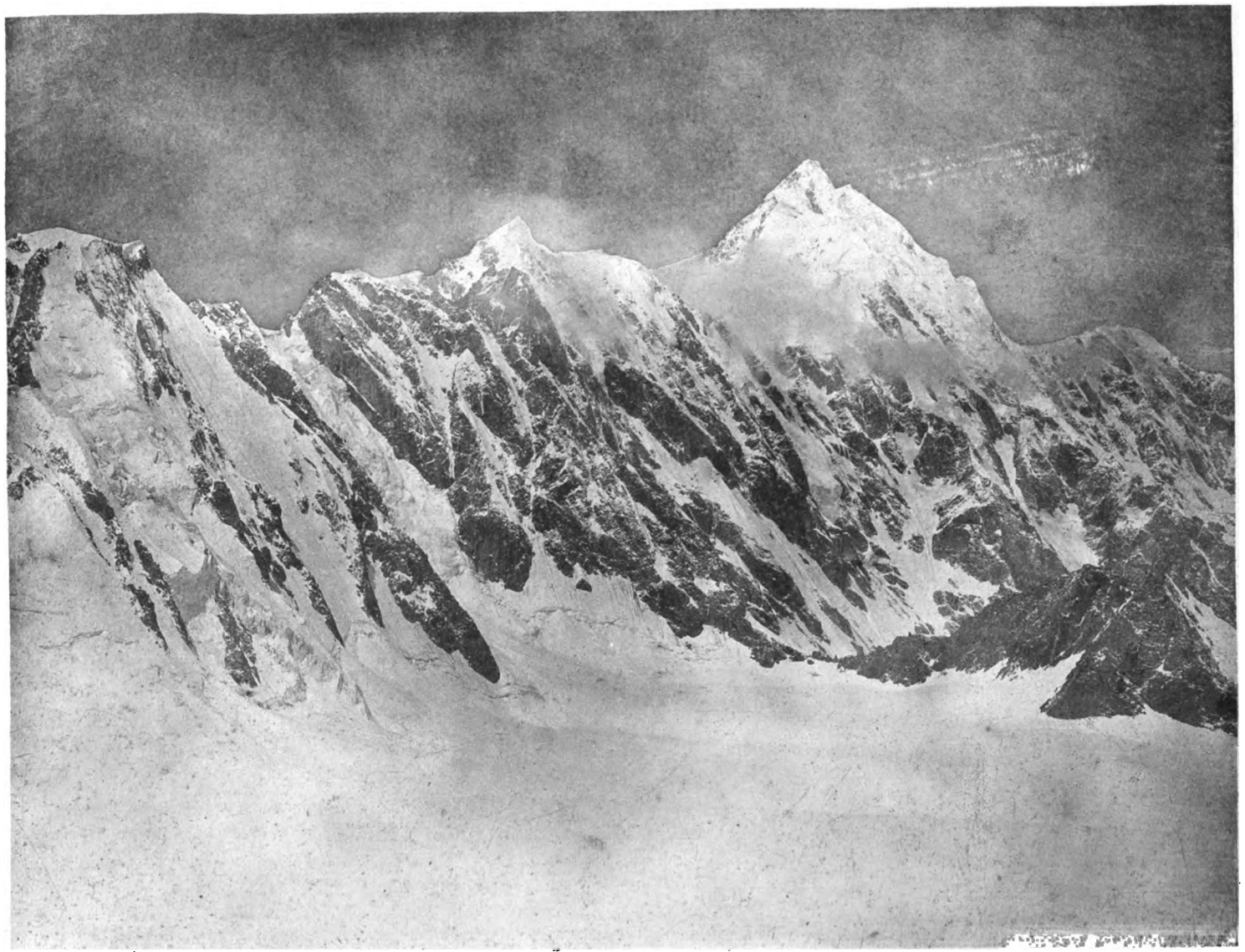


Photo-etching. Survey of India Offices, Calcutta, October, 1896.

THE DARKOT SNOWFIELD ON THE TOP OF THE PASS. 15,300 FEET.

Photo etching

Survey of India Offices, Calcutta, October, 1896.

SARHAD IN AFGHANISTAN.

Photo etching.

Survey of India Offices, Calcutta, October, 1896.

THE SARKHIN LAKE JUST BELOW THE SARKHIN PASS (12500).

WAKHAN VALLEY. VIEW DOWN STREAM FROM LANGAR

Photo-etching. Survey of India. Offices, Calcutta, July, 1896.

GLACIERS, FROM DARKOT.

sheet of water lying in a direction running from south-west to north-east, about 4⅓ miles long and 1½ miles wide at its greatest width. A curious feature about the lake is the fact that the Chilab stream (leading to the Burgutai pass), which enters it at its western extremity, is divided into two channels, one of which runs westward, and the other eastward into the lake. Thus its glacial origin becomes the real watershed of the Pamir. We made the altitude of the lake to 13,020 feet by triangulation, differing by 400 feet from Trotter's determination.

Leaving this lake to the south of the route, General Gerard's party marched to the southern end of the Benderski pass, where they camped on the night of the 21st. The pass was crossed next morning. It proved to be a singularly easy opening, or depression, in the range, very much of the nature of a wide saddle. Although the watershed was 14,700 feet above sea, there was but little snow about it, and this little lay in patches on either side the track. The route wound gently upwards from the Little Pamir over rolling grass downs bordered by rounded slopes with wide ravines. These ravines and hill-sides were the haunt of large herds of ovis poli. At this season, however, the males herded separately from the females, and no good heads were obtained; except, indeed, by the simple process of picking up old ones from the ground. The Pamirs are in certain localities covered with the heads of ovis poli killed during the winter by the Kirghiz, who hunt them with dogs. These sportsmen set no value on the heads, which are left on the ground as a useless encumbrance. At the top of the Benderski pass (the true local name of this pass is Andamin, but it will for the future bear that of the eminent Russian explorer and topographer, Benderski) there is a small lakelet which possesses two outlets flowing north and south, thus forming the head-waters of the two streams which on either hand define the pass. This is, I believe, a most unusual geographical feature. The northern descent from the Benderski was as easy as the southern ascent,—a gentle fall through a narrow rock-bound vale, with here and there little spreads of knee-deep grass bordering a deep tan-coloured stream which looked for all the world like a Devonshire trout stream. The trout were there too, or rather a species of barbel which is exceedingly trout-like in appearance, though it possesses little of the trout's activity and gameness.

On the wide plain, intersected with rivulets, which lies at the northern foot of the Benderski, was a fair show of Kirghiz akois, and large herds of fat-tailed sheep, goats, yaks, and a few camels. The latter are the double-humped Baktrian breed, and, though small, have a singularly high-bred appearance and gait. Yaks are kept chiefly for their milk and for riding purposes. In both these departments they are admirable, and future mountaineers in these highest of highlands may note that they can provide themselves with comfortable means of transport, and certain addition to their commissariat, up to elevations of at least 20,000 feet by making use of yaks. The Swedish traveller Dr. Sven Hedin employed yaks to carry him through his exploration of the mighty glaciers of Muztagh Ata as baggage animals. They must, however, be regarded as being much inferior to the Kashmir pony, even though they are extensively used as baggagers by their Kirghiz owners.

From this plain the British Commission turned westwards. They were now in the Great Pamir and within 25 miles of Lake Victoria. They pushed on to the lake during the afternoon, making a total day's march of 40 miles in order to bring themselves into connection with the Russian camp on the day that had been provisionally fixed by the Foreign Department as the date of meeting. In spite of the fact that the rendezvous had shifted from Bozai Gumbaz to Lake Victoria, a distance of some 60 miles, it is satisfactory to record that on the day fixed, *viz.*, 22nd July, exactly one month after leaving Bandipur, the two Commissions joined hands. Some two miles from the lake the small party, which included General Gerard, Captain McSwiney, and Dr. Alcock, were met by a detachment of Cossacks bearing torches at the end of their lances to light them into camp, if necessary. General Gerard decided to wait for the arrival of the baggage in order to change, after the long day's dusty march, into uniform befitting the occasion; whilst Captain McSwiney rode forward to the Russian camp, which was pitched on the edge of the lake, to report the arrival of the British Commission. The Russian Commissioner

enquired at once for his English colleague, and would accept no excuse for further delay. He ordered his horse for the purpose of riding out personally to insist on General Gerard's acceptance of his hospitality without further formalities. Captain McSwiney rode back in anticipation of this movement on the part of the Russian Commissioner, and General Gerard and his dusty little party, accepting the earnest invitation of their hosts, rode on to the Russian camp at once. Here they were received with that courteous hospitality in which the Russian official is never wanting, and the foundation was then and there laid of a feeling of a good-fellowship between the two camps which never afterwards was broken.

The *personnel* of the Russian Commission, which had arrived at Lake Victoria on the 20th, consisted of 11 officers and 33 men (with the band) and included—

General Povalo-Shveikovski, Governor of Ferghana, as Chief Commissioner.
Monsieur Ponafidine, Councillor of State.
Colonel Galkine, of the Russian General Staff.
Captain Krutorojin, Commanding the Escort of Orenburg Cossacks.
Captain Kutitonski, Horse Artillery.
Dr. Welman, Medical Officer in charge.
Monsieur Stiefel, French Professor.
Colonel Zaleski, of the Russian Engineers, Astronomer and Geodiste.
Monsieur Benderski, Chief of the Topographical Staff.
Captain Alexandrovitch, Russian Engineers, Assistant Topographer.
Lieutenant Orakolov, of the Police, who acted as interpreter.

They were comfortably quartered in Kirghiz akois, the General's residence being distinguished not only by outside decorations of Kirghiz embroidery, but hung inside with Bokhara silks, and well furnished with Central Asian carpets and divans. A portrait of the Emperor Nicolas II. occupied a place of honour on the walls of the akoi.

The English camp was pitched close to the Russians on the opposite side of the eastern affluent of the lake. Lake Victoria has been christened by as many names as the lake of the Little Pamir, there being no local designation recognised by Afghans, Kirghiz, and Sarikolis alike. The name adopted in the Russian maps was Zor Kul, possibly their transliteration of Sar Kul or "Head Lake." It was, I believe, their intention to adopt the name Tsar Kul in the Russian maps of the future. At a dinner given to the Russian staff on the evening of the 24th, General Gerard, in proposing the health of the Russian Emperor, happily suggested that the range which divides the Great from the Little Pamir, and which is as much in want of a geographical designation as every other natural feature in the Pamirs, should be known in future as Range Nicolas. The suggestion met with the cordial approval of the Russian Commissioner, who, as a return compliment to the English nation, promised that the name of our Queen should still be retained by the lake that has borne it for the last fifty years, and that in Russian maps in future "Lake Victoria" should be a recognised feature. M. Ponafidine diplomatically sealed the compact by naming the three-headed mountain peak which is the prominent connecting link on the line of boundary between Lake Victoria and Range Nicolas, "La Concorde."

The first official meeting of the Commissioners was held on the 23rd, before the arrival of the Afghan representatives, when credentials were exchanged and enough business transacted to make it clear that, as far as possible, all technical difficulties and objections that might arise would be waived in favour of a rapid demarcation of the line of boundary as defined in the agreement between the two Governments. It was clear from the first that as far as the Benderski pass (*i.e.*, nearly half the distance) no difficulties would arise; and within a week the first pillar had been erected on a rising knoll at the eastern end of the lake, and the position of the boundary accepted on both sides as following the snow and

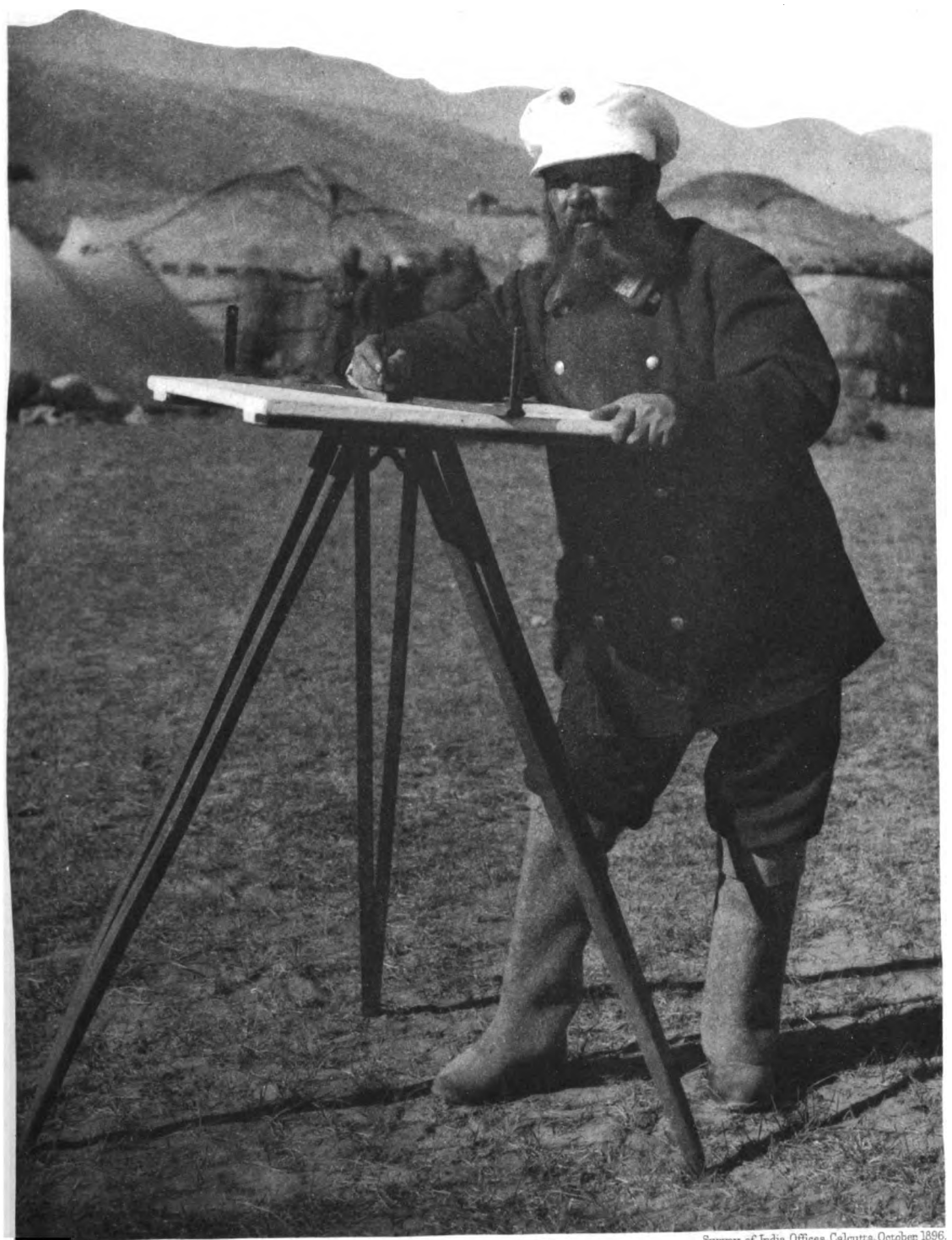


Photo-etching. Survey of India Offices, Calcutta, October 1896.

MONS. BENDERSKI.

Photo-etching. Survey of India Offices, Calcutta, October 1896.

THE AFGHAN REPRESENTATIVES

SARDAR GHULAM MOHI UD-DIN KHAN
MAULVI ASHUR MUHAMMAD KHAN.

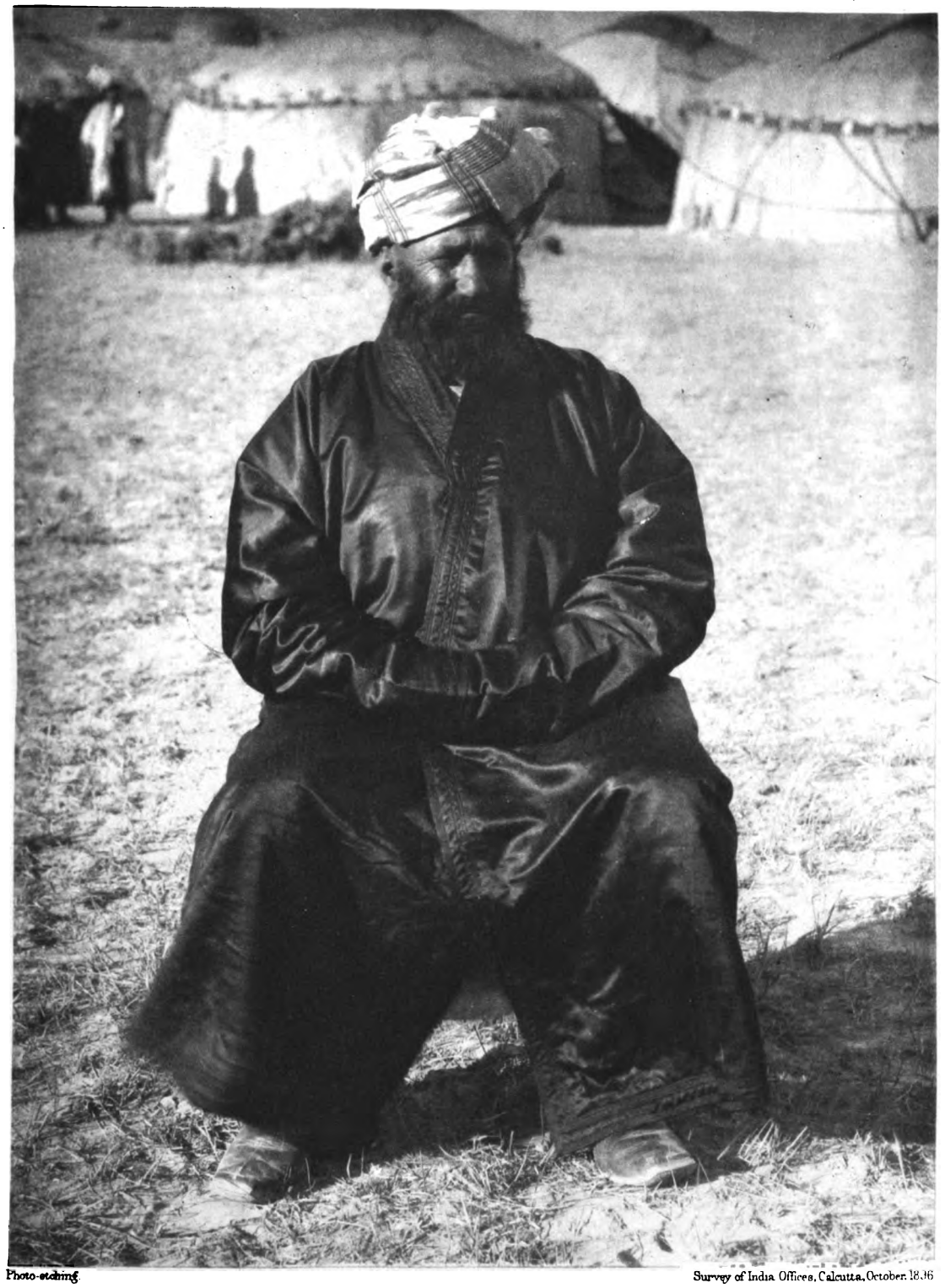


Photo-etching. Survey of India Offices, Calcutta, October 1906

JAN MUHAMMAD, BAJAURI.

glacier covered crest of the Nicolas Range as far east as that pass. The Russian surveyors had been busy on the area of demarcation for some time previously, and their topography of that nearly inaccessible mountain barrier was as nearly complete as geographical mapping of such a region could be made by the time that the English surveyors arrived on the Great Pamir.

The latter had found very great difficulty in preserving the continuity of their triangulation along the narrow valleys of the Wakhan and Little Pamir in face of the unsettled and squally weather of a Pamir summer; and some divergence of opinion with the Russian surveyors was expected as to the position of the initial point of the boundary on Lake Victoria. The position of the Benderski pass was found to be very far east of that assigned to it in the Russian maps; and there was indeed considerable uncertainty pervading the geography of our own maps of this district. Happily the unsettled weather broke into clear skies and brilliant sunshine for a day or two as we crossed the Nicolas Range, and afforded an opportunity for extended observations from one or two high peaks, which definitely and finally decided their geodetic position. The remarkable results of these observations, when the initial data thus secured came to be compared with the Russian records, are given in the survey report.

The survey party joined the head-quarters camp at Lake Victoria on the 28th, and a survey conference was held next day. At this meeting it was decided that each Commission should be responsible for its own mapping. Two points, one at each end of the boundary, were to be selected for geodetic comparison, and if the absolute and differential values of these two points were in fair accordance both in the English and Russian records, differences of topographical detail were to be examined and settled by representatives from both sides *in situ*. There seemed to be no object in delaying the progress of the Commission whilst the English topographers mapped the almost inaccessible glaciers and spurs of Nicolas Range already completed by the Russians. As soon as it was ascertained that we were in technical agreement as regards the position of the first pillar of the boundary, and that there could be no serious divergence of opinion about that of the Benderski pass, the intermediate Russian topography was accepted, and the combined camps moved forward.

Meanwhile, on the 27th July, the Afghan representatives had appeared on the scene. They had hurried up from Badakshan by the most direct route to the Great Pamir *viâ* Kala Panja. Sardar Ghulam Mohiuddin Khan was the chief Afghan delegate. He had left his position as Governor of Faizabad, the capital of Badakshan, with a regret that he took no particular pains to conceal, in order to assist at the Pamir demarcation. He was a nephew of the well-known fighting Muhammad Ján, whose name was very much in men's mouths when the British force was shut up in Sherpur during December 1879. Muhammad Ján led the attack and survived it, but has long since joined the roll of those whose influence in Afghanistan has proved their own destruction. Ghulam Mohiuddin was assisted by a Mullah, Mufti-Ashur-Muhammad-Khan. Both of them were present at the official meetings of the Commission, and both set their seals with much ceremony to the protocol and official documents placed before them.

On the 28th July, the date on which the whole British Commission party was collected at Lake Victoria and the first pillar placed in position, the position of the first and second pillars and line of demarcation were formally registered.

Lake Victoria lies about 12 miles west of the watershed between the Pamir river and a tributary of the Aksu called Kokmamar, and presents the appearance of an intensely blue mirror 12 miles long and from 1½ to 2½ miles wide, reflecting the rugged outlines of snow-capped mountains on either side. It is trigonometrically fixed at 13,390 feet above sea, a result in absolute agreement with the barometrical determinations of the Russian, and differing from Captain Trotter's value (13,950 feet) by 560 feet. The observations of the latter observer were, however, made in the unsettled spring weather, when single barometric determinations are of little value. It is curious that Wood should make its altitude 15,600 feet in mid-winter by hypsometer observations. Lake Victoria is only 400 feet higher than Lake Chakmaktin and about 500 feet below the watershed. The sources of the lake are warm springs beneath the

surface, and an affluent, about 14 miles long, which rises in the northern slopes of the valley not far from the pass to Jarti Gumbaz known as Yangi Diwan, which flows through two small lakes about ½ mile square (called Kurkuntai) lying close under the saddle of the watershed. The relative height of the mountains enclosing the lake is considerably greater than that estimated by previous travellers. They run to between 5,000 feet and 6,000 feet above the lake level on the south side, and to over 4,000 feet on the north.

The first move of the Joint Commission from Lake Victoria took place on the 1st August, to Jarti Gumbaz, a point 26 miles from the lake, and about 16 north of the boundary line on the Andamin river which rises at the Benderski pass. An intensely cold wind blew across the valley, raising clouds of dust, and as its direction was shaped by the distribution of the surrounding hills, it appeared to concentrate on the ruined little domed tomb which gave its name to the place. Grazing was scanty as compared with the lake pasturage, and the fuel supply shorter than usual. The main source of fuel for the entire camp was the roots of the "burtsi," a low-growing plant allied to wormwood, with which the Pamirs are usually as abundantly supplied as are the plains of Baluchistan. There were, however, spaces of country here and there almost devoid of this plant, where it became necessary to select a camp in the neighbourhood of some preceding nomadic habitation and to make use of the droppings of Kirghiz yaks and camels. On the whole, if the fuel supply of the Pamirs is somewhat scarce and crude, it always exists in sufficient quantity to serve all cooking purposes.

The surveyors of both camps had some days previously taken the field in detachments, so that the head-quarters camp of the Commission at Jarti Gumbaz was considerably reduced. We found that the advantages afforded by a warm sulphur spring in the immediate vicinity of the camp had something to say to its selection. About a quarter of a mile down the stream, and on its banks, about eight or ten separate springs, varying in temperature from 80° F. to 100°F., bubbled to the surface, depositing a thick stratum of black sulphuric mud which made them very difficult of approach. Over one of these on the left bank of the stream, where the mud formation was happily absent, a kibitka had been pitched by the Russians, and luxurious arrangements added to make the bath attractive. This was the greatest attraction of Jarti Gumbaz, and it was much appreciated by both camps.

Barometric readings made very little difference between the height of Lake Victoria and of Jarti Gumbaz, the latter place being only 60 feet below the level of the lake.

On the 2nd August a meeting was held in the tent of the Russian Commissioner at which the first protocol was signed.

The 3rd August was a feast-day in the Russian calendar. It was "Marie" day, the Saint's day of the Dowager Empress of Russia, and of the Duchess of Edinburgh, and it afforded us an excellent opportunity of observing the ceremonial reverence which the Russian army attaches to all such semi-religious festivals. Had the Russian escort consisted of an army corps instead of a small detachment, the ceremonies of the occasion could not have been more punctiliously observed. We were, of course, invited to assist. An open air religious service was followed by the solemn ceremony of drinking to the health of all the "Maries," a toast which was responded to by a cheer "in line" on the part of the Cossacks, who executed the vocal manœuvre with as much precision as any other part of their drill. No service in Russian is complete without music, and the grand hymns and anthems of their band sounded strangely impressive amidst the wild surroundings of that remote corner of the empire. The Kirghiz followers of the Russian camp were then collected for their national game of "Ulak," a game which is known as Buzgala-bazi amongst the Turkomans, and seems to be as common to all High Asia as is the game of polo to Persia and the Himalayan valleys. It consists in a wild rush by mounted men for the possession of a goat, which, amongst the Turkomans, is picked up off the ground by the first man who reaches it from a distance of 100 yards or so—all starting at a given signal. Amongst the Kirghiz it is carried at the saddle bow of some well-recognised performer from the start. The whole game centres on the efforts of the

possessor of the goat to ride clear of all opposition, and deposit the carcase on a selected space of clear ground. At Jarti Gumbaz there is a tolerably rapid stream with a most uneven and dangerous bottom covered with slippery boulders, and the "sanctuary" where the goat was to be deposited, was a small patch of grass on the bank of this stream opposite the officers' "gallery," where we sat in a row to witness the sport. Each horseman who succeeded in avoiding the eager hand of rival goat-snatchers, and who dropped the carcase on to that patch of grass, forthwith left the *mêlée* and was placed by the side of the Russian General's chair to receive his reward in due time. The game was fast and furious, quite as reckless as any Turkoman performance, and the dust rose in clouds over the spinning horsemen. We soon found that the protecting river, which under ordinary circumstances would give a rider some reason for reflection ere he attempted to ford it, was no protection at all in the heat of a Kirghiz fray such as this. Horses and men went into it headlong, and it appeared to be only due to some special Kirghiz providence they ever came out again. The game ended when at length one of their hardy and handy little horses got his legs broken. The wretched little beast was promptly executed, skinned, and preserved for the evening's feast. Meanwhile, there had been races for boys (mounted, of course, for no Kirghiz infant would dream of running a race), and it was interesting to see the jockeyship displayed by these young Mongols, whose faces at the end of a furious ride were equally indicative of stolid indifference to the result, whether they were first or last in the run. All winners were promptly rewarded by the Russian General, and the prizes (rouble notes, and khilats of Bokhara silk) were bestowed with a ceremony which doubled their value. The Cossacks' "jigitovka" was the next performance; the most noticeable feature of the performance being the readiness with which they could vault out of the saddle and back again at full speed, and the ease with which they could pick up their caps, etc., from the ground whilst in the saddle. It may be remarked that the performers were not merely a few picked men, but the whole detachment that was on duty with the Russian camp took part in the show. A really magnificent banquet took the place of what we should call lunch, and it was late in the day ere the festivities ceased and the party broke up. There can be no doubt that the readiness shown by the Russians to support the national festivities and games of the nomadic people with whom they are rapidly assimilating themselves in High Asia, the apparently valuable prizes which they bestow on those who distinguish themselves, and the careful observance of all due ceremony and etiquette on these occasions, go far to impress the native mind with an idea of liberality and power. That evening the Cossacks gave a dinner to all sepoys, orderlies, and even the native servants of the British camp.

On the 5th August the whole camp moved southward from Jarti Gumbaz across the Benderski pass to its debouchment at the southern end. On this morning, early, we recorded our lowest degree of cold, the thermometer reading 19° F., but the weather was clear and fine. Whilst crossing the summit of the pass, opportunity was taken for fixing the position of pillar No. 3, which was placed on a small rocky knoll overlooking the minute lake which marks the kotal. Two large herds of ovis poli were seen on this march, but made off as soon as the head of the column appeared. The camping ground did not admit of combination at this point, so the Russian staff pitched their akois about a mile to the south of the British camp in the open plain of the Little Pamir. Here another survey conference was held to decide on future topographical tactics. From this point the wording of the agreement on which the line of boundary was based demanded a most careful survey of the line of the Nicolas Range watershed, which approximated so closely to the parallel of Lake Victoria that a difference of opinion as to its correct position with reference to that parallel was exceedingly likely to arise. About this period the progress of demarcation necessarily waited on the progress of the surveyors, and opportunity was found for exploring neighbouring passes and hunting for specimens to add to the natural history collection which was gradually being amassed by Dr. Alcock.

On the 7th Mr. G. Macartney, Assistant for Chinese Affairs to the Resident in Kashmir, arrived from Kashgar with a small following of thickly-clothed Kashgar dependants. The weather thickened up about this time.

Snow-squalls were frequent, and on the 8th there was a heavy fall which drew a white shroud over the whole Pamir and forced the return of an exploring party which had started for the Bayik.

The next move of the Commission camps (following the progress of the survey) was to Urta Bel. Urta Bel is unmarked by any more conspicuous feature than the pass of the same name, which, like the Benderski, connects the Great and Little Pamirs by a very easy and open route across the Nicolas Range. Easy as are the lines of communication between the Pamirs, they lead to no permanent habitation on either side of the range. There are the ruins of a few mud huts at the western end of the Chakmaktin lake, and there are also here and there scattered groups of tombs, square built, with the usual gumbaz or dome, which always betokens want of wood material for building. These are the last resting-places of departed Kirghiz chiefs. Round about them are more humble graves of the usual Mussalman pattern, quaint little relics of the vanished inmates sometimes being left to tell the pathetic tale of broken domestic ties. One such was a little cradle, a silent witness of the unavailing efforts of even European skill to save the life of a small baby which had been brought to our camp for treatment. The baby was taken away and we heard no more about it; but we passed by that cradle, as we left the Pamirs, rocking in the wind on a little new-made grave. So far as permanent settlements are concerned, excepting the Robat, or Sarai, at Kizil Robat, the Little Pamir (like the Great) is but a valley of the shadow of death.

The scenery from Lake Chakmaktin to Kizil Robat, where we left the Little Pamir, is rather monotonous. Down the middle of a narrow green plain, bordered with the yellow-gray dunes of the *dasht* which spreads itself outwards from the foot of the hills on either side, runs the infant Aksu, meandering through the lush meadows and occasionally spreading into small lakes or marshes. On the north side the rugged peaks of Range Nicolas occasionally break into impressiveness, the rounded white head of Peak Salisbury which overlooks the Benderski pass being a grandly conspicuous feature from every point of view. At Kizil Robat the Aksu bends away northward and is lost to view. Due east from Kizil Robat are the peculiarly wild and savage outlines of the great range which we now call Sarikol, which at this point present the appearance of an impracticable series of precipices. Towering above these is a magnificent peak (20,720 feet) which rests on a long spur running north-east towards Tashkurghan, and beyond the Sarikol, which overtops the main range looking right up the length of the Little Pamir. The southern mountains bordering the Pamir (which are part of the Sarikol range) present nothing but the butt-ends of enormous spurs ranged with such remarkable precision, and repeating the same outlines with such perfect architectural sequence, that the conviction is forced on one that the same forces of nature must have shaped them all to the same ends. The scattered boulders blotting the green expanse of Pamir tell their own tale of what this force must have been. It can only have been glacial action.* Probably long after the British Isles had freed themselves from their glacial encumbrances and had arisen from the "azure main" to rule the seas, the Pamirs were still held in that terrific ice-grip which even now has only partially relaxed its hold. Between every pair of contiguous Sarikol spurs there is a glacier, which, according to such superficial observations as we could make, appears to be slowly diminishing and withdrawing towards the crest of the range. Under the influence of a bright sky and freshly fallen snow Pamir scenery is exhilarating. When the glory of sunset touches it up, and the hills of Sarikol turn scarlet and purple, it is impressive; but under ordinary every-day effects of light and shade, it becomes monotonous, though never uninteresting.

It was from the camp at Urta Bel that one of our shikar parties made the acquaintance of the only Pamir bear that was seen by any member of the Commission. The bear showed no signs of curiosity about the shikar party, and escaped from afar without being touched. He was of a dirty-brown colour, and about the size of the Himalayan red bear. In the glens of the same line of hills ibex were also seen, but they remained on their native crags in peaceful security. Amongst them were some unusually fine horns.

* Dr. Alcock considers it to have been the action of water-courses, once on a high level.

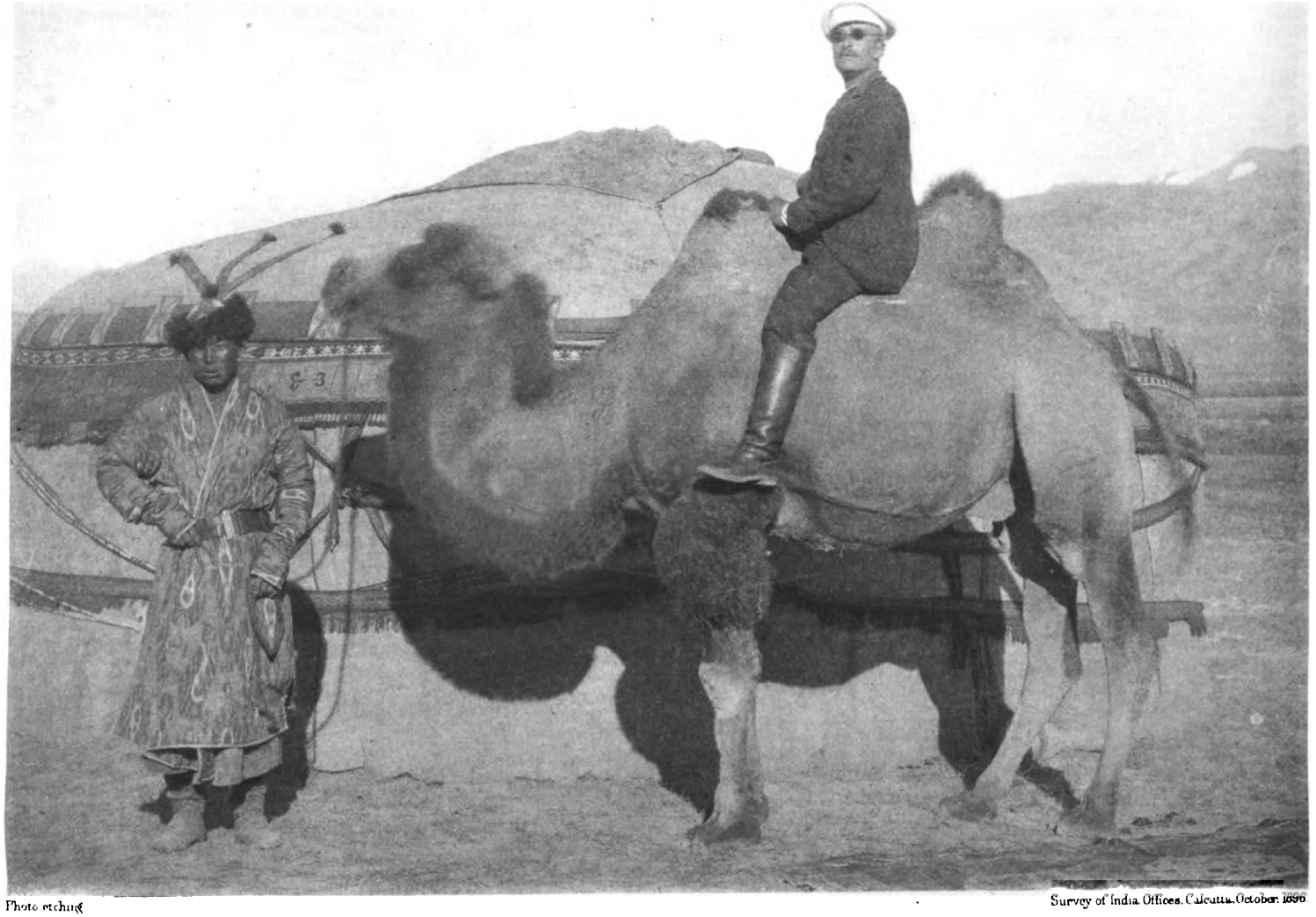


Photo etching

Survey of India Offices, Calcutta, October 1896

Dr SVEN HEDIN ON KIRGHIZ CAMEL.

CHAKMAKTIN LAKE, LITTLE PAMIR

Photo-etching

Survey of India, Offices, Calcutta, July 1896.

KURKUNTAI LAKE NEAR LAKE VICTORIA, GREAT PAMIR

THE LITTLE PAMIR.

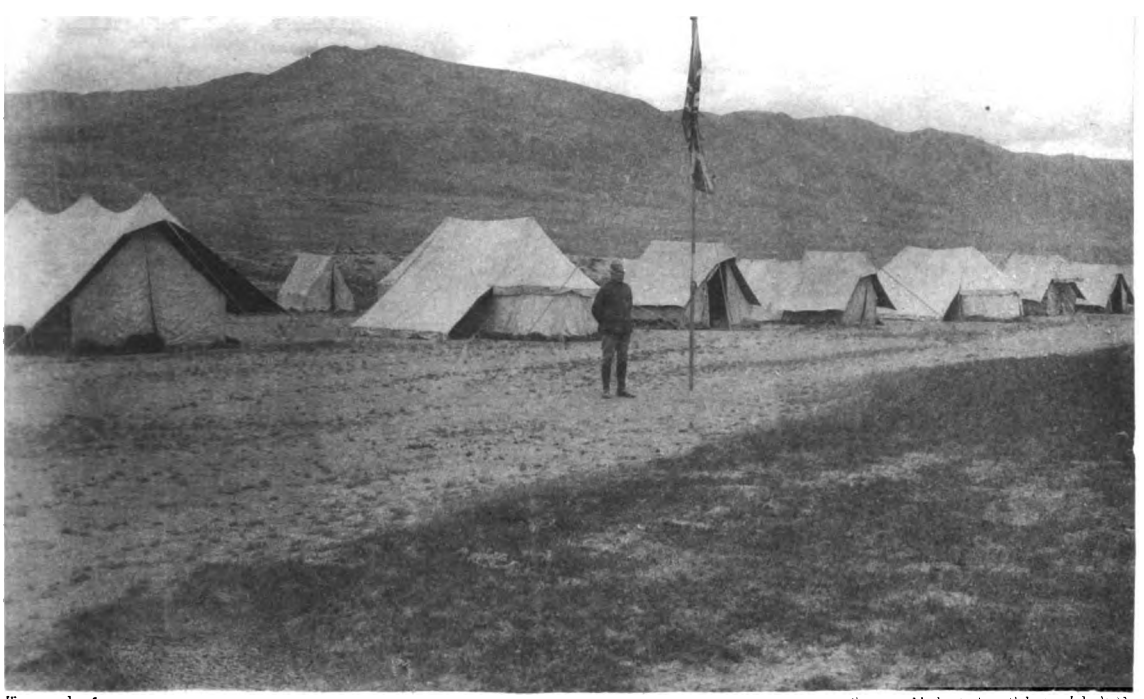


Photo-etching Survey of India Offices, Calcutta, July, 1896

CAMP MIHMANYOI, LITTLE PAMIR.

On the 12th two more pillars, Nos. 4 and 5, were fixed. The process of fixing boundary pillars was simple. From each camp the Commissioner emerged with a small staff of mounted officers and attendants, one of whom always carried a flag. The English flag was the national Jack; the Russian flag had two sides of it. On one side was the double-headed Eagle of Russia and on the other the crest of the Commissioner. The two little parties met and proceeded together to ride over the ground whereon the boundary was to be aligned; and as this alignment frequently followed the crest of a ridge or spur and seldom touched the green flats of the plains, the morning's ride was not unattended with difficulty. The fixing of the pillar sites on the maps was left to the surveyors, and the building up of the 8-feet stone pyramids was the subsequent work of the Cossack detachment, when once the position *in situ* had been determined by the Joint Commission party.

On the 15th August the two camps moved to their final position at Mihmanyol on the left bank of the Aksu, about 2 miles above Kizil Robat, and nearly opposite the Mihmanyol pass which crosses the Sarikol range into the Taghdumbash Pamir. The night of the 17th will be remembered for a severe snowstorm which proved too heavy for two of the tents in the English camp. Next morning not a blade of grass was visible, and the mountains on either side sloped down in smooth white undulations to the river with hardly a break in their gradients. A small party of Russian and English officers had started on a shooting expedition by the Bayik pass towards the Sarikol district. They were forced to return to head-quarters after passing a most uncomfortable night at the northern foot of the pass. Fuel was unprocurable and the pass itself was waist-deep in snow.

At Mihmanyol the Aksu river is about 200 yards wide, running strong, but shallow, so that it is fordable almost anywhere. There is a considerable extent of marsh adjoining the river on either side, and it is in these flats that the best grazing is found. They are also the favourite haunt of many aquatic birds, chiefly waders, with occasional flights of duck, teal, and snipe. The statement of many travellers that at certain seasons of the year the lakes of the Pamirs swarm with waterfowl, which breed in them, is not sustained by any observations that we were able to make. It is difficult to explain the singular absence of life that was observable about these lakes. Even Chakmaktin, otherwise called Gazkul (or Goose Lake) only sustained its reputation by the assistance of a flight or two of the chukwa (Brahmini duck, or red Sheldrake) so common on the banks of every Indian river.

The second and third protocols having been signed on the 14th and the line of boundary selected as far as Mihmanyol camp, a formal meeting was held on the 17th to decide on further proceedings. At this it was agreed that alternative lines in advance should be reconnoitred to the Chinese frontier, and points of difference referred to the respective Governments of the two Commissions. Accordingly, on the 18th and 19th, General Gerard rode over the ground between the camp and the Bayik river and selected positions for pillars that would complete the demarcation according to his interpretation of the terms of the Convention. On the 20th the cold was severe, the thermometer during the night falling to 9½° F. The effect of this premonition of the coming winter was decidedly in favour of coming to an agreement as rapidly as possible, and on this point there was at least no divergence of views between the representatives on either side. The fourth protocol was signed that day, which was further marked by the arrival of a distinguished visitor in the person of Dr. Sven Hedin, the celebrated Swedish traveller. Dr. Sven Hedin is both a scientific explorer and artist. He had lately been investigating the glaciers of the Muztagh Ata or Peak Tagharma (about which more will be found in the survey report), and the results of his most interesting and difficult series of ascents have been given to the world in the October number of the Proceedings of the Royal Geographical Society. A more welcome addition to the social circle of the two camps could not have been found.

On the 24th August the position of pillars Nos. 5, 6, 7, and 8 were determined, the last pillar standing as a conspicuous feature on a small knoll bordering the river within a few yards of the Russian camp. In spite of a continuance of hard frost at nights, the weather now became warmer, and the clear blue skies

and the sharp outlines of the snow-peaks, which lasted for about a week, were all in favour of rapid survey progress. Warm clothing and extra akois for the followers were obtained from Kashgar, with Mr. Macartney's assistance, and preparations commenced for facing the contingency of a winter in the Pamirs.

On the 28th another formal meeting was held, the proceedings of which practically amounted to an official "agreement to differ" as to the respective lines of further boundary demarcation pending instructions from Government. Social relations between the two camps, however, remained as cordial as ever, and the 30th and 31st of August were witnesses of perhaps the first and last gymkhana that the Pamirs will ever see.

Competition on the first day was confined to shooting matches between the officers, and foot races and tug-of-war amongst the escort and followers. The champion shot of the Pamirs turned up in Major Wahab, who won both the rifle and revolver contest; but the aggregate of the Russian officers' scores was better than that of the English. General Gerard, whose skill as a marksman is well known through all India, did not compete; consequently the selection of representatives for the English team was rather circumscribed. The foot races were entirely confined to the British camp followers. No Kirghiz or Cossack will ever run if he can help it; doubtless because he finds that severe physical exertion in an atmosphere rarefied by many thousands of feet of altitude is difficult, if not dangerous. Our camp followers did not seem to appreciate this difficulty, and it is worth recording that they not only ran well, but did not seem to be in any way the worse for their running. It is also noteworthy that the tug-of-war was entirely in favour of the Cossacks. We were unable to produce any team that had a chance with the broad shouldered and muscular detachment that represented the Russian camp. On the other hand, our Native infantry proved the better shots collectively, although one of the Cossack representatives, the "wachmeister" or quartermaster of the detachment, was an almost phenomenal shot with the rifle. The prizes to the English teams were presented by the Russian General. They were not only intrinsically valuable, but they were presented with all that attention to effective detail which is characteristic of Russian generosity. The *déjeuner*, too, at which the Russian staff entertained the English officers and at which even the Afghan representatives were present, was more of the nature of a civic banquet than a rough-and-ready luncheon party in a remote camp in the Pamir wilderness.

A broad level space was selected between the camp at Mihmanyol and Kizil Robat for the second day's races, which also proved somewhat instructive in their results. Our own Native cavalry representatives more than held their own in all feats of riding, although they were but badly mounted on Kashmir ponies. There was indeed no reason (as events proved) for leaving their own regimental mounts behind in India. A cavalry soldier who is utilised as a mounted, and not as a dismounted, attaché on political expeditions, and who is imperfectly equipped in this respect, loses half his value as a representative of our Indian army. However, handicapped as they were, they acquitted themselves very creditably. The camel race and the yak race were productive of much amusement. As regards the latter, no one who is but imperfectly acquainted with the heavy-shouldered lumbering brute, built on the lines of an American bison, and called "khushgao" by Parsiwans, "bepu" by Pamir nomads, and "yak" by no native that I have yet met, could conceive the agility with which he can get over the ground under a suitable jockey. The "grunting ox" is certainly a *lusus naturæ*, as inefficient for the baggage purposes for which nature apparently intended him, as he is remarkable for gymnastic feats for which he seems absolutely unfitted.

On the 2nd September the Russians began to break up their camp. The band left with half their Cossack escort for the Pamirski Post.

On the 4th, as no instructions had as yet been received from the British Government, the English camp also broke up for purposes of exploration. Colonel Holdich and Mr. Macartney left for a reconnaissance of the Chinese frontier and the Sarikol district *viâ* the Bayik pass. Major Wahab (who just then heard of his promotion by brevet to a Lieutenant-Colonelcy for distinguished service in Waziristan) left at the same time, and by the same route, for a tour

of exploration in the Taghdumbash Pamir; and the whole party journeyed together. The weather was fine and clear and there was every prospect of good work before them. A separate report on these expeditions will be found in the survey section. Next day, the survey camp, which had crossed the Bayik pass and was on the Chinese side of it at its southern foot, was joined by General Gerard, who contemplated a rapid reconnaissance through a part of the Taghdumbash to the Mihmanyol pass, which would lead him direct over the Sarikol range to our camp near Kizil Robat. Leaving camp early in the morning of the 6th, General Gerard rode with Mr. Macartney to the Chinese post at Bayik (14 miles), where he had breakfast with the Kirghiz inhabitants of a small encampment. Mr. Macartney remained at Bayik, awaiting the arrival of the survey camp. From this place the General engaged a couple of Kirghizhorses to relieve his own, and pushed on for another 28 miles to the Taghdumbash end of the Mihmanyol pass, only reaching that point about 4 P.M. It was dark ere he topped the crest of the pass, and 10 P.M. before he arrived at the Mihmanyol camp, another 25 miles from the Taghdumbash debouchment. Colonel Wahab came over the same pass subsequently by daylight. He describes it as unfit for horsemen, and although he succeeded in getting his ponies over without accident, he considers that it can hardly be reckoned a practicable pass at present from its extreme roughness, huge boulders blocking the way with slippery obstructiveness and leaving dangerous gaps between their rounded sides well calculated to break the legs of either horse or horseman. How General Gerard succeeded in negociating that difficult moraine so late in the day still remains a mystery. His 67-mile ride was certainly a remarkable feat.

Meanwhile the long-expected telegram had arrived which enabled the British Commissioner to complete the demarcation. On the 7th September there was a conference at which the last completed protocol was signed, and General Gerard was able to inform the Russian Commissioner that he was empowered to accept their line. The news was received with the greatest satisfaction, and next day was appointed for determining the sites of the final pillars.

There was, indeed, but a short space of six miles which required pillar demarcation. From the sixth mile a rugged and inaccessible spur of the Sarikol range carried the boundary into regions of perpetual ice and snow to its junction with the main range. Here, amidst a solitary wilderness 20,000 feet above sea-level, absolutely inaccessible to man and within the ken of no living creature except the Pamir eagles, the three great Empires actually meet. No more fitting trijunction could possibly be found.

On the 8th and 9th the pillar sites were fixed and the 9th protocol signed. On the 10th the last conference took place, and the last protocol was completed, and the 11th and 12th were given up to the final preparations for the return march of the two Commissions and an interchange of hospitalities. Mr. Macartney and Colonel Holdich returned from the Sarikol district on the 11th. An account of this reconnaissance will be included in the survey report together with that of Colonel Wahab, who returned to head-quarters on the 12th.

At the farewell dinner given by the Russians to the British staff on the 11th, the Russian Commissioner expressed an earnest hope that the agreement just concluded would be the beginning of more cordial relations between the two countries, and of a better understanding of mutual national aims and desires. A return dinner was given to the Russian staff on the night of the 12th at which every member of both Commissions was present, except Colonel Galkine, who had left previously on urgent duty. Nothing could exceed the enthusiasm with which the toast of "*Entente cordiale*" between the two countries was received. The scene after dinner was one which will be long remembered in the Pamirs. With considerable difficulty and delay a supply of wood had been collected from valleys south of the Hindu Kush as a provision against a winter sojourn on the Pamirs. All this wood was now stacked into such a bonfire as the Pamirs will never see again, and round about it various dances were conducted with much spirit and energy. The night was still, and as cold as 25 degrees of frost could make it, and the moonlight glinted on the

freezing surface of marsh and river, adding not a little to the fantastic effect of the scene. Men of Hunza and Nagar, Khataks and Cossacks, Kirghiz and Wakhis, all danced to the inspiriting strains produced from two kerosine tins and a reed pipe, with a Cossack concertina accompaniment. The dances were led by a most able master of ceremonies in the person of Lieutenant Miles, who had joined the Commission party for a few days from a political tour in Hunza. The proceedings closed with the old-world chorus of "Auld Lang Syne."

On the 13th Colonel Holdich assumed command of the Commission party from General Gerard, who had arranged to return to India *viâ* Petersburg and England, and was to accompany the Russian Commission to Ferghana. The two Commissions parted with expressions of the most sincere friendship and esteem, the one marching eastwards to Kizil Robat and Aktash with their picturesque baggage train of camels, yaks, and Kirghiz followers; and the other westwards to Bozai Gumbaz in that compact order which is always suggestive of frontier manœuvres.

The story of the return journey can be shortly told. Between Mihmanyol and Bozai Gumbaz the return marches were over old ground, and although the weather was squally and cold, no difficulties were experienced. At Chakmaktin, a Chitrali slave-boy escaped into the British camp from his Kirghiz owners who had planted their "aul" in one of the side valleys on the south side of the Little Pamir. He claimed the protection of the British flag as far as Gupis, from which place he was prepared to make his own way to Chitral. He had apparently been sold at a very early age by his own relatives, and he made no complaints of ill-treatment on the part of the Kirghiz, who had provided him with a rather exceptionally good pony and employed him in herding yaks. His owners came to our camp at Chakmaktin and demanded his restoration. They were naturally indignant at their request being refused, but it was characteristic of these people that finding they could not get back the boy they declined to take the pony on the ground that it had been given to him and was his own property. It was fully expected that they would attempt to steal some of our ponies, but no such *revanche* was attempted.

Captain Ossetinski, of the 16th Turkistan Battalions, joined us at Bozai Gumbaz. He meditated a shooting trip into hills near that place where he expected to find ovis poli. He was most successful in his shooting excursion, and succeeded in securing two grand specimens of male ovis poli within a few miles of the camp, which he generously presented to Dr. Alcock, and they formed undoubtedly the finest contribution to our natural history collection of any that had been made on the Pamirs.

The difficulties of the homeward march commenced at Langar. The morning of the 18th broke with a blizzard from the west. The wind was intensely cold, and the driving snow was almost blinding in its force. There was a disposition on the part of some of the mule drivers to resent the necessity of marching, and had the route been outward instead of homeward, it might have been difficult to force them to load up. They were well aware, though, that every day was now of consequence, and, as events proved, the delay of a day at Langar might have led to insuperable difficulties at Darkot. The march to Langar was the most severe of the whole outward journey on account of the dangerous nature of the narrow hill-side tracks and the labour involved in the ascent and descent of successive passes over spurs abutting on the Wakhan river, which itself affords no highway at this time of the year. This was now aggravated by the effects of the blinding snowstorm which lasted the whole day, and the slippery state of the narrow little footpaths. The march was, however, somewhat shortened by a steep descent into the river-bed to a camping ground called Marpit, which was rendered practicable by the comparatively low level of the river, and which saved at least one severe climb. Before reaching the camp the Darra river had to be crossed. We found, on the whole, that it was easier to ford near its junction with the Wakhan river than higher up; and in the exceedingly damp state of the whole camp following, the difficulties of fording, which only involved an extra ducking to a few of our number, were really of little consequence.

The next day was fine and clear, but the tracks were, if possible, worse in the slush of melting snow than they had been the day previous. It was

necessary to leave the river course and to take again to the mountain sides. The winding zig-zag goat-tracks, which at best afforded a most insecure foothold, were now converted into narrow rivulets of freshly-melted snow and were hardly more than slimy little slides, almost as slippery as ice, under the feet of the struggling convoy. Deep below these tracks, as we ascended each spur in succession, was the swollen torrent of the Wakhan river, and between us and it there was often nothing better than a smooth slope of shaley *débris*, an embarkation on which could only have resulted in the final cold embrace of the snow-fed stream. Fortunately no accident happened, and the camp was collected once again safely on the green slopes of Sarhad.

The dangerous condition of the weather rendered rapid movement a necessity, so it was decided to push straight across the Hindu Kush by the pass we knew best (the Sarkhin) in one long march, whilst the heavy snow-clouds still held up preparatory to a fresh downfall. This was accomplished on the 18th September. There was not more than a foot or two of snow on the Hindu Kush, and this presented no great obstacle to a successful day's run.

We were now encamped on the banks of the Yarkhun river, with the river itself before us, and beyond it lay the gloomy valley leading up to the Darkot, which appeared to us to be almost blocked with snow. The reports which we had received at Sarhad were not encouraging. The last heavy fall had closed the pass and no communication had been held with the Yasin people for some days. It was not considered probable that we should be able to force the passage. Still, the first closure of these mountain passes is not always conclusive. There usually are breaks in the persistency of the early snowfall, and, meanwhile, the pass may be temporarily open again even after it has been closed for weeks. Accordingly, we resolved on the attempt, should there be no heavy fall of snow during the next twelve hours, and should we be able to find a guide. Yaks were collected with the object of driving them in front of the baggage train to trample down the snow and clear the way, and enquiries were set on foot in every direction to obtain information about a trustworthy guide. The latter was an absolute necessity considering the uncertain condition of the glacier and the constant recurrence of crevasses in unsuspected directions. The prospect of finding the guide seemed small; certainly no one was prepared to show us the way who belonged to Yarkhun, and our only chance lay in the discovery of some weather-bound Yasini anxious to return to his home in the southern valley. Late in the evening Ressaidar Zahirulla Khan appeared with two men from Yasin, who had by great good luck just arrived, and who reported that the pass was open, though the snow was deep. One of them had come to collect the remains of his sister who had died at Sarhad, and who was to be buried at Yasin. Her bones had been brought to the Yarkhun river, and he was ready to depart with them on the morrow. She must have been a very small sister, for an ordinary handkerchief was sufficient to contain all her mortal remains. He proved a most capable and entertaining guide.

We halted one day at Gilgit on the 30th September and again pushed on to secure our passage of the Burzil whilst the fine weather lasted. Between Doian and Bandipura we altered the route which had been taken on the outward journey so as to save a day, and to adjust the marches more evenly to the reversed gradients of the road. Nothing could exceed the beauty of the autumnal scenery we passed through during that week's march. So glorious had been the effects of early summer in flowers and foliage that one could but wonder what early October might bring. It brought such a wealth of colour, so lavishly bestowed, that any attempt to portray it either with pen or brush could only end in lamentable disappointment. The valley of Gurais was especially lovely, and the view from the Tragbal pass over the vale of Kashmir was such as can only be remembered with reverence.

We crossed the Burzil pass on the 9th of October and experienced no difficulty whatever in the passage. There was a foot or so of snow on the crest, which had hardened on the northern slopes for some 200 or 300 feet of the final ascent into slippery ice slopes, which it was necessary to avoid. On the southern side the mud was deep and tenacious.

We reached Bandipur on the 12th, and on the 13th there set in a phase of bad weather which proved the destruction of 150 commissariat bullocks on

the Burzil, and delayed Sir George Robertson, who was on his way to Gilgit, at the southern foot of the pass for a week ere it was again practicable. Thus the good fortune of the Pamir Commission attended it to the end. During its four months' progress over dangerous roads, rickety bridges and boulder-strewn fords, or in high altitudes where the vicissitudes of climate were as variable as that of a bad English spring, not a member of the Commission, either European or native, had been seriously injured, or seriously ill; nor was there one single day which could be written down as lost by either accident or design.

CHAPTER III.

HISTORICAL NOTES ON THE PAMIR REGION.

THE very short space of time into which the labours of the Pamir Commission were compressed afforded little opportunity for enquiry into the ethnography or history of the Pamir plateau or of the lower-lying provinces adjacent. The admirable report of the Yarkand Mission of 1875 has, however, left little to be desired in this respect, and the many subsequent travellers who have visited the Pamirs at their leisure during the last twenty years have all aided to keep such information well up to date. The consideration of such a problem as the practicability of passing such a barrier of mountains as exist between the Pamirs and India with any considerable military force can at least be assisted by a study of the history of the past as well as by that of existing physical conditions, so that it cannot be altogether without interest if we collect such items of evidence as are afforded by Bellew's History of Kashgar in the Yarkand Mission Report, Yule's Marco Polo, Beale's Chinese Pilgrims, and a few other authorities, to support our own observations in elucidating the intricacies of the problem of reaching India from the north. To begin with, if we search the world over, we should probably not find any region which has retained its primitive ethnic and topographical characteristics so unchanged through so many centuries as this region with which we have had to deal. The physical conditions under which men live in these altitudes of Asia have ensured that it shall be so. The nomad of the Pamirs was probably its only occupant in Old Testament days, though he may not have been called Kirghiz; and the routes and passes that lead from the Pamirs to India are those which must have presented themselves to hundreds of generations of warlike tribesmen bred in Asiatic highlands and taught from their cradles to regard India as the promised land of pillage and plunder. Consequently the earliest evidence that we can get of the routes selected by the semi-military hordes which were from time to time let loose on the world from the heart of the Asiatic continent to surprise the west as well as the east, and who adopted the motto of "*Vestigia nulla retrorsum*," is of interest, if not of importance. We may be assured that they took the shortest route that they could find, and that if India could be reached from, let us say, districts east of the Pamirs by any direct road, it would have been invaded by that line many centuries ago.

The first invasion of India of which there is sound historical record is that of Alexander, and fortunately history is sufficiently clear as to his route to leave little room for discussion. Although this is indeed the first record of successful invasion of India, there is also the suggestive story of those people of Greek origin who claimed Alexander as a fellow-countryman in the country bordering Swat, the people who pointed to the vine leaves and ivy of Meros and the town of Nysa at its foot as evidence of their own connection with the Greeks, and descent from Dionysos. These people must have been descendants of a previous race of Pelasgic conquerors, so old as to be legendary even in Alexander's time. We can trace Meros in the Koh-i-Mor of the Bajaur country, and the ruins of Nysa are still to be found under the old name at its foot; and in these Nyseans of Alexandrian days we shall probably find the progenitors of the Kafir tribe now occupying Kamdesh at the foot of the Bashgol valley opposite Chitral. Alexander effected his entrance into the plains of Kabul by the pass of Kaoshan (the Hindu Kush pass *par excellence*), and between Kabul and the plains of India he divided his forces and followed two routes. One of these was by the valley of the Kabul river to Lughman and thence through the lower Kunar valley into Swat and Bajaur, which districts he reduced before emerging into the plains of India by one of the Swat passes. This was the route he himself followed. The other was the more direct route to Taxila *viâ* the Khaibar. This was the line taken by his general, Hephæstion; and by these two routes successive armies have frequently found their way to India since Alexander's time.

An invading force arriving from Europe would naturally enter from the western side of India, so that even if we take due count of those operations of Alexander immediately preceding his descent upon Kabul, which carried him into the heart of Turkistan, there is nothing remarkable about his selection of the Kaoshan pass for his advance southwards. But we find that the same pass, or rather the same group of passes, which includes the Kaoshan and the Khawak at the head of Panjshir valley, are those which gave access to India when successive hordes of people whose original habitat was far east of the Pamirs (as far east indeed as Northern China) pushed their way southwards and established dynasties in the west and north-west of Hindustan. There was nothing except the impracticable nature of the mountain regions between Eastern Turkistan and the plains of India to prevent the successive irruption of waves of Caucasian barbarians, driven from the Asiatic highlands in the great struggle for existence which seems to have marked the evolution of nations in those regions from time immemorial, into Northern India; but, so far as history can tell us, none of these Central Asian hordes, be they Sakœ, Yuchi, Jats, Goths or Huns, ever penetrated southwards from districts east of the Pamirs further than the valley north of the Gilgit river. In the remote recesses of that buttress of mountains which stands at the south-west corner of the great Kashgar plain, the narrow glens and defiles of the head-waters of the Tiznaf and Zarafshan (or Yarkand) rivers, on the northern slopes of what is now a recognised part of the Sarikol range, dwell a people called Papa or Pakhpa, of whom Captain Chapman writes that they are so like Europeans that "they only require to be put into coat and trousers to pass, as far as appearance goes, for the fairest Englishman, and their tall figures, fair skins, light eyes and sandy whiskers and hair, coupled with their pronounced Caucasian features, at once marked them as of an entirely different race to any of the many our journey had brought us in contact with." We never saw any specimen of this race during the progress of the Pamir boundary demarcation, but it is easy to hazard an opinion that these people along with many of the Dard tribes north and north-east of Gilgit, whose ethnographic status cannot yet be said to be satisfactorily established, are representatives of the earliest Caucasian races of Central Asia, who have been driven to their present habitat as a conquered people from the north; and who, like the Kafirs, have never left the wilderness of mountains which has sheltered them from the destroying whirlwinds of Mongol or Turk for centuries. They never penetrated southwards, and none of them ever found their way to India; though the Baroghil, and the passes east of the Baroghil, were presumably as open formerly as they are now. Further to the west matters were very different. The route by which Alexander entered India has always been recognised in history as the great highway from the north and west, whether for military or commercial purposes, and the eastern routes were known to religious pilgrims only.

By far the greater number of the successful invasions and irruptions that have changed dynasties and determined the fate of India from time immemorial have been directed on to the Kabul valley as the great practicable gateway of Hindustan. Subsequent to the days of Alexander we have but a shadowy history of successive invasions from Turkistan till we reach the period of the spread of Islam through Asia, but, shadowy as these stories are, they are all clear as to the general direction of the advance southwards. About 200 B. C. a Caucasian race called the Yuchi (a branch of the Tokhari) were driven westwards from Chinese territory by an advancing Mongolian wave of Hiungnu or Huns. A section of them displaced the Sakœ occupants of Kashgar and Yarkand about 163 B. C., and twenty years later pushed westwards into Soghd (Ferghana). Here they made a stand, and from this fresh point of departure about 126 B. C. they overthrew the Greek Bactrian kingdom, drove the Sakœ across the Oxus and Parapomisus into the Kabul river basin and established the kingdom of Tokharistan, which included Balkh, Bolor, and Badakshan. Here they developed into a powerful nation with their capital at Bokhara. The displaced Sakœ who, according to some accounts, seem to have been the actual destroyers of the Bactrian kingdom in the time of Mithridates, and to have subdued the Parthians about the same time (90 B. C.), crossed the Parapomisus from Bactria, turned the Greeks out of Afghanistan, and finally

established themselves as far south as Sind. Here, however, they were checked and defeated by Vikramiditya, King of Avanti, about 56 B. C. This gave the Yuchi another opportunity. Hyrcodes united all five Yuchi tribes under him and rapidly conquered Kabul, Ariana (Herat), and Gandhara. His son, Kadphises, subdued all India west of the Jumna, and his celebrated grandson, Kanishka, ruled Kashmir for sixty years. Here, then, historical evidence has been gathered of at least two military irruptions into India, both of which were first forced westward from regions east of the Pamirs, and finally entered India over the Parapomisus, which we now recognise as that part of the Hindu Kush west of Kafiristan which borders the Kabul basin on the north and west. The next great invasion of India from the same direction was that of the Epthalites, or White Huns, about 460 A.D., and it followed much the same course. We may disregard the almost countless invasions which took place from Ghazni or Kabul, and which for two centuries followed nearly every known route across the western mountains of the Indus valley (in which connection the ancient military road lately discovered by Colonel Wahab in the Tochi valley is of much interest) as they were all directed from the west; but the invasion of Chenghiz Khan in 1221 is a case in point, as there is good reason to suppose that he would have adopted a direct route from the north had it been possible. He invaded India by the Kuram valley. On the authority of the Tabcati Nasari,* Chenghiz Khan is said to have wintered in the Gabar country on his return journey from the Indus whilst awaiting the return of envoys whom he had sent to the Emperor Sultan Said at Delhi to ask permission to retire through his territory to China. As these envoys returned with an unfavourable reply, and certain omens consulted by Chenghiz were unpropitious, he set out across the snowy mountains in winter, and with great difficulty and much loss made his way by *Kabul* and Kashgar to Eastern Turkistan. Bellew places this Gabar country in Swat, and remarks that this route was "probably across the Swat country into the Kunar valley where Chagan Sarai (or white hostelry) from its name, attests Moghul occupation, and thence up the Chitral valley (called also Kashkar) through the Baroghil pass, and so on to the plains of Kashgar; such at least was the route taken by part of his army, if not by Chenghiz himself," etc. If this is so, then it is the solitary instance in history of any force making use of this route for military purposes, but I think there is room for doubt on the subject. The Gabar country hardly seems to agree with what we know of the history of Swat. Swat was a great Buddhist centre long before the days of Chenghiz, and it is improbable that Buddhism was replaced by fire-worship at any period of its history. It seems more probable that the Gabar country referred to in the Tabcati Nasari was in the Kunar valley on the borders of Kafiristan, which must have been occupied by Kafirs for a considerable period after they were driven from Swat in ancient times and before they took refuge in their present mountainous habitat west of the Kunar. To the Moghul the Kafir (who still retains vestiges of the old Zoroastrian faith) would be a Gabar or fire-worshipper. From the Kunar valley and Chagan Sarai the direct route to the plains of Kashgar would doubtless lead over the Baroghil; but considering the nature of that pass, I see no reason for departing from the text of the history which states that the retreat was by Kabul. Here, again, we strike the historical road either into, or out of, India, and that road is bad enough at its best, in winter, to account for any disastrous record.

Timur, who crossed the Hindu Kush to Kabul by the "usual route" in 1398, and who entered India with one column by Banu, whilst his general, Pir Muhammad, crossed the Indus further south with another, is said once to have attempted to cross the Hindu Kush by a pass leading from the Minjan valley in Badakshan into the heart of Kafiristan, and to have left a record of his failure behind him in the shape of a stone set up on the pass with an inscription to the effect that to enter India by that way was impracticable. I had the opportunity last winter of questioning the Amir's Commander-in-Chief, Ghulam Haidar, about the existence of this interesting record. He assured me that its existence was undoubted, though he had not seen it himself, but he was not disposed to be communicative on the subject of the pass itself.

* The Tabcati Nasari of Minhajuddin 'Uthman Jauzjani quoted by Dr. Bellew in his History of Kashgar contained in the Yarkand Mission report of 1873.

The next invasions of India by a conqueror from the north, and the most momentous that India had ever seen prior to the advent of the European on her coasts, were those of the Turk Babar in 1505, 1519, and 1525, the last of which established the so-called Moghul dynasty at Delhi.

Babar followed almost step by step the route taken by Alexander. He, too, crossed the Hindu Kush north of Kabul and established himself securely in the possession of that veritable "key of India" before proceeding to the reduction of the Kunar valley, Bajaur, Jandul, and Swat as a necessary preliminary to the final invasion of India and capture of Delhi and Agra.

This, indeed, completes the record of those historical invasions of India which, originating in Turkistan, have from time to time decided the destinies of India; and the record points its own moral. No conquering races have ever entered India by any route east of Badakshan, nor have any conquered people been driven further towards India than into the recesses of the impassable mountain barrier which lies south of the Hindu Kush and Muztagh ranges.

But this great northern barricade has not been quite so effective in checking commercial intercourse as it has been obstructive to semi-military tribal movements, although none of the passes north of Gilgit and Chitral have ever been utilized as trade routes except on a very small scale. A "caravan route," which can hardly be other than the Baroghil, is referred to by the Chinese pilgrim Fa Hian; and the Karakorum pass was probably well known also to traders; although the great recognised trade routes of Asia were those which connected east and west along the fertile Oxus valley or on lines north of it. Throughout the length of that enormous empire which Chenghiz Khan divided amongst his sons, until comparatively recent days of history, there has always been a trade highway between east and west with none of those physical obstacles which have hitherto defeated all efforts to bring the trade of Central Asia to India by a southern route. It was when the trade of Persia passed along the line which is represented by the Russian railway from the Caspian eastwards, and in the days when Christianity held its own in High Asia and Christian missionaries were afoot in Turkistan, that the Great and the Little Pamirs afforded a right of way between Badakshan and China. Eastward of the Pamirs the interchange of commercial courtesies was constant, and much of the mediæval history of Kashgar and Yarkand is but a record of the going and coming of envoys loaded with valuable presents. The Chinese border extended then, as now, to the eastern edge of the Great Pamir. From about 90 A. D. to the time of the Muhammadan conquest, the Kashgar plain was Chinese, and the district now called by them the New Dominion is in fact a very old one indeed. There is no historical record to show that the Chinese ever actually occupied the Pamirs or claimed authority westward of the Bolor (Sarikol) range in pre-Muhammadan times. The trade routes of the Great and Little Pamir passed through the indefinite kingdom of Bolor, and were probably equally used, there being nothing but the vicissitudes of climate or season to decide which of the two it were best to follow.

But whilst the evidence of the existence of this great eastern and western trade is abundant and detailed, there is no such record of any passing from north to south. The Pamirs developed no trade themselves, and from the countries east of the Pamirs trade passed almost entirely westward. All the record that we can find of the existence of passes across the Hindu Kush and Mustagh is derived from Chinese Buddhist pilgrims who found their way either individually or in groups, but evidently in considerable numbers, to India in search of religious knowledge. These men who set out from Northern China as scholars, and returned as missionaries, seem to have explored every route in existence which led to the great Buddhist centres in Swat and the Kabul river valley. Fa Hian, who set out in 400 A. D. from Kansu, crossed the desert of Gobi to Khotan. Here he found a flourishing Buddhist community and witnessed the great car procession. From this point his route has been much discussed, but the topographical lie of the districts westwards appears to me to decide it. He journeyed for 25 days towards the country of Tseuho, from which he says there is a caravan route due south into the mountain region of

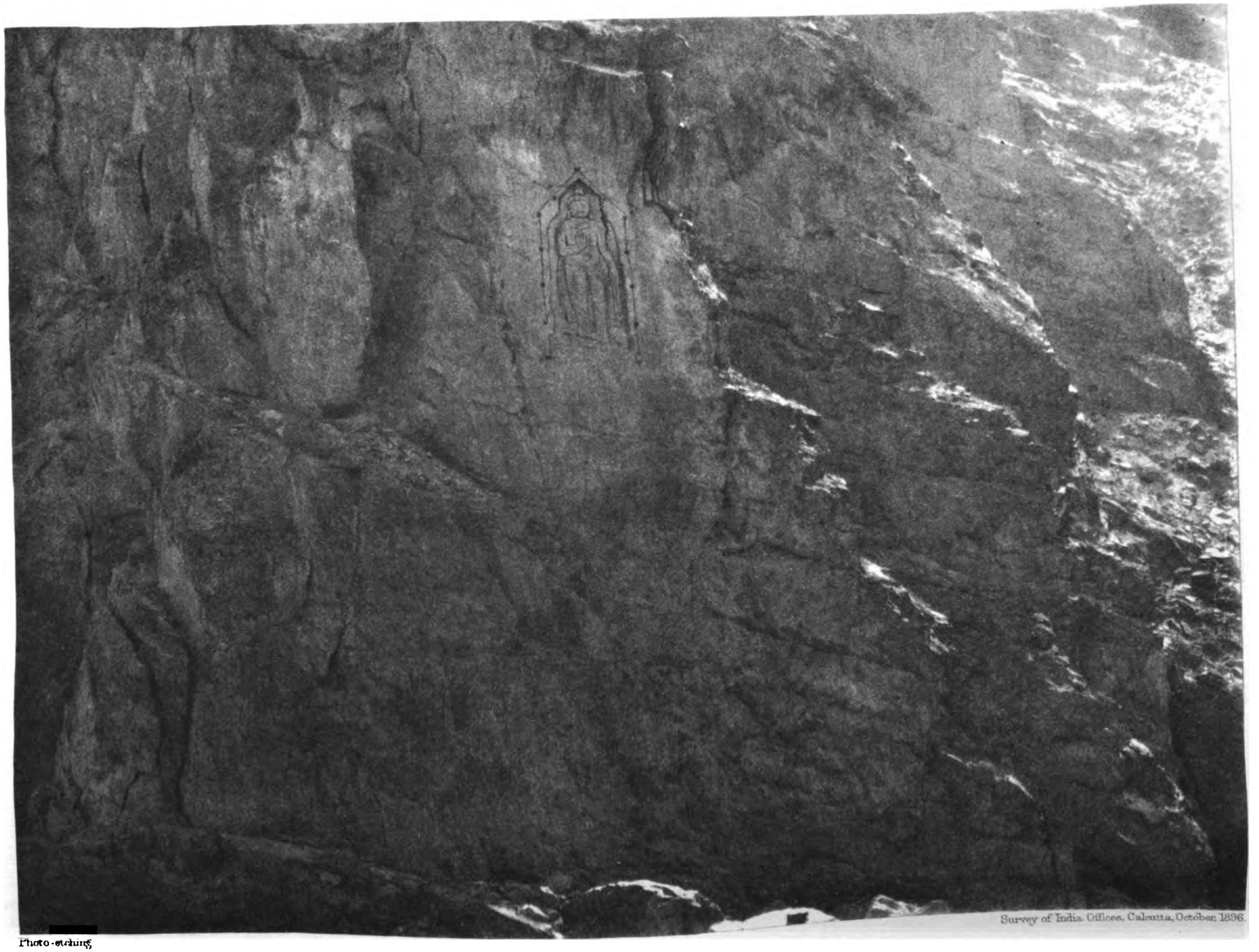
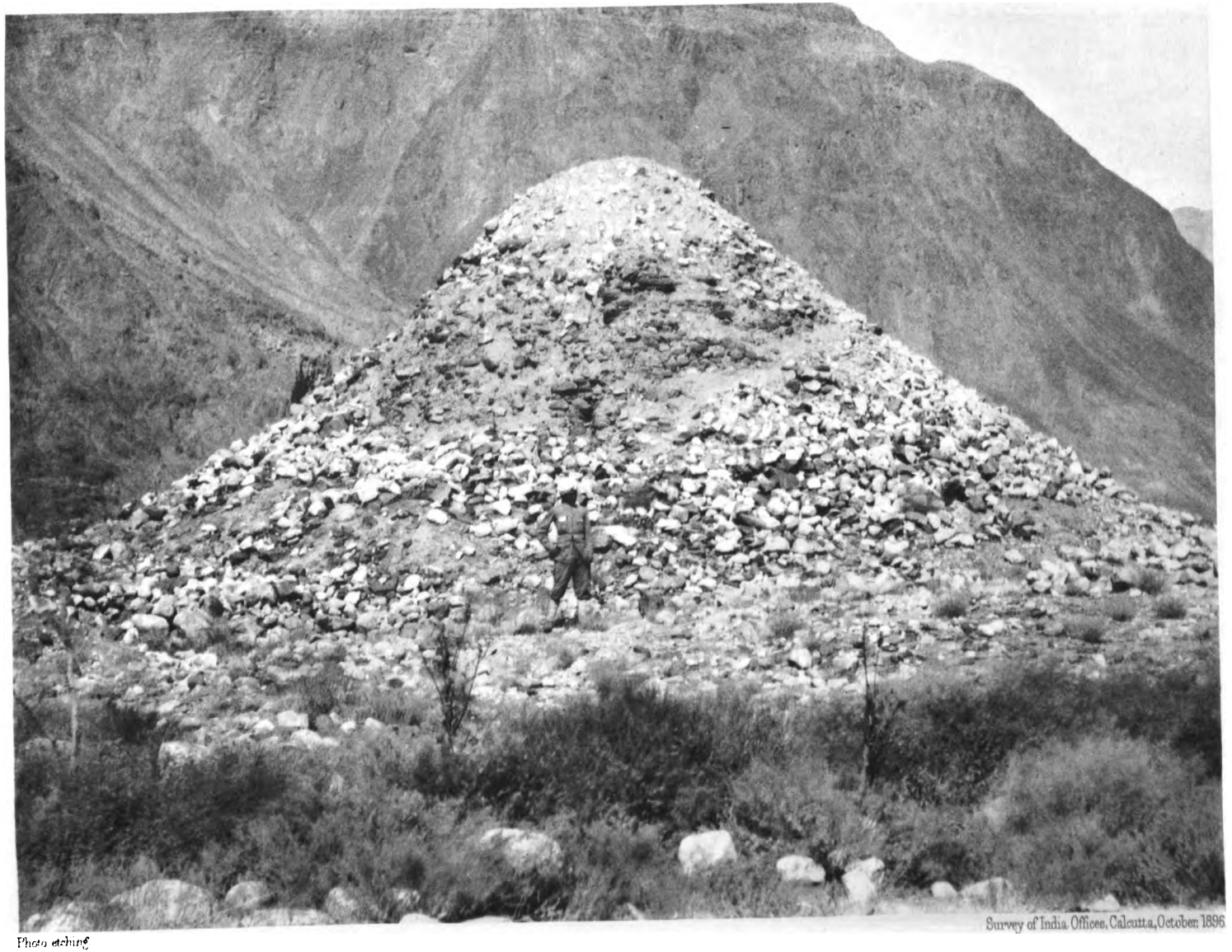


Photo-etching

STATUE OF BUDDHA NEAR GILGIT



Survey of India Offices, Calcutta, October 1896

Photo etching

RUIN AT HANZIL, NEAR GILGIT

the Tsungling. After a month he reached the country Kiesha in the centre of the Tsungling mountains. Another month across these mountains brought him to Toli, which has been identified with the valley of Darel south of Gilgit. In another 15 days advancing south-west he struck the Indus, and, crossing it, he reached the kingdom of Udyana.

Tseuho is probably rightly conjectured to be the Yarkand district, and the mountain region of Tsungling can hardly be other than that which lies between Yarkand and India, either the Hindu Kush, or the Muztagh and Karakorum. But if we are to accept Darel as certainly identified with Toli, together with the caravan road southwards, we are driven to adopt the Hindu Kush as indicating his line of route because there could be no possible caravan road southwards nearer than that which crosses by the Baroghil, and there is no known road into Darel from the north except through the Gilgit valley.

Geographical considerations therefore lead us to conclude that Fa Hian followed the only route which could ever have been called a caravan route, and which led him in about a month to another Buddhist centre (called Kiesha), itself a month's journey from the valley of Darel, which he entered from the northern or Gilgit side. Kiesha, then, must either be Chitral (Kashkar) or very near it.

In support of this view there is the probability that so earnest and devout a pilgrim as Fa Hian would endeavour to visit all the Buddhist districts that he could compass on his road to India. We have interesting evidence that Chitral was a Buddhist country before it was Muhammadan. Fa Hian's description of it as a country hilly and cold, where only wheat will ripen, that it is in the middle of the Tsungling range, that the people from the mountains eastwards wear garments made of coarse stuff, etc., tally well with Chitral. There is, I think, yet further evidence in a certain analogy in the name Kiesha as applied to Kashkar, the ancient name of Chitral. Another pilgrim, Hiuen Tsiang, more than two centuries later applies the name Kiesha unmistakably to Kashgar, but with different symbols. Not being acquainted with Chinese, I can only suggest that if the resulting transliteration into Roman characters is the same in both cases, the varied symbols may possibly indicate the two distinct districts which we now know under practically the same name, Kashgar and Kashkar.

After leaving Chitral there followed a month on a road where "there is snow both in winter and summer," where there are "poison dragons who spit poison; winds, rain, drifting sand and gravel stones," and the people of that land are called "snowy mountain men." This is evidently not a country with a good climate, and the description may apply with some modifications to the route lately followed by Kelly's Relief Force. Unfortunately, we know little about Darel, or Darail, beyond that which is contained in the report of the "Mullah" who surveyed the valley in 1876. He describes its general fertility and its growth of vines, but says nothing about signs of Buddhist occupation. There is, however, evidence of Buddhism in the Gilgit valley about the entrances of the narrow defiles and "durras" which lead thence to Darel. There is the figure of Buddha carved on a rock not far from Gilgit itself which has been described by Biddulph. There is also what appears to be the remains of a stupa at Hanzil about 10 miles from Gilgit. The construction of the masonry does not, however, altogether bear out the theory of Buddhist construction, and Colonel Wahab considers that it is a frontier tower of ordinary fashion which has in the process of dissolution assumed the appearance of a dilapidated stupa.

From Darel Fa Hian's graphic description of the next 15 days' journey along the Sintu-ho (Sindhu, or Indus) till he reaches the Udyana plains leaves little doubt about the position of his final entry into India. After visiting Gandhara, Taxila, and Purushapura (Peshawar), he travelled through India, and returned to China by Ceylon and Java after an absence of 14 years. Sung Yun, 518 A. D., seems to have followed the same route. Hiuen Tsiang, who visited India about 630 A. D., followed the trade route of subsequent days from Northern China *viâ* Turfan, Issykkul and Tashkend, and returned *viâ* the Pamirs. From him we get many interesting particulars of this old-world country, but he has nothing to say about the passes of the Hindu Kush.

CHAPTER IV.

GENERAL GEOGRAPHICAL DESCRIPTION OF THE PAMIRS.

THE Pamirs are a series of high level valleys, falling off from a central mountain system, wherein prehistoric glacial action, aided by the ordinary processes of wind and weather (still in action and still tending to the same results), has gradually worn down the mountain excrescences and filled up the valleys, altering and changing their relative positions in altitude, smoothing out the ruggedness of the waterways and rounding off the edges of the lower hill-slopes, till wide and comparatively flat plains occur in alternation with rugged snow-covered and glacier-bound ridges. The relative altitude of hill and plain has been much under-estimated by travellers. It frequently happens that the mountain ridges run to an average of 6,000 or 7,000 feet above the plain, though they may sink here and there to 2,000, or even less. The Nicolas range, for instance, which towers 6,000 feet above either the Great or Little Pamir (dividing the two), sinks at the Benderski and Urtabel depressions to something less than 2,000 feet. That the Pamirs must all of them have supported enormous glaciers in extension of those which now exist, is rendered evident by the peculiar formation of the valleys, their regularity and smoothness, and the deposit of huge boulders here and there amongst them in positions unreachable by any theory of dilapidation of the mountain crests. The word Pamir (according to Sir D. Forsyth) is a Khokandi-Turki word signifying "desert." Accepting this meaning and noting how very ancient is the use of the name Pamir, we may, I think, save ourselves the trouble of speculating on the possibility of any former term of permanent occupation.

The Pamirs are, however, so far as I could ascertain, never actually deserted. Kirghiz huntsmen haunt them in the winter for the sake of hunting of the ovis poli, which they slay in the snow, running them down with dogs; and in summer they are alive with encampments of Kirghiz herdsmen, whose white felt akois cluster under the shelter of the hills, and whose heavy-shouldered yaks dot the bright landscape with black spots.

The Pamirs take their rise from one great central meridional range which descends in long, gentle gradients to the west, but drops more suddenly to the east: westward drainage either finds its way to the Oxus or else is absorbed in local kuls or lakes. Eastward this range breaks up its spurs more abruptly, and although the passes which cross it present many of them but gentle and easy gradients, it is, in its southern section, where it abuts upon and forms a trijunction with the Hindu Kush and Muztagh, magnificently savage and wild, and its defiles are quite impracticable. Most of the Pamir country is west of this range; there is, in fact, but one true Pamir east of it, *i.e.*, the Taghdumbash, which forms a small geographical feature in itself. The general elevation of these high Pamir valleys has been rather over-estimated. They are rather over 13,000 feet at their highest, and fall to 11,000 feet at their lowest altitude. The average height of the mountains which divide them is about 17,000 feet to 18,000 feet. The name of the great meridional watershed dividing the Oxus basin from the plains of Kashgar has varied through different periods of history. Its classical name was Taurus; its mediæval name Bolortagh. By Gordon it has been called the Nezatash, after one of its principal passes; by Trotter, the Pamir or Shindi range. The last name adopted is that of Sarikol, after the province which it separates from the Little Pamir. It is now once again, as it has been during many centuries at various historical epochs, the western frontier of China. The name Sarikol is the locally Persianised version of the original Turki words "Sarigh Kul," "Yellow glen." It is, however, a name that has become recognised in our maps in its Persian form, and it is best, therefore, to adhere to it. The Sarikol watershed adapts itself at least as far north as the Rang-kul Pamir more or less to the meridian of 75° east longitude. About latitude 37° 15′ it curls westwards, forming to the north of it the head of the Little Pamir, and south of it the Tagdumbash Pamir. After about 30 miles of this westerly bend it doubles round again eastward,

Photo-etching. Survey of India Offices, Calcutta, October 1896

SALISBURY PEAK IN THE NICOLAS RANGE LOOKING N.W. FROM THE LITTLE PAMIR NEAR MIHMAN YOL.

Photo etching. Survey of India Offices, Calcutta, October, 1896

LITTLE PAMIR, LOOKING SOUTH TOWARDS THE RIVER AKSU.

including in this loop the head of the Taghdumbash; and finally after 12 miles of easterly run it effects a trijunction with the Hindu Kush which trends away to the south-west, and with the Muztagh which subsequently merges into the Karakorum to the south-east. The actual junction is in the glacial regions, a few miles west of the Kilik, which thus becomes the first pass crossing the Muztagh system.

East of the Sarikol range, approximately parallel and subsidiary to it (subsidiary only in the sense that it is not the main watershed), is another range, a range which is broken through transversely by the drainage from the eastern slopes of the Sarikol, and which forms a far more prominent feature in the mountain system which divides the Pamirs from the plains of the "New Dominion" than even the Sarikol. This has been called the Kashgar range by late travellers. Hayward gives it the name of Kizilart. The name which I obtained for the southern part of it bordering the cultivated plain of Sarikol, was Kandar. As a comprehensive term for the whole range perhaps Kashgar is as good as any. It is no doubt included with the Sarikol in the "Shash or Bolor mountains" of mediæval geography. The chief interest of it lies in the fact that it is in this range that we find the highest northern outposts of the Himalaya; gigantic peaks far overtopping the Sarikol watershed, just indeed as it is in the southern spurs of the Hindu Kush and not on the Hindu Kush, itself, that we find such giants as Tirich Mir.* Which of the Kashgar mountain peaks claims the honour of pre-eminence in altitude is, I think, still an open question. The most northerly of this series of high peaks is in latitude 38° 35′, and this is the one which was fixed by Trotter from the Kashgar plain and named Tagharma. Trotter determined its height to be 25,050 feet from two observations taken from different points trigonometrically based on his barometric value of the Kashgar plain. This is the same peak that was seen by Ney Elias in 1885 to the north-east of Lake Kara Kul, and named by him Mt. Dufferin. The real name of the peak has been determined by the Russians to be Kungur, and by this name it will be known in future. Trotter's position of the peak is, however, 12 miles east of the position assigned it in the latest Russian Staff map, which there is every reason to believe to be very nearly correct, although no systematic triangulation has as yet been carried over that part of the Pamirs. At Aktash the Russian map is absolutely correct in longitude, and as far north as 38° 5′ we had means of verifying its general accuracy. The average error in longitude of Trotter's values (based on his absolute determination at Kashgar), compared with those now determined by direct connection with the Indian surveys and Russian maps, is eight minutes too far east. His position of Kungur is therefore four miles too far east relatively to the rest of his own mapping. Though this appears to throw a doubt on his observations, it must be conceded that any record of so careful, painstaking, and accurate an observer as Captain Trotter requires very strong evidence to shake it, and for the present we must accept the altitude of Kungur as 25,300 feet or more. Both Bower and Ney Elias consider this the highest peak, though the latter states that this is not the opinion of the natives of Kashgar. South of the Kungur there occur a couple of prominent peaks intermediate to a third very conspicuous mountain, called Muztagh-Ata in the Russian maps (and also by Sven Hedin, the Swedish explorer), which bears south-east from Kara Kul as mentioned by Ney Elias. This is the one which has been mistaken for Trotter's peak in some maps, but which (as Ney Elias points out) is not visible from the Kashgar plain at all. It has, however, been accepted by the Russian surveyors, and by so distinguished a scientist as Sven Hedin himself, as the highest peak north of the Himalaya, and its height is given in the Russian Staff map as 25,050 feet. Accurate as are the Russian determinations of height in the plains, based on most careful and systematic barometric records, I doubt, in the absence of triangulation, whether they have equally accurate altitudes assigned to their mountain ranges. This particular height is the only one recorded in this part of their map, and as there is reason to think that this peak has been mistaken for Captain Trotter's Tagharma, its value in altitude may have been adopted from Trotter's determination. However that may be, the position of Muztagh-

* NOTE.—This is so far as our present geographical knowledge of the Hindu Kush extends. Since writing the above some uncertainty has been thrown on the position of Tirish Mir with reference to the main watershed.

Ata has now been fixed in connection with the triangulation of the Pamirs, and its height is well ascertained.

It is a broad, bold mountain, with a magnificent glittering dome of snow for its highest summit, whilst other more sharply defined pinnacles of less altitude support the dome as sentries on either hand. The height of the dome (from one observation only, but that a very clear and distinct one) is 23,480 feet, and the height of an outlying pinnacle from two observations for altitude based on three intersections is 22,780 feet. The two values of the latter agree within a few feet. It will be a matter of future interest to learn whether the great Kungur of Trotter is still to hold its proud position as the highest of the Pamir system. In spite of an apparent discrepancy in position, I am inclined to think it will.

The Pamir tableland or lake district southwards is very nearly defined by the parallel of 37° north latitude, for the Little Pamir ends at Bozai Gumbaz, if indeed there is anything that should be called Pamir south of the Chakmaktin watershed. On the west it reaches very little further than the western margin of its great lakes, *i.e.*, Kara Kul, Rang Kul, Yashil Kul, Victoria, and Chakmaktin. Those affluents of the Oxus which drain the districts of Roshan, Shignan and Wakhan, are all mountain streams flowing through deep and difficult gorges and defiles, some of them indeed being almost impassable and marked by totally different characteristics to the Pamir.

There is little doubt that all the Pamirs formed part of the great mediæval kingdom of Bolor, itself a part of the more ancient empire of the Yuchi, Tokharistan. So many various positions have been assigned by great authorities to this kingdom of Bolor, of which even the name (so frequently referred to in mediæval records) seems to have passed away, that it has almost become, in the words of Yule, "the symbol of controversy." Its limits are, however, very plainly stated in the *Tarikh-i-Rashidi*, on which Bellew draws largely for his history of Kashgar, and there is no reason to doubt the accuracy of the historian Mirza Haidar, a cousin of the Emperor Babar, who, writing in the first half of the sixteenth century, himself played an important part in Central Asian politics and war, in his time.

At the beginning of the sixteenth century, when Babar was gradually consolidating his power in Kabul, Moghulistan was ruled by Ahmad surnamed Alaja, or "the destroyer," and Abubakar reigned at Kashgar. Ahmad left seventeen sons whose quarrels amongst themselves kept all Central Asia in turmoil for many years. One of them, *Said*, whose fortunes had been much associated with those of the great Babar, after many narrow escapes and adventures, was the final invader of Kashgar, and avenger of the tyrannies of Abubakar, whose barbarous cruelties make his name one of the most infamous in history, whom he destroyed about 1513. The conquest of the Kashgar kingdom by Said—who successively took Kashgar (the ancient city was at this time destroyed by Abubakar, and a new position rapidly made defensible by gigantic earthworks), Yangi Hissar and Yarkand, and drove Abubakar into the Tibet wilderness, where he was finally hunted down and killed—is one of the most stirring episodes in Central Asian history. Abubakar had previously, with the aid of his general, Wali, subdued "Bolor" to the borders of Karatigin, and added it to his kingdom, but it never appears to have been entirely subjugated, for we find Said in 1525 sending his sons Rashid and Mirza Haidar on a "gharat" against the Kafir of Bolor. "This country is bounded on the east by Kashgar and Yarkand, north by Badakshan, west by Kabul, and south by Kashmir. It is altogether a mountain fastness and has not a level 'farsakh' of ground in a circuit of four months' journey. The people have no religion and their women do all the labour, field and domestic. The men do nothing but fight each other all day and every day, and only leave off when their women interfere with food. They then enter their houses, and on the conclusion of the meal return to fight; and so it goes on from sunrise to sunset. At night they always barricade their doors and keep watch. These people have few oxen, but lots of goats and sheep, from whose wool they make all their clothing. There is little pasture in their country, and every glen has its own peculiar language which is unintelligible to the neighbours. Honey and fruits are in plenty."* If we shift the points of the compass slightly there is little difficulty in recognising that

* Tarikh-i-Rashidi.

the country enclosed within the limits of Kashgar, Badakshan, Kabul (or the Kabul valley), and Kashmir must include Kafiristan, even if the graphic description of the Kafir, which might stand good for the present day, did not identify his habitat. How far east Kafiristan then extended it is difficult to say, but apparently its limits were much as they are now. We know that Swat and Chitral were Buddhist a thousand years before Said's day, and we must look back another thousand years to find the Nysean progenitor of the modern Kafir in the Swat valley. The western limits of Kashgar are set down by the same author as the "Shash and the high mountains of Bolor which form a chain from south to north, where they join the range of Moghulistan." Between the mountains of Bolor and the highlands of Kafiristan we have the Pamir plateau and a part of Badakshan; so that we can have little doubt about the Pamirs forming part of the kingdom of Bolor at the beginning of the sixteenth century. But the name is a very ancient one. It occurs in the Chinese records of Hiuen Tsiang in the middle of the seventh century, and the country is described by him as standing in the midst of the great snowy mountains. "It is long from east to west and narrow from north to south." This tallies well with the limits given by Mirza Haidar. "It produces wheat and pulse, gold and silver." This latter addition to its characteristic has induced some authorities to extend its limits to Baltistan or Little Tibet, but I think there is no necessity for this. The Gilgit river basin and the upper Kunar or Chitral river both produce gold in sufficient quantities to make washing a recognised industry amongst their people. A description of the Pamir valley (Po-mi-lo) by the same author runs as follows:—"It is situated amongst the snowy mountains; on this account the climate is cold and the wind blows constantly. The snow falls both in summer and spring time. Night and day the wind rages violently. The soil is impregnated with salt and covered with quantities of gravel and sand; the grain which is sown does not ripen, trees and shrubs are rare; there is but a succession of desert without any inhabitants. In the middle of the Pamir valley is a great dragon lake; from east to west it is 300 *li* or so, and from north to south 50 *li*. It is situated in the midst of the great Tsungling mountains and is the central point of Jumbudripa. The land is very high; the water is clean and pure as a mirror; it cannot be fathomed. The colour of the lake is a dark blue; the taste of the water sweet and soft; the water hides the kanki fish, dragons, crocodiles, tortoises. Floating on its surface are ducks, wild geese, cranes, and so on; large eggs are found concealed in the wild desert wastes or among the marshy shrubs or on the sandy islets." Our Chinese author proceeds to state that there are two outlets from the lake, one flowing westward to the Oxus, and the other eastward toward Kiesha (Kashgar), and adds, "passing over a mountain to south of Pamir valley we find the country of Po-lo-lo (Bolor). Here is found much gold and silver." There are, as will be apparent, certain statements in this description which must not be accepted too literally; but we find, on the other hand, that his reminiscences of the climate of the Pamir could not be drawn with a keener appreciation of the bitter truth. It was the veritable Pamir of which he had experience, whose shifty climate resembles that of a bad English spring. It was separated in those early days from Bolor by a mountain. But passing over a mountain to the south from the Pamir, one reaches the Chitral or Gilgit river valleys, so that we must include these districts as part of Bolor in the seventh century, and exclude the Pamirs.

Towards the end of the thirteenth century we have the evidence of Marco Polo, who crossed the Pamirs in 1272 in company with his father Nicolo and his uncle Maffeo, when returning to the court of the great Khan Kublai, after a vain appeal to Pope Gregory for a scientific and religious mission to be sent at the Khan's request to Mongolia.

They journeyed from Acre to Baghdad and Hormuz, and thence *viâ* Khorasan and Balk to Badakshan. "Leaving this little country (Wakhan)," says Marco, "and riding three days north-east, always amongst the mountains, you get to such a height that it is said to be the highest place in the world, and when you get to this height you find a great lake between two mountains, and out of it a fine river running through a plain clothed with the finest pasture in the world; the plain is called Pamir, and you ride across it for twelve days together finding nothing but a desert without habitations or any green thing . . . Now if we go on with our journey towards the east-north-east, we travel a good

forty days (*i.e.*, it is altogether a forty days' journey from Wakhan) continually passing over mountains and hills or through valleys and crossing many rivers and tracts of wilderness, and in all this way you find neither habitation of man nor any green thing, but must carry with you whatever you require. The country is called Bolor." Why Marco should twice insist on the absence of any green thing in "a plain clothed with the finest pasture in the world" which "plain is called Pamir," it is difficult to explain. The total absence of trees or brushwood other than the low scrubby worm-wood must have struck him as it strikes every one, and it was probably this barrenness of landscape scenery that instigated the remark. Yule thinks that the forty days' journey to Kashgar should commence from the Pamir Lake and not from Wakhan. This, however, would be an unnatural lengthening out of the road, nor does the text of Marco's narrative seem to require it. The description of the country traversed during those forty days is such as can only apply to the Pamirs, as indeed does also the reiteration of the remark about the absence of any green thing; and we may safely assume that the Pamirs were a part of Bolor in 1270 as they were in 1500. Once again the Pamirs were crossed by Benedict Goes in the autumn of 1603, and from thence to the days of Wood in 1838 we have no European record.

The Pamirs never seem to have afforded a well-recognised or much-used highway. It might naturally be assumed that at the period when Venetian and Genoese influence was paramount in the commerce of the world, and before the Cape route to the East was known to travellers, missionaries from western ports would spread into the East by every route that has ever been used for trade purposes; and that the three Polos were but one small trio of adventurers amongst the many that must have made the eastern world their quest. But there is no evidence whatever that this was so. On the contrary, individual records are most marked in the absence of all reference to contemporaneous travellers; and though there may have been European explorers who have crossed the Pamirs unknown to fame, they can only have been solitary travellers, not supporters of continuous and successful trade intercourse. It is indeed difficult to avoid the conclusion that forced itself on the observant mind of Marco Polo, that the Pamirs have never been worth much to anyone, excepting, perhaps, to their intermittent Kirghiz inhabitants.

The Pamir plateau is now divided into two parts, the Russian Pamirs, and the Afghan Pamirs. With the Russian Pamirs and the gradual but certain advance of civilizing influences southward to the Little Pamir we shall have little practical concern in future. The extraordinary rapidity with which these evolutions occur on the Russian frontier is one of the most remarkable phenomena in the gradual evolution of their great schemes of civilization.

Afghan Pamiristan lies south of the Nicolas range, and is all condensed into the upper half of the Little Pamir. It lies inclosed between two remarkable ranges, the Nicolas on the north, and the Sarikol, which here takes a bend westwards from its general meridional strike and encloses the Taghdumbash Pamir, on the south. The Nicolas range rises westward from the junction of the Pamir and Wakhan rivers, and rapidly culminates in a series of peaks rising to 18,000 and 19,000 feet, which lie packed in the folds of eternal glaciers. The range has a wide base of at least 25 miles south-west of Lake Victoria, and throws out so many high, rugged, weather-beaten spurs on both flanks, that the crest is seldom visible from the plains. The total length of the range is about 100 miles to the point where it sinks to insignificance north of Kizil Robat. The western half of the range is not known to be passable, but between Langar and Kizil Robat on the eastern half are four recognised passes connecting the Great and Little Pamirs, two of which, the Benderski and the Urtabel, are of the nature of great depressions in the range, with almost flat, open saddles, the approaches to which on either side possess the regular Pamir Valley characteristics of widish spreads of grass and gentle undulations. The third pass (the Warram) is but a hunter's track. For a few months of the year it may be passable with difficulty to horsemen, but it cannot be regarded as a practicable through route from Langar to Lake Victoria. The fourth is the Burgutai, which, like the Warram, may be occasionally passable, but is not open to laden animal traffic. The Sarikol range, where it flanks the Little Pamir on its

Photo-etching. Survey of India Offices, Calcutta, October, 1896.

RIVER AKSU, FROM MIHMANYOL LOOKING EAST TOWARDS THE SARIKOL RANGE

southern border, is of the same general character as the Nicolas range. Glacial action has had the effect of wearing the buttresses of this range into an almost architecturally regular succession of gigantic square cut spurs, each facing the plain with a broad triangular shaped abutment and each pair in succession embracing a glacier. The aspect of the range is very remarkable, but it is not so impassable as it appears. Between the Little Pamir and the Taghdumbash, within the limits of Afghan territory, are three well-known passes, *i.e.*, the Mihmanyol, the Taghramansu and the ZorKara Jilga. None of them, as they stand, are practicable for laden animals, but members of the Commission passed over the last two with their horses, and it is only necessary to apply local labour at such intermittent seasons as snow admits, to make them practicable.

The Taghramansu and Mihmanyol are contiguous valleys leading south from a point some three miles west of Kizil Robat. On the Taghdumbash side these two passes are so close that they are sometimes reckoned as one and mistaken for each other. Probably no efforts will ever be made to improve them, as they are all outflanked by the Bayik, an easy pass connecting Kizil Robat with the lower Taghdumbash across the Sarikol watershed, by a direct route indicated by the line of the Bayik river. Between the Bayik and the Aktash (or Nezatash or Shindi) pass, connecting Aktash with Tashkurghan, the Sarikol rises into a rugged wilderness of precipitous mountains that present no possibilities for crossing except to men on foot. Of the passes north of the well-known and often described Nezatash, we obtained no new information, but the main Sarikol watershed sinks as it gradually runs northward into comparative insignificance, and the routes across it north of Tagharma are all known to be easy.

Of the Pamirs themselves there is little to be said that has escaped the observation of previous explorers. Their emptiness and desolation, the broad spread of pasturage during the few summer months when they are habitable, and the dreariness of their snow-covered wastes in winter have all been well described, and one only needs to add a note or two about their nomadic population. This is entirely Kirghiz, and it may, I think, be taken for granted that it will soon be entirely Russian. We were on the Pamirs at that season of the year when pasturage is most in demand, and when the largest Kirghiz population and the most extensive encampments might naturally be expected to exist, and yet the akois of Kirghiz herdsmen within the Afghan border might be counted on one's fingers; and on the Chinese side in the Taghdumbash direction, there were but two or three encampments. The total population of non-Russian Kirghiz that we encountered could not possibly have amounted to more than a few hundred. There is doubtless a tendency on their part towards accepting Chinese domination, which is due to the easy terms on which they are permitted to live within Chinese territory, and the absence of direct taxation; the skins of certain wild animals killed by their huntsmen forming the chief tribute claimed by Chinese authority at Tashkurghan. But the security for life and property will inevitably lead them to the Russian fold eventually, especially as there is no ethnographical distinction whatever between the Kirghiz of the Alichur or Alai-Pamir and those of the Taghdumbash. There seems, indeed, to be a certain historical fitness about the return of the Kirghiz to a Christian Government, if they are, as they seem to be, a survival of the mediæval Nestorian Christian communities of Asia. I do not think that any writer has noticed the curious analogy between the names of the modern Kirghiz Pamir tribes and those of the mediæval Asiatic Christians. As early as the fifth and sixth centuries A. D. there were Nestorian Christian bishoprics at Herat, Merv and Samarkand, later at Yarkand, and finally in China. That at Yarkand flourished in 1260, when Marco Polo visited the country, and is supposed to have come to an end about a century later. The last Gurkhan of the Kara Khitay empire, the legendary Prester John, was apparently a member of a Christian tribe called Naiman. Ney Elias gives as the names of the four principal Kirghiz tribal divisions (which names he found to represent more of a nominal intertribal distinction than of any practical family division) Naiman, Tait, Kara Tait, and Kasik. "At KaraKul, Kirghiz of all these four main divisions are found living together promiscuously, and having in many cases

intermarried." The names of these Nestorian Christian tribes which constantly recur in the mediæval records of High Asia, members of which rose to prominence about the time of Chenghiz Khan (who married a Christian wife), were Naiman, Karait, and Makrit.

About the Naimans of Ney Elias' report, we read that "though less numerous than the Tait, they claim to be of the best Kirghiz blood or of the highest caste on account of their kinship with the Kipchaks, whom all Kirghiz seem to regard as a superior people to themselves. The common descent which the Naimans claim with the Kipchaks dates from many hundreds of years ago, when the home of their common ancestors was, as they believe, in the country between Bokhara and Samarkand. They seem to have no record or estimate of the time they have inhabited the Pamirs. Yet it is curious to note the clear knowledge that the most squalid and ignorant among them have of their own descent, and the pride with which they point out their respective pedigrees." It is a matter of regret that no opportunity was afforded during the too short space of the late Pamir Commission's labour for further elucidation of the manners and customs of these interesting people. The survival of a certain form of Christian ritual (accompanied by gross symbolism) in the marriage customs of the Sarikolis and Kirghiz has been noted in the comprehensive report of the Yarkand Mission. It is difficult to account for the survival of a Christian ritual amongst the Sarikolis, who are a Shiah people of pure Aryan descent, and, according to their own traditions, are allied to the Shignis of Shignan, and speak the same language. The Naiman Kirghiz are Sunni Mussalmans speaking a dialect of Turki, and between the two there seems to be no connection that can be readily recognised. Yet, according to the Yarkand Report, these marriage customs are the same, and the ritual in both cases Christian. The Sarikolis are not a nomadic people. They live in permanent habitations, scattered in small groups, and not collected for purposes of mutual defence in the manner that their immemorial hostilities with the Kanjutis would seem to render imperative.

There is no evidence to show that the Pamirs were ever the support of permanent settlements. Such *débris* of mud buildings as we saw at Chakmaktin and Langar point only to recent occupation that had little of a permanent character; and the shrines and domed tombs which we found scattered here and there on the Great and Little Pamirs alike, were always recent. The best known amongst them is the Bozai Gumbaz, about which a Russian "jiggit," or orderly, who was a native of this part of the Pamirs, gave the following brief information. He said he remembered the fight twenty years ago, when the chief Bozai, who was supported by Kokandian troops, was killed. A graveyard adjacent to Bozai's tomb was, he said, the last resting-place of those killed in that action, which was fought against the allied Wakhis and Kanjutis. The wretched remains of a small fort exist not far from the Gumbaz, and this is said to have been built by Bozai.

The district of Sarikol adjoins the Pamir plateau immediately east of the central watershed and includes in its western limits the Taghdumbash Pamir and the Tashkurghan valley. The whole system of drainage from the Wakhjir pass at the head of the Taghdumbash to Tashkurghan itself has been included in some maps under the word Pamir, but this is a misapplication of the term. The Taghdumbash valley narrows almost to a gorge at Bayik opposite to the southern foot of the Bayik pass, where the Chinese outpost is now placed, and from this point eastward the valley (depopulated, it is true, by Kanjut raids and so far deserted as far as Ujadbai) possesses none of the marked characteristics of the true Pamir.

There is, however, little to add to the already comprehensive reports of previous travellers and explorers in Sarikol; what little fresh information was obtained during the progress of a special reconnaissance into the Tashkurghan river valley will be found in the report which includes that reconnaissance.

T. H. HOLDICH,
Colonel, R. E.

CHAPTER V.

COLONEL HOLDICH'S RECONNAISSANCE INTO THE SARIKOL DISTRICT.

ON the 4th September when a break in the weather, which had been unusually severe during the preceding week, promised better opportunities for surveying, a party consisting of Colonel Wahab, Mr. G. Macartney and myself, started for the Bayik pass with the intention of separating into two divisions at its southern foot, so as to explore eastwards into the valley of the Tashkurghan river, and westwards through the Taghdumbash Pamir. The object of this reconnaissance was, firstly, to obtain information about the position of the Chinese frontier posts and to observe the nature of the boundary separating Russian and Chinese dominions in this quarter; secondly, to fix the position accurately of Tashkurghan so as to make a more accurate junction with the Kashgar and Yarkand surveys of the Yarkand Mission party of 1875; and, thirdly, to join our topography with that of the Chitral Mission of 1885. Two of these objects were fairly attained, but we were prevented from ascertaining the position of Tashkurghan quite as conclusively as we could have wished.

The route from the Mihmanyol camp followed the comparatively open plain bordering the right bank of the Aksu for about 4 or 5 miles, when it gradually ascended the dasht, or foot hills, of the Sarikol range by easy gradients to a height of about 1,000 feet above the river. From this point a grand view was obtained of the open plain about Kizil Robat, where the Aksu bends northward flanked by the magnificent precipices of the same range that we were now preparing to cross. The dasht was stony but soft, with occasional short stretches of marsh and bog where the snow had but recently melted. Passing over a shoulder of the lower spurs of a conspicuous conical hill to which the Russians had given the name of Topographers' Peak, we dropped for 6 miles gently toward the Bayik river, which so far had been hidden in a deep gorge on our left, and camped on its grassy banks. Although the country we had passed over appeared to be completely deserted, with nothing to break its silence and solitude but the shrill chirrup of the marmots who sat bolt upright near their holes to watch our progress from a very discreet distance, we found evidences of a considerable Kirghiz encampment hidden away in the folds of the hills not far from the place where we pitched our tents. A large flock of goats and sheep moved slowly up from the river as we approached, and the opposite hills were dotted with black yaks for many hundreds of feet above the river bed. It is interesting to observe how completely hidden a large encampment may be by the gentle undulations of what at first sight appears to be flat country. The Bayik Valley, like every glen in the Pamirs, affords a very considerable area of most excellent grazing. At this point it is about 2 miles wide, and although the hills carry their slopes down to the river's edge there is still ample room for movement of troops on the gentle gradients of the left bank. The valley continues to be wide and open to within a mile of the actual pass.

The ascent is gradual and easy from the north, and practicable as it stands for even wheeled guns. The altitude of the pass (15,000 feet) which we crossed on the 5th is such that even in summer it may at any time be closed by snow. The week previous to our reconnaissance the snow was reported to be 'waist deep,' but by the 5th September hardly a trace of snow was left. The view from the top of the pass looking southwards was magnificent. The mountain track fell steeply away for 1,000 feet over shale and soft detritus to the narrow little camping ground of Ganjabai, where a stream which takes its rise many miles to the west of the pass, curls round the foot of gigantic red cliffs and becomes a thin streak of blue, pointing straight for the snow peaks of Muztagh. The descent to Ganjabai was not difficult, but exceedingly steep; it would be quite impracticable for wheels without much labour in road-making: but in spite of this the whole of the pass must on the whole be classed as exceptionally easy. On the evening of the 5th our camp was joined by General Gerard,

who pushed on early next day for a ride of 67 miles round the foot of the Taghdumbash Pamir to the Mihmanyol pass, which he crossed late in the evening on his way back to Head-quarters. On the 6th our camp moved down the Ganjabai to Bayik at the junction with the Karachukar, or river of Taghdumbash.

For the first 3 miles from Ganjabai the valley is open but narrow, and the track leads over gentle undulations on the right bank to an easy crossing of the stream at a point where it suddenly narrows in. Then follow 2 or 3 miles of track over the 'talus' or 'fans' of mountain ravines on the left—nowhere difficult, but everywhere rough. For the last 4 or 5 miles the valley narrows considerably, and near its debouchment becomes almost a gorge, necessitating constant crossing and re-crossing of the stream. Here and there a few acres of bush-grazing exist on the river banks, and these were invariably occupied by herds of fat, contented-looking camels. Even in early September the valley wore the tattered appearance of late autumn. The wild rhubarb leaves were curled and blackened with frost, and all flowers had died away under the touch of coming winter, except the hardy purple monk's-hood and a few yellow primulas. The road was evidently much used, although we met but few casual travellers. The debouchment of the Ganjabai is just opposite the Bayik encampment, deep in the embrace of a magnificent surrounding of rugged snow-topped peaks, which form the base of the two great ranges of Muztagh and Sarikol.

Here we found a Kirghiz encampment and a Chinese outpost side by side. The encampment was that of Kasim Beg, a near relation of Thakur Beg, the Kirghiz chief representative with the Russian camp. By the recent boundary settlement the amount of Pamir grazing country now open to Kirghiz nomads within the limits of Chinese territory is practically limited to the Taghdumbash and Marriom Pamirs of the Sarikol district. The Pamir of Taghdumbash practically ends at Bayik. Although the whole valley of the Tashkurghan river from the Wakhjir (or Wakhijrui) pass to Tashkurghan fort has been represented in our maps as 'Pamir,' there is little justification for the application of the name eastwards of Bayik. Between Bayik and Ujadbai there is certainly a small amount of grazing near Chadar Tash, but it did not appear to me to be of the same character as that which obtains at higher altitudes, and there was no Kirghiz occupation. Beyond Ujadbai (at Dubdar) the valley opens out into a comparatively wide cultivated plain with permanent habitations scattered through it, which are in no accordance with the usual characteristics of Pamir. Of the nature and extent of the Marriom Pamir I had no opportunity of judging, but clearly the whole extent of Pamir country now under Chinese domination is but a very small fraction of the area held by Russia, hardly more indeed than that part of the Little Pamir which is now owned by Afghanistan. There being but a shadowy line of distinction drawn between the Kirghiz tribal divisions, all of which appear to follow their yearly migrations in search of pasturage on lines which are quite irrespective of national frontiers, we may expect that the whole Kirghiz population will soon be under the domination of the strongest power, possessing the largest share of Pamir.

According to information obtained by General Gerard when personally investigating the subject, the Chinese taxation of the Kirghiz in the Sarikol district is of the most nominal description. All skins of wild animals killed (except Ovis poli) are given up as tribute to the Amban of Tashkurghan, but no money payment whatsoever. To their own Begs they pay one per cent. annually of all their flocks. Such easy terms are no doubt attractive, but will not suffice to keep Kirghiz nomads permanently away from Russian influence.

The Chinese outpost at Bayik consisted of a couple of Kirghas (or Akois) and a rough stone and mud-built hut which was just sufficiently well constructed to claim the honours of a "permanent" building. On reaching Bayik on the 6th September I paid a visit to the post, accompanied by Mr. G. Macartney, whose perfect knowledge of the Chinese language enabled us to explain the object of our presence there and to make a few enquiries.

On the 7th our camp divided. Colonel Wahab with a small topographical party started westward up the Taghdumbash, where he hoped to effect a junction

with Colonel Woodthorpe's Survey about Kilik, and I turned my camp eastward to see as much as possible of the new line of frontier.

The position of Bayik is an important one and is well selected for a post of observation by the Chinese.

The Taghdumbash valley is tied in at this point by the spurs of the Sarikol and Muztagh, so that the post absolutely commands its entrance. The Ganjabai (or Bayik) pass is equally well dominated from the same position opposite its debouchment, and the outlet of the Mihmanyol, the Taghzamansu and other Sarikol passes west of them is effectually guarded on the Chinese side. The march of the 7th followed the Karachukar (or Taghdumbash) river down the narrow valley (barely a mile wide) amidst stupendous cliffs and rugged hills, occasionally rising over the rough undulations formed by the detritus of the southern watershed, for about 8 miles, to Ujadbai. The valley of the Karachukar exchanges the desolation of Pamir for a fair show of brushwood undergrowth near the river. Many of the small rivulets are bordered with a thick hedge of stunted willow, and juniper is found higher up the hillsides. The valley teems with ground game, and hares were almost as thick as rabbits in an English warren. The road generally was easy enough and evidences of Chinese occupation were abundant. Besides the stone-built barrack of Bayik there is a small sarai surmounted by a gumbaz (or dome) which was built by Baz Khan, a Chinese subject, close to the outpost; and there is also a fairly well-built but small stone tower about 2 miles down the valley which commands the road and the river from an eminence of about 150 feet above the latter. Ujadbai, which is itself an important post commanding the junction of the Karachukar and the Paspak rivers (the two together now forming the Tashkurghan), has been fixed by our topographers in a position about 8 miles north-east of that hitherto assigned to it. There is a badly repaired stone fort, about 50 yards square, at Ujadbai, with a considerable area of open grass plain immediately surrounding and forming a good camping ground. From this point the Tashkurghan river takes a course a little west of north, bearing straight on the great domed peak of Muztagh-Ata, which fills up the vista of the valley, in line (according to Captain Bower) with that other higher peak (Kungur) fixed by Trotter at 25,000 feet above sea-level. Unfortunately at this period of our reconnaissance the weather thickened and became so hazy and squally that it was impossible even to make certain of the nearest peaks on the Sarikol, still less to take observations to the north. The snow peaks of the Kandar mountains (the southern section of the Kashgar range which from 37° N. Lat. to 38° 30′ runs approximately on the meridian of 75° 30′ at a half-degree distance from the great Sarikol watershed) were visible, however, and they formed a fine series, dominated by the white cone of *Chiralujin*, on the eastern flank of the valley. Immediately north of Ujadbai the Tashkurghan road rises some 100 feet and winds for 7 miles over a 'dasht' of stone and gravel, which is evidently identical with the long sweeping talus of the left bank, through which the river has cut its way in a deep and narrow gorge. This plateau appears to fill the valley from side to side and is distinguished for its absolute sterility. Passing the ruins of the Kizkurghan (or woman's fort) perched on the red cliffs of a ravine on the opposite bank, a sudden drop from the plateau to the plain of the river brought us to Dubdar and introduced a fresh phase of scenery. From a barren wilderness of gravel we dropped into an open plain, green with well-irrigated cultivation, interspersed with fairly wide stretches of grass covered land.

On the early morning of the 8th September, we started down the valley towards Tashkurghan. For about 5 miles the valley widens considerably (it is about 4 miles wide in the plain of Dubdar) and continuous cultivation is maintained. The crops were chiefly wheat, some of which promised well and was fairly advanced, but none of it was yet ripe for harvesting. A small stone-built watermill was in active operation near the encampment, and I counted about 30 scattered hamlets and houses at intervals. In spite of the thick weather the scenery was impressive. It was impossible to conceive a grander natural frontier than that formed by the Sarikol range at this point. The gigantic cliffs of the watershed were but just visible above

the rugged outlines of the eastern spurs. The whole massive structure stands on a base which is about 25 miles in width and is as nearly impassable as any mountain system can be between the Bayik and the long narrow ravine of the Neza Tash, or Shindi, pass near Tashkurghan. There is indeed one foot-path through the range east of the Bayik, known as the Sar-i-Kuram pass, but it is only open to mountaineers and shikaris, and is carefully watched by a small outpost on the Chinese side. On the other side of the valley the snowy peaks of the Kashgar range formed a white line in the haze, but the Muztagh-Ata dome northward was still hidden. At about five miles from the Dubdar encamping ground and four from the fort the valley narrows suddenly to about two miles and the road again strikes a stony 'dasht.' This point is known as Eric Jilga, and here our reconnaissance terminated.

At Eric Jilga we met a Chinese detachment consisting of about 25 sowars well mounted on sturdy horses of the Cossack class, and well equipped as to accoutrements and uniform. They carried Snider carbines, and there were distributed amongst them four or five long lances, but no other arms that I could see. The lances were at least 12 feet in length, and carried broad triangular red flags lettered in white with Chinese characters and edged with the familiar Chinese dog-tooth border of white. The commandant of the detachment, who proved to be an old acquaintance of Mr. Macartney's, was not in uniform, but the sowars were on the whole well turned out in black velvet double-breasted coats with scarlet lettering, indicating that they belong to a force maintained for the preservation of peace on the border. This information extended from the collar to the skirts. A scarlet border some three inches wide, edged with a narrow white stripe, set off the black breast-piece. Their sleeves were of an unadorned grey colour and their pantaloons, tucked into boots reaching to the knee, were purple. The boots had the usual tip-tilted toes attached to feet so small as to suggest that the immemorial custom of clubbing the feet of Chinese women had developed a final tendency to club feet as a national feature in all Chinese mankind. The coats extended in lappets down the thigh; on this part of the uniform no regimental legend was attached, and the ornamentation was of a purely geometric type. The head dress was simple: a blue kerchief twisted round and knotted behind the ear. However suggestive of fancy dress the *tout ensemble* may have been in individuals, the uniforms massed together looked smart and effective. On the march the detachment moved in very close order and at a rapid run or trot—a pace which was maintained from start to finish. The general impression left on my mind was that whatever the strength of the Chinese force maintained in Kashgar may be, the troops selected for this service were efficient as frontier escorts and kept a very careful watch on the border.

On turning our horses' heads we made a long march back to Ujadbai. The position of that place had been well fixed, the nature of the Chinese occupation of the Tashkurghan valley had been ascertained, and the frontier fully reconnoitred up to a point far beyond the interests of Afghanistan. Further than this, enough had been done to prove that the position of Tashkurghan itself has already been correctly fixed with reference to present mapping, and the general accuracy of the Russian mapping along the line of the Sarikol frontier placed beyond doubt. With further surveys in this direction India can have but little concern in future. A bitterly cold march, enlivened by some excellent hare-shooting, brought us back to the Bayik post on the 9th. Here we breakfasted under the shelter of a Kirghiz akoi, and I had the opportunity of observing a Kirghiz interior under favourable circumstances. Excellent cream and butter were supplied to us by the family, and one member of it (a girl of about 18) was sent out to fetch us a sheep from the hillsides. There is a certain air of dirty comfort about a Kirghiz akoi. A strong colouring of smoke pervades the whole and is not altogether absent from the otherwise fresh and fair complexions of the Kirghiz ladies themselves, whose blue eyes and frank manners are very attractive to the European wayfarer. Their outward and visible dress is a long close-fitting gown reaching to the ankles of a pair of top boots. All Kirghiz men, women, and children, alike wear these long Russian boots, but they are guiltless of the high heels affected by the Turkomans, which render walking on them barely possible. The head dress of

the Kirghiz women is so distinctive and so peculiar that it would be interesting to learn the origin of it. It is not altogether unlike the long pointed cap and streamer of the women of Tartary in mediæval times, which by some eccentricity of fashion was temporarily adopted in Europe, and may be recognized in illustrations of early English history; but the conical shape of the cap has disappeared and the fashion of the Kirghiz shapes it into the semblance of a milk pail. The streamers remain almost down to the heels in the case of matrons, but the maids braid their hair into long tails and are not quite so fully developed in the matter of turban. The men wear small caps with fur edging, or else the Kashgar hat. Round about the interior of the akoi good rugs and felts were scattered, and a portion of it was screened off for dairy purposes. Here milk in various stages was set in wooden vessels. Most of the domestic utensils were wooden. I observed several excellent milk pails, a sieve, many bowls, a gigantic wooden spoon, and an iron pot or cauldron that would contain about 20 gallons. Some half dozen old Snider rifles with the bayonets fixed were attached to the walls, and a sword or two. Very pretty saddle bags were scattered about, the smaller ones containing women's gear, amongst which I was astonished to find neither scissors nor thimbles, but there were dark glasses for use in the snow and other products of civilization of Russian manufacture.

During the afternoon I walked over to the other camp with Mr. Macartney to visit the Captain of our Chinese guard. Here again we were welcomed and treated with much courtesy. The commandant and his whole detachment were occupying one akoi, which was arranged with divans or low seats around it whereon the warriors sat and smoked. The sides of the akoi were so strung with their various articles of equipment that it was difficult to distinguish amongst them the exact nature of each article. On our arrival we were invited to enter and given the seat of honour at the further end of the akoi. Tea was prepared by the simple process of pouring hot water on a few leaves in a small China bowl, and handed round without the English accessories of milk and sugar, or the Russian additions of lemon juice or jam. Their capacity for smoking appeared to be abnormal, but there was little real continuity in the process, as their pipes (which were long-stemmed wooden ones with an elaborate stone mouth-piece) were very small in the bowl and required constant re-filling. I observed one hubble-bubble, or hookah, with a brass receptacle for the water, of a very elaborate description. There were enough valves and stops about it for a small steam-engine. A salad was in course of preparation on our entrance, materials for which (lettuce and tomatoes) must have been brought from Tashkurghan. The sight of it filled us with envy. One other feature about this Chinese outpost deserves record. There were two or three thriving fowls about it. As fowls are unknown on the Pamirs and cannot live there, this little fact indicated a return to the almost ubiquitous conditions under which fowls can live and flourish.

With such an interpreter as Mr. Macartney, conversation was easy. Our Chinese host pressed us to extend our visit over a few days, but the day was waning and we bade adieu to our Chinese escort, and crossing the river made a late afternoon's march up the Ganjabai valley towards the Bayik pass.

On the 10th we re-crossed the pass, finding the southern ascent of 1,000 feet both steep and difficult on account of the loose nature of the shaly soil. A snowstorm met us on the southern slopes, but did not prevent our reaching the site of our first camp on the outward route from Mihmanyol. Next day we reached the Head-quarter camp and found orders for the return march to India there awaiting us.

CHAPTER VI.

REPORT ON THE SURVEY WORK BY COLONEL WAHAB, R.E., C.I.E.

THE survey party detailed to accompany the Pamir Mission consisted of the following officers: Colonel T. H. Holdich, C.B., C.I.E., R.E., in charge, Major R. A. Wahab, R.E., Surveyors, Khan Sahib, Abdul Ghaffar, Asmatulla Khan, and Dan Sing,* with 29 Native khalassis. Of the Native Surveyors Abdul Ghaffar had distinguished himself in several previous expeditions on the northern frontier, during his long service in the Department; Asmatulla was an excellent draftsman, with a good knowledge of English, and had undergone a short training at Rurki Survey in photography with a special view to the requirements of the Mission; and both he and Dan Sing had had several years' training in the Himalaya Party. The majority of the khalassis were Panjabi Muhammadans on the establishment of the Baluchistan party, and accustomed to a great extent to the severe climate of the Northern Trans-frontier.

The camp equipment taken was of the lightest description, and was as nearly as possible on what is known as the Kabul scale. An ample supply of warm clothing was obtained at Srinagar, and issued free to all the native establishment.

The instrumental equipment in addition to plane tables of the Indian survey pattern and the usual accessories for each plane-tabler, included an 8-inch transit theodolite with reading microscopes, a 6-inch transit theodolite with verniers, two aneroid barometers, a George's mercurial barometer, a maximum and minimum thermometer, two ordinary thermometers, and two hypsometers, two photographic cameras, and a printing apparatus for reproducing maps by both the bromide and cyanotype processes, measuring chains, and subtense bars.

The 8-inch theodolite is the smallest instrument of the microscope class yet used in the Indian survey; it is as portable as the older vernier instruments of the same diameter of limb, and as regards stability and accuracy of graduation it is probably superior to the old 12-inch and 14-inch vernier theodolites, while as regards the facility and accuracy with which the limb can be read it is far superior. It was invariably used for all astronomical observations and at all plain stations for the ordinary triangulation; the 6-inch instrument was, however, used at all the hill stations where, owing to the great altitudes and the very laborious ascents, it was desirable to limit the weight carried to a minimum; and for a triangulation for which it is rarely possible to provide artificial signals to observe to, no better instrument could be wished for.

The aneroids were read twice daily in camp, and at important points on the march, and were chiefly used in determining small relative differences of height. For absolute heights, or for large differences, such, for example, as between the summit of the Darkot pass and the valleys on either side, where the difference exceeds 5,000 feet, their indications were not very satisfactory; the George's barometer was not used until the Mission reached the standing camp at Mihmanyol, on the Little Pamir, where a halt was made from the 18th August to the 12th September and regular readings were taken twice daily. Owing to the fact that trigonometrical determinations of height were obtained at nearly all the halting places north of the Darkot pass, neither the barometers nor hypsometers were practically required for this purpose; but the record will doubtless be of interest in comparing the record from day to day with those at the Indian meteorological stations. The measuring chains, and subtense bars of Colonel Tanner's pattern were used on several occasions. The latter, though extremely useful in measuring short distances over rough ground and where chaining is impossible, are not suitable for measurement of base lines from which any extension is intended beyond, say, 10 to 15 miles.

The Survey Party joined the Mission at Bandipura in Kashmir on the 19th, and started from there on the 21st June. Up to the Darkot pass, which was crossed on the 14th July, the country traversed had been already surveyed

* Recently killed on the eastern frontier whilst surveying with Pottenger's expedition.

CAPTAIN ALEXANDROVITCH

LIEUT COLONEL R A WAHAB R.E.

Photo-etching

COLONEL T H HOLDICH C.B.C.I.E.R.E.

MONS BENDERSKI

Survey of India Offices Calcutta October, 1896

THE BRITISH AND RUSSIAN SURVEYORS

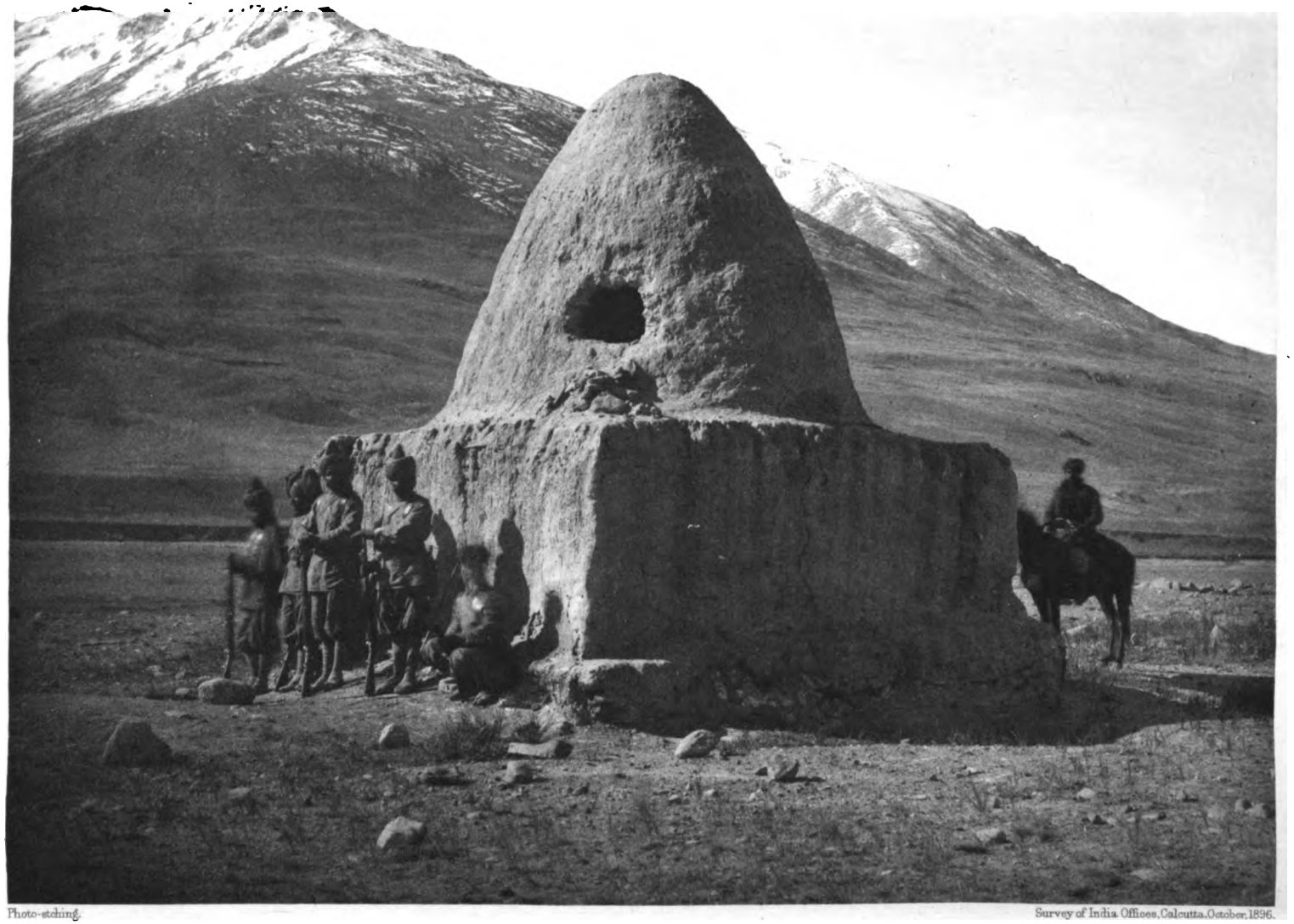
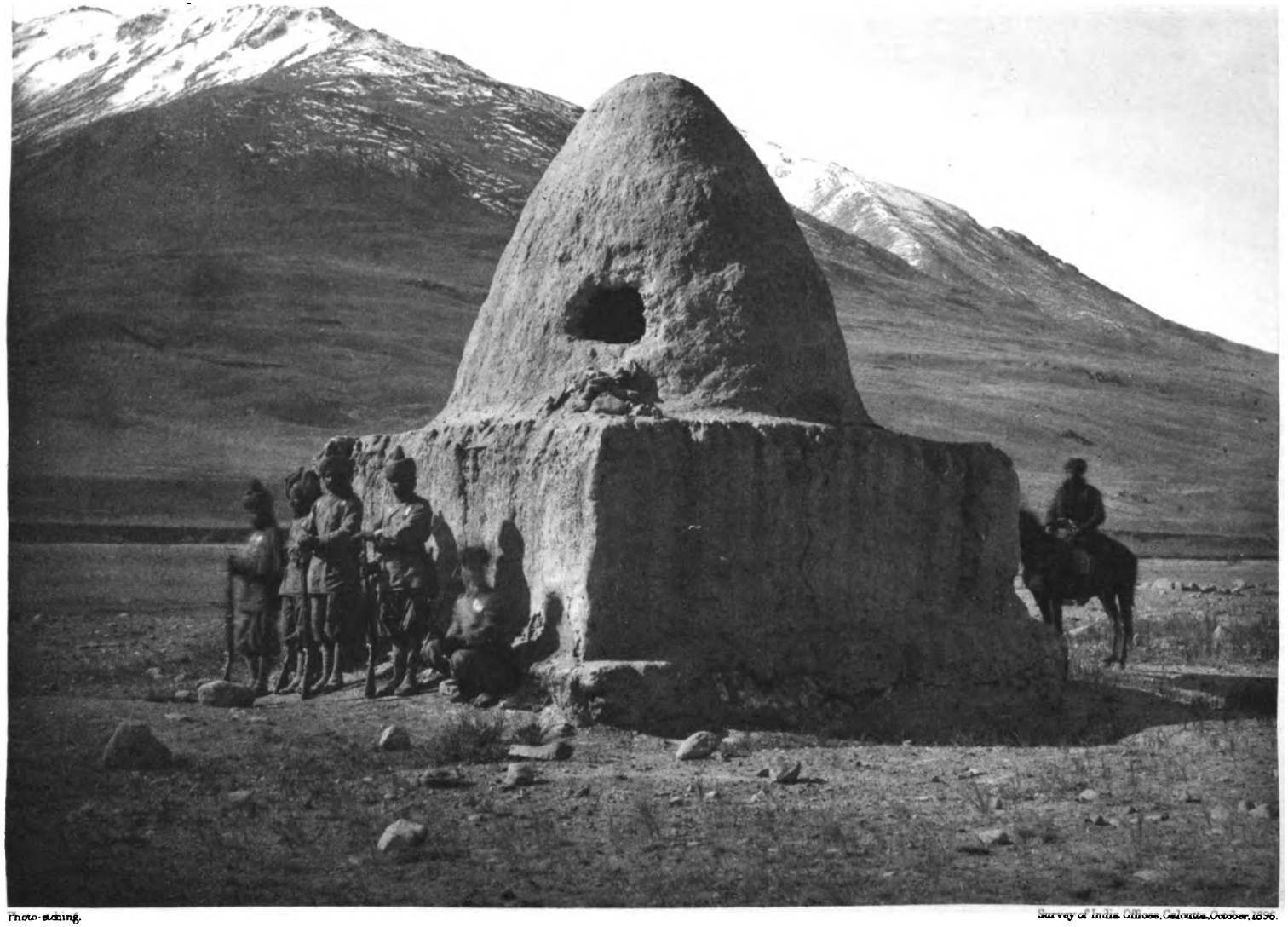


Photo-etching. Survey of India Offices, Calcutta, October 1896.

BOZAI GUMBAZ, ADVANCE GUARD OF 20TH PUNJAB INFANTRY.



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BOZAI GUMBAZ, ADVANCE GUARD OF 20TH PUNJAB INFANTRY

more or less completely; beyond this point the maps of the Pamir and Upper Oxus valleys, as far as regards materials by British explorers, were based on the route surveys of Colonel Trotter during the Yarkand Mission of 1873, which depend entirely on astronomically fixed latitudes and longitudes, and of Colonel Woodthorpe during the Chitral Mission in 1885, supplemented by routes or sketches furnished by officers of the Intelligence Department, and by independent travellers. None of them gave any topographical information beyond the actual route followed, and with the exception of Colonel Woodthorpe's carefully executed traverse over the Kilik pass and down the Wakhan valley to Kila Panja, none had any direct connection with the Indian triangulation.

The most northerly extensions of the Great Triangulation are the Khagan and the Astor minor series; from them points have been fixed by intersection on the snowy ranges north of the Indus basin up to the latitude of 36°, and these have been supplemented by a number of points fixed by Colonel Tanner on the Darkot-Kilik range, the furthest range visible from his stations on the hills above the Upper Gilgit valley. The peaks of this range (called by Colonel Tanner the Hinduraj) greatly exceed in altitude those of the more northerly Hindu Kush, which forms the water-parting between the Oxus and Indus systems; most of them exceed 20,000 feet, and though that height has been attained by Indian surveyors in the Central Himalayas where the snowfall is comparatively scanty, it was evident that with deep snow on the Darkot pass at 15,000 feet it was hopeless to think of reaching any point sufficiently high to command a view on both sides; the only feasible way then of keeping up a connection with the Indian triangulation was to find some accessible peak on the Hindu Kush within view of the Hinduraj range, and determine its position from as many previously fixed points as possible. A suitable station was found on a spur a little north of the Baroghil pass, overlooking Sarhad, and here the work of the Survey Party practically commenced. From this station, Zartigar h. s. observations were taken to peaks on either side of the Sarhad valley and to points likely to be suitable as forward stations. A station was also selected at Zartigar camp, 5,000 feet below, whose distance from the hill stations was obtained by means of a short measured base, and from the observations at these stations, sufficient points were fixed for the immediate needs of the topographers. A similar procedure was adopted at Langar camp, at Bozai Gumbaz, and at the western end of the Chakmaktin Lake. By means of these bases a connection of some sort was maintained with the original station; but the idea of superseding this method by a more or less regular series was kept in mind throughout, and was afterwards successfully carried out, when the observations were completed with more leisure, and the final results computed.

The topography of the Wakhan valley was in the mean time carried on, as well as the rapidity of the march permitted, though not without great difficulty both from the nature of the ground and the weather, which almost throughout our stay on the Pamir was against Survey work. At Langar it was decided that the head-quarters of the Mission, which was timed to reach Lake Victoria on the 22nd July, should push on, and that the Surveyors should follow in their own time. A short halt was made here, and the opportunity taken to ascend Rit. h.s. an isolated hill near Langar, commanding a view for a long distance both up and down the valley, and which had been observed to from Zartigar. On the 23rd Bozai Gumbaz was reached, where the deep gorges, through which the road had hitherto lain, were at last left behind, and the broad open valley of the Pamir was entered. On the 25th the party reached the southern foot of the Benderski, or Andamin pass, and next day a halt was made for the ascent of a peak in the neighbourhood, where a station was necessary in order to carry the triangulation over the snowy range dividing the Little from the Great Pamir. Fortunately the day was fine and clear, and from the summit of the hill (Andamin h.s.), which turned out to be 17,300 feet above the sea, a magnificent view was obtained, not only over the Great Pamir and ranges beyond it, but southwards to the whole line of Himalayan peaks fixed by the Indian triangulation. The next station visited was within sight of the Victoria Lake; from it two of the great trigonometrical

points observed at Andamin proved to be visible, and with the new basis thus obtained, a direct trigonometrical connection was made between the station in the Mission Camp, on the borders of Lake Victoria, and the stations of the Great Trigonometrical Survey with only two intermediate steps. Once established on the Pamir, no difficulty was found, beyond the physical one of climbing at high altitudes, in extending the triangulation to the furthest point reached by the Mission. A regular series of triangles was carried from Lake Victoria on the west to Kizil Robat and the Bayik pass on the east, from which intersected points have been fixed from the head of the Shighnan valley in longitude 72° 53″ to the Tagharma range beyond Sarikol in longitude 75° 9″.

On the 28th July the party reached Lake Victoria, where General Gerard and the head-quarters had arrived six days earlier, and had already commenced the delimitation in communication with the Russian Commissioners. We heard from them of the cordiality with which they had been received by our colleagues after their long march of 40 miles; and as soon as our baggage arrived we went over to the Russian camp to pay our formal visit. We found that their topographers had finished their work in the neighbourhood, and had moved on to commence the survey of the Little Pamir; but from a memorandum left by them of the latitude and longitude of No. 1 Boundary Pillar, which we were able to fix from our own work next day, we had the pleasure of knowing that here at any rate we were almost in exact accord with them.

The next few days were spent in computing the results of the triangulation, as far as it had gone, in plotting new plane tables, and observing for latitude and azimuth. A base was also measured by chain about 1¼ miles long, from which several points near the lake were fixed. The length of this base was afterwards determined in terms of the triangulation, and agrees with the measured value, the mean of six measurements reduced to sea level within 2 feet.

Three determinations of latitude gave a mean value of 37° 26′ 33″ for Boundary Pillar No. 1. The final value of the same point by triangulation is 37° 26′ 32·2″.

On the 31st the party divided, Major Wahab going on with Dan Sing to continue the triangulation, and Colonel Holdich remaining with the head-quarters of the Mission and the rest of the party to complete the topography of the Great Pamir east of the lake. Unfortunately the stay of the Mission at Lake Victoria was too short to allow our topographers to extend their work westward along the Pamir, or southward into the lateral valleys leading up to the crest of the Nicolas range which had been adopted as the boundary; the Russian Surveyors had, however, completed this part of their work before our arrival, and it was agreed that we should accept their mapping of the portion of the range between the lake and the Benderski pass rather than waste time in the re-survey of its snowfields and glaciers. Major Wahab rejoined the Mission at the Benderski pass after observing at four stations, and the whole party was occupied during the remainder of August in the topography of the Little Pamir and of the eastern part of the Nicolas range up to Kizil Robat. This part of the range was surveyed in some detail, as it was necessary, according to the terms of the agreement, to determine the point where the watershed crosses the latitude of Lake Victoria, and whence the boundary was to be defined by an arbitrary line running generally eastwards to the Chinese frontier. To clear up this point which was really the *crux* of the boundary question, a survey was made on the half-inch scale (double that of the general survey) on which the proposed positions of the boundary pillars were laid down between the Urtabel pass and the eastern end of the boundary. After its completion a long delay took place in discussing the alignment to be adopted, during which the Mission remained halted at Mihmanyol, a few miles from Kizil Robat, and the time was utilised in finishing up the field sheets, and in preparing reproductions of the maps for the use of the Commissioners and for transmission to Government. These were done by the cyanotype process, negatives being obtained on Ilford P. O. paper from tracings of the original sheets. The process is extremely simple, and the results are clear and faithful reproductions of the originals, though for artistic effect they could not compare with the beautifully drawn copies of their map made by the Russian

topographers, hand printed, and outlined in three colours, with the hills elaborately brush-shaded in burnt sienna.

During this halt at Mihmanyol three more stations were observed at, and the position of Kizil Robat Sarai, the most easterly of the Russian astronomical stations within the limits of the work, was fixed trigonometrically, so that we were now in a position to compare our values as brought up from Indian data with theirs at both extremes of the boundary. The Russian values were entirely astronomical; their latitudes obtained by direct observation, and longitudes by comparing local time with that shown by chronometers brought up from Osh. Six chronometers were used for this purpose, and Colonel Zalesky believed his probable error to be within 0·3 seconds of time, or about 5 seconds of arc. In comparing the longitudes an allowance of 2′ 27″ has been made for the probable error of the Great Trigonometrical longitudes with reference to Greenwich. The Russian heights were absolute determination by hypsometers :—

	English values.			Russian values.		
	Latitude.	Longitude.	Height.	Latitude.	Longitude.	Height.
Pillar No. 1	37°-26′-32·2″	73°-49′-00·6″	13,398	37°-26′-10″	73°-48′-59″	
Kizil Robat (Sarai)	37°-27′-26·5″	74°-47′-03·2″	12,575	37°-27′-16″	74°-47′-02″	

The agreement in longitude is remarkable. The difference in latitude is, however, more than would have been expected, and as mentioned above the astronomical value obtained by circummeridian observations to three stars taken with our 8″ theodolite was 37° 26′ 33″, which agrees almost exactly with our geodetic value.

As the differences between the Commissioners on the subject of the boundary had to be referred to their respective Governments, the delay was utilised by the survey party in extending the topography into Chinese territory in Sarikol. Beyond the desirability of improving our geographical knowledge of this region, it was important to ascertain where the recognized frontier of China actually lay, and this could best be determined by pushing on in an easterly direction until signs of effective occupation were reached. Accordingly Colonel Holdich and Major Wahab, with two surveyors, left camp on the 4th September, crossed the Bayik pass on the 5th and reached the Taghdumbash stream, head branch of the Yarkand river, on the 6th; here a small outpost, garrisoned by four Chinese soldiers, was found. On the 7th Colonel Holdich, accompanied by Mr. Macartney, started eastwards down the valley towards Tashkurgan, while Major Wahab marched west up the Taghdumbash Pamir. No signs of Chinese occupation were seen in this direction, though the nomad Kirghiz whose tents were found for some distance up the valley professed to be Chinese subjects. After visiting Kukturuk and the Kilik pass, Major Wahab's party returned by the Mihmanyol pass to the Mission Camp on the 12th September, where Colonel Holdich had already arrived, and heard that all differences about the boundary had been satisfactorily settled and all arrangements made for the break up of the Mission and the return march to India next morning.

Owing to the lateness of the season, it was important to push on the march as rapidly as possible and to re-cross the Darkot pass before its difficulties were enhanced by the first falls of snow. No opportunity, therefore, offered of leaving the direct road, or of adding to the outturn of topography anything beyond what could be seen from the line of march. The whole time available for survey on the Pamirs was thus included in the two months that had passed between our arrival in the Wakhan valley on the 17th July and our return to it on the 18th September. Within this time the boundary had been delimited for a distance of 90 miles from Lake Victoria to the Chinese frontier, an area of 4,925 square miles surveyed on the $\frac{1}{4}$-inch, and of 228 miles on the $\frac{1}{8}$-inch scale, and triangulation had been extended across the Hindu Kush as far north as the

38th parallel, and from the 73rd to the 75th meridian, covering an area of 1,820 square miles.

The party returned to Simla on the 21st October. The fair mapping was at once taken in hand in the drawing office and the triangulation has been re-computed, and the final results are given in the synopsis accompanying this report.

In the revised computations Andamin h. s. has been made the initial station of the triangulation; a number of previously fixed points were observed at this station, and with the assistance of Lieutenant-Colonel Gore, Superintendent, Trigonometrical Surveys, who was good enough to investigate the original records of the previous triangulation, the best-fixed points were selected, their mutual azimuths and distances apart computed, and the distances between them and Andamin determined by interpolation. In computing the latitude and longitude of Andamin, the azimuth at that station brought up from the observed azimuths at Victoria station and Mihmanyol station was adopted. The azimuths were obtained from observations to α and β Ursa Minoris near elongation; the difference of azimuth at Andamin deduced from the observed values at each end of the series is only 6″, so that the error introduced from this source must be very small. The error in position of the data points does not probably exceed 150 feet: the linear error of the Pamir triangulation, as deduced from the differences of common side, is 9 inches per mile, and we may therefore fairly assume that the position of Andamin as now determined is within 200 feet or 2 seconds of the truth. The heights have been deduced from those of the two Great Trigonometrical Survey points Nos. 7 and 10 fixed from the Khagan series, each by two independent deductions. The mean error of the present triangulation, as deduced from differences of common heights, is 10 feet. The topography throughout was based on the points fixed by triangulation; their preliminary values as computed in the field differ from the final values by very small amounts, not appreciable in the scale of survey.

It may be of interest to compare the positions of places fixed by previous explorers with those now determined. The position of Kala Panja was fixed by Colonel Woodthorpe by an observed latitude, and in longitude by the observed azimuth of Lunkho hill, a triangulated point on the Hindu Kush. The portion of his traverse between Sarhad and the Kilik pass falls within the area now resurveyed, and the agreement throughout is so close as to leave no doubt of the accuracy of his determination of Kala Panja on which this part of his work rests. Colonel Trotter's position of Kala Panja is 7 miles east of Colonel Woodthorpe's, and his routes down the Little Pamir and Wakhan valley to it, and thence up the Pamir river to Lake Victoria and Aktash show, as might be expected, this error in a greater or less degree, Bozai Gumbaz, Chakmaktin lake and Aktash, as shown by him, being 8 or 10 miles too far east. This error extends probably throughout his map, for Tashkurgan is 6 miles east of the position given in the Russian maps (which agree very closely wherever comparison is possible with ours); and the discrepancy in the longitude of the Tagharma range, fixed by him from direct observations near Kashgar, and not by traverse, seems to show that the position of this, his initial point, may require correction. From Mr. Ney Elias' description of this range, it is clear that there are two points of nearly equal height situated to the north-east and south-east respectively of the Little Karakul lake, which were mistaken for each other by former travellers. The north-eastern one is visible from the Kashgar plains and was fixed by Colonel Trotter during the Yarkand Mission and called by him Tagharma peak, because it was believed by the Kashgar people to be the peak overlooking Tagharma at the head of the Sarikol valley. There is, however, little doubt that this latter peak, the most conspicuous from the south and west, is not visible from Kashgar; it is the peak called by the Russians Muztagh-Ata, and is the same which Dr. Sven Hedin, the Swedish traveller, believed to be the highest, and which he ascended to a height of over 20,000 feet; the latitude which he gives in his account of his journey in the recent proceedings of the Royal Geographical Society leaves no doubt on this point. Both peaks are shown in the Russian maps; the northern one, from its position relative to the little Karakul, is their Mount

Kungur, lat. 38° 38′, long. 75° 8′ 40″; the southern one is their Muztagh-Ata, marked as 25,050 feet high, in lat. 38° 20′ and long. 75° 7′. The highest point trigonometrically fixed from the Pamir stations, is in lat. 38° 16′ 42″, long. 75° 9′ 33″, and height (a single determination) 23,800 feet; it is probably the Russian Muztagh-Ata, though this is not quite certain, as the continuation of the range northwards was hidden by intervening hills. As the range runs north and south, its longitude and that of Muztagh-Ata must in any case be almost the same; so that allowing for the difference in longitude of the Russian position of Muztagh-Ata, 2′ 3″, and altering their value of Mount Kungur to the same extent, the north-eastern point should be in longitude 75° 11′ 10″ approximately, instead of in 75° 22′ 47″ as shown by Trotter. As regards the heights of these peaks, Mr. Ney Elias, though assuming on Colonel Trotter's authority that the north-eastern one is the highest, says that local opinion gives that honour to the southern one, which stands conspicuously above everything in its neighbourhood; and if the trigonometrical height determined be that of the highest point, the heights previously shown on our maps may have to be considerably reduced.

A record is appended of the meteorological observations taken from the 19th August to the 11th September while the Mission was halting at Mihmanyol on the Little Pamir. During the remainder of the time spent on the Pamirs, it was impossible, owing to almost daily moves, to keep the record with sufficient regularity. The weather during this period was on the whole the finest and most settled we experienced and probably represents fairly the midsummer conditions of the region.

The maximum recorded was 77° on the 21st August; on the four following days maxima exceeding 70° were recorded; the lowest minimum was 11° on the 7th September. The maximum diurnal range was 63° and the mean maximum and minimum for the period were respectively 64° 4′ and 22° 2′. The following is a brief abstract of the weather from the date of crossing the Darkot pass till the return of the Mission:—From 18th to 23rd July cold and cloudy, with high wind at times; on the 24th rain fell all the afternoon turning to sleet and snow at night. The next day was cloudy and cold, mist low down on the hills; 25th to 27th fine and still; 28th July to 5th August fine, with cold frosty nights and cold west wind during the day. Cloudy weather again from the 6th, and on the 8th light rain and snow on the hills down to 14,000 feet, after which cloudy but milder weather continued till the 15th, when rain fell with a slight thunderstorm. Rain fell on the 16th, and on the following night a heavy snowstorm occurred. The snow at 8 A.M. on the 17th lay 4 inches deep, but disappeared in the course of the next day, and bright still weather set in, with high day and low night temperatures, which continued till the 26th when clouds came up with a strong westerly wind, and on the 27th rain and snow fell, and again on the 31st and on the 1st and 2nd September. From the 3rd to 7th fine weather with cold nights; on the 8th snow fell during the night, and on the 14th and 15th, with strong westerly squalls. The 17th was squally and heavy snow fell during the night and throughout the 18th, and again on the 21st when the party re-crossed the Darkot pass. On the whole the weather conditions probably resemble those of the North-western Himalayas. The unsettled character of the summer months and the direction from which bad weather almost invariably came, *i.e.*, the west and south, seem to show that the monsoon influence extends at least as far north as the Great Pamir, and this is borne out to some extent by a comparison of the weather with that during the same period in Kashmir and the North-western Himalaya stations, Murri and Simla.

The general description of the topographical features of the country and detailed descriptions of the roads and passes traversed, will be found in another part of the report.

CHAPTER VII.

SYNOPSIS OF PILLARS AND POINTS ON THE PAMIR BOUNDARY.

Number.	Latitude.			Longitude.			Height.	Description.
Pillar 1, Victoria Lake .	37°	26′	32″	73°	49′	1″	13,398	Conical stone pillar, 9 feet high, built at the eastern end of Lake Victoria on a mound rising 10 feet above the level of the lake.
	Fixed trigonometrically.							
Pillar 2 . . .	37°	24′	51″	73°	48′	44″	...	Conical pillar at the foot of the northern slope of a spur of Range Nicolas II, leading up to Peak La Concorde.
	Fixed trigonometrically.							
Peak La Concorde .	37°	20′	35″	73°	49′	14″	17,753	The central point of a conspicuous mountain peak situated on a spur running northwards from the crest of Range Nicolas II towards the eastern end of Lake Victoria, and defining the line of boundary between Pillar 1 and the crest of the range. From Peak La Concorde to Pillar 3 the boundary follows, firstly, the crest of the spur indicated by that peak to its junction with the main watershed, and thence the crest of the watershed eastwards to the Benderski Pass.
	Fixed trigonometrically.							
Pillar 3 (Benderski) .	37°	22′	36″	74°	16′	3″	14,950	Conical pillar erected on a rocky rise about 20 feet above and 20 yards to the east of the kotal, defining the Benderski Pass. From Pillar 3 the boundary continues to follow the main crest of the range to Pillar 4.
	Fixed by topographers.							
Pillar 4 (Urtabel) .	37°	24′	08″	74°	32′	32″	14,150	Conical pillar defining the crest or watershed of Range Nicolas II at the point where the Urtabel pass crosses that range. The crest at this point immediately overlooks the Little Pamir plain.
	Fixed by topographers.							
Pillar 5 . . .	37°	23′	58″	74′	33′	05″	...	Pillar 5 is situated about half a mile from Pillar 4, bearing E. S. E., and defines the main watershed to the Ganjabai peak.
	Fixed by topographers.							
Ganjabai peak . .	37°	24′	33″	74°	33′	56″	...	There is no pillar, but a pile of stones has been erected on the Ganjabai hill, at a point overlooking the plains, between the Urtabel pass and the Ganjabai stream. This pile of stones defines the upper end of the spur which conducts the boundary southwards from the main watershed to the plain.
	Fixed by topographers.							
Pillar 6 . . .	37°	23′	45·5″	74°	35′	30″	...	At foot of spur descending northward from the Ganjabai peak to the Ganjabai stream.
	Fixed by topographers.							
Pillar 7 . . .	37°	22′	26″	74°	36′	06″	...	Conical pillar on right bank of Aksu river opposite the junction of the Ganjabai and Aksu streams. From this point the boundary follows the course of the Aksu river (mid-stream) to Pillar 8.
	Fixed by topographers.							
Pillar 8 . . .	37°	24′	43″	74°	44′	6″	12,700	Conical pillar on left bank of Aksu river, about 20 feet above the river level situated on a low gravel spur which touches the river opposite the junction of the Mihmanyol stream with the Aksu river.
	Fixed trigonometrically.							
Pillar 9 . . .	37°	23′	14″	74°	44′	53″	...	The pillar is placed on a small hill on the right bank of the Mihmanyol stream, about 2 miles from the point of junction between its eastern branch and the Aksu river. The pillar is built of stone in the form of a pyramid, about 8 feet high.
	Fixed by topographers.							

Photo-etching. Survey of India. Offices, Calcutta, October, 1896.

PILLAR 1 LAKE VICTORIA.

SYNOPSIS OF PILLARS AND POINTS ON THE PAMIR BOUNDARY—*concluded.*

Number.	Latitude.			Longitude.			Height.	Description.
Pillar 10 . . .	37°	21′	53″	74°	48′	45″	...	This pillar is built at the lower end of the spur running northward from Peak Gerard of the Mustagh range, dividing the Taghramansu from the Kachkasu streams. The pillar is a pyramid of stone, about 8 feet high.
	Fixed by topographers.							
Pillar 11 . . .	37′	21′	25″	74°	50′	22″	...	This pillar is built on the bank of the Taghramansu stream, about 6·3 miles from the junction of the Taghramansu with the Bashmir stream. The pillar is a stone pyramid about 9 feet high.
	Fixed by topographers.							
Pillar 12 . . .	37′	21′	20″	74°	50′	40″	...	This pillar is built on an elevation on the left bank of a small unnamed nala joining the Taghramansu, about 1 mile from its junction and close to Pillar 11. The pillar is a stone pyramid, about 8 feet high.
	Fixed by topographers.							

METEOROLOGICAL OBSERVATIONS taken at Camp Mihmanyol, on the Aksu river, during part of August and September 1895, latitude 37° 25′ longitude 74° 44′, height above sea 12,686 feet.

Date.	Thermometer.				Barometer 9 A.M.		Barometer 4 P.M.		Weather.
	Maximum.	Minimum.	9 A.M.	4 P.M.	Inches.	Temperature of mercury.	Inches.	Temperature of mercury.	
1895.		°	°	°					
19th August .	66	13·0	43	58	18·68	53	18·66	...	9 A.M. clear morning, hard frost. 4 P.M. light clouds in afternoon.
20th ,, .	67	11·5	57	56	18·74	53	18·70	64	4 P.M. clear, light easterly breeze.
21st ,, .	77	14·0	51	58	18·76	51	18·72	63	9 A.M. clear, still morning. 4 P.M. light clouds, easterly wind afternoon.
22nd ,, .	72	20·0	49	60	18·84	53	18·74	70	9 A.M. still, slight haze.
23rd ,, .	73	18·0	50	62	18·80	53	18·70	70	9 A.M. clear, no wind (morning). 4 P.M. clear, light west wind (afternoon).
24th ,, .	75	17·0	58	70	18·80	58	18·69	75	9 A.M. clear, no wind. 4 P.M. clear, light wind.
25th ,, .	74	15·0	...	72	18·72	62	18·66	66	9 A.M. clear, still.
26th ,, .	60	24·0	57	60	18·70	50	18·68	63	9 A.M. cloudy and still. 4 P.M. high west wind, heavy cumulus clouds to east.
7th ,, .	63	35·0	53	55	18·68	53	18·64	55	9 A.M. thick clouds, rain at night. 4 P.M. clouds (cumulus).
28th ,, .	53	30·0	47	42	18·74	41	18·74	43	9 A.M. heavy mist, snow at night, still. 4 P.M. clouds clearing, no wind.
29th ,, .	60	25·0	47	47	18·78	44	18·72	56	9 A.M. light clouds, little wind. 4 P.M. squalls from west.
30th ,, .	54	26·0	45	...	18·76	47	...	...	Cloudy, light wind.
31st ,, .	58	22·0	54	47	18·78	47	18·74	51	9 A.M. light clouds and south wind. 4 P.M. cloudy and rain, little wind.
1st September .	70	26·0	48	50	18·80	56	18·72	58	9 A.M. light clouds, no wind. 4 P.M. light showers, heavy clouds, north wind.
2nd ,, .	54	31·0	51	53	18·80	50	18·74	57	9 A.M. clear, no wind. 4 P.M. heavy clouds, light rain, strong east wind.
3rd ,, .	47	30·0	37	43	18·80	45	18·78	57	9 A.M. rain all night, clouds very low, light west wind. 4 P.M. heavy clouds, east wind.
4th ,, .	68	16·0	43	53	18·86	52	18·80	56	9 A.M. fine and clear, still. 4 P.M. clear with a few clouds, south wind.
5th ,, .	69	15·0	44	58	18·88	46	18·82	70	9 A.M. clear, light south-east wind. 4 P.M. clear, wind variable.
6th ,, .	70	12	47	...	18·86	51	18·78	...	9 A.M. clear, light south wind. 4 P.M. clear, moderate west wind.
th ,, .	62	11	51	64	18·82	57	18·71	69	9 A.M. clear, light south wind. 4 P.M. clear, west wind.
8th ,, .	61	35	43	47	18·72	47	18·64	52	9 A.M. overcast, light east-north-east wind. 4 P.M. overcast, east wind.
9th ,, .	63	26	38	51	18·70	45	18·67	55	9 A.M. overcast, snow at night, still. 4 P.M. fine, clouds to east, west wind.
10th ,, .	66	20	46	49	18·69	50	18·67	55	9 A.M. fine, light clouds to east, light west wind. 4 P.M. thick clouds, north-west wind.
11th ,, .	...	20	43	51	18·77	48	18·70	57	9 A.M. fine, no wind. 4 P.M. west-north-west wind.
Means .	64·4	23·2	48	55	18·761	50·4	18·710	60·3	
			Correction to 32°		−·036		−·036		
					18·725		18·674		

CHAPTER VIII.

REPORT UPON THE NATURAL HISTORY OF THE PAMIR BOUNDARY COMMISSION.

SECTION 1.

Introductory and Explanatory.

THE Commission left Bandipur in Kashmir on the 21st June, and returned to Bandipur on the 12th October, and all the species mentioned in this report were collected between those dates.

The entire collection consists of 143 species of animals and 116 species of plants, of which 66 species of animals and 115 of plants came from the Pamirs.

These results may seem small; but it must be borne in mind, first, that, beyond the already well-known limits of Gilgit, the country traversed by the Commission is one that, except for a few isolated spots of cultivation, may be fairly described as barren and inhospitable; secondly, that considerations of decisive political importance forbade any sort of delay along the road; and thirdly, that although no overwhelming difficulties of transport actually occurred, they were anticipated to such a degree as to make rigid retrenchment of collecting material obligatory. In short, and more especially in so far as the collections made along the road are judged, it has to be remembered that the expedition was first and foremost a political one, and that any efforts in behalf of natural history that might have delayed its progress towards the scene of action, or that might have impeded its return before the closing of the passes, were quite out of question.

Since the country on this side of Gilgit was considered to be well known, or, at any rate, to be always open to future observation, and since, as already stated, economy of transport was necessary at the start, it here seemed advisable to increase our collections with judgment, and only at places—such as the higher passes—which are less easily accessible to ordinary collectors. In this part of our journey, therefore, only a few examples of the Alpine flora of the Burzil were preserved, and only such animals as were specially desirable.

Again, between Gilgit and Bozai Gumbaz, botanical collection, in the circumstances, had to be left alone. In our hurried passage it would have been impossible, even with unlimited transport, to make anything like a complete collection; and rather than bring away a few haphazard specimens, it was thought preferable to keep all collecting material intact for the less accessible flora of the Pamirs. But so far as zoology was concerned, everything that could be got along this part of the march was preserved.

On the other hand, when the Pamirs were reached, every effort was made to get together as complete and representative a collection as possible; and cabinet specimens of the rocks, and of most of the animals and of almost every plant seen, were brought away.

The rocks have been described by Mr. T. H. Holland, of the Geological Survey; the plants have been determined by Mr. Duthie, of the Botanical Survey; and the animals by myself, with the assistance of specialists whose names are mentioned in their appropriate place.

SECTION 2.

Remarks upon the More Obvious Natural Features of the Pamirs.

In a general view, the Great and Little Pamirs are simply the broad alluvial valleys of the sources of two of the large original affluents of the River Oxus. Although the Commission stayed for some days in the eastern part of the Great Pamir, the greater portion of its time was passed in the Little

Pamir, which was traversed from west to east, and could therefore be more leisurely and critically observed; so that an outline of the natural features of the Little Pamir may take the first place.

The Little Pamir—assuming its extremes to be the Andamin Pass on the west, and the Kizil Robát bluffs on the east—is the broad alluvial basin of the first fifty miles, or so, of the river Aksu. Its greatest breadth is not more than four or five miles, and it lies, east-north-east and west-south-west, at an elevation of about 13,000 feet. It is bounded north and south by grassy downs, which rise to a height of about 18,000 feet and culminate in sharp-cut peaks,—most of these, especially on their northern faces, being capped with perpetual snow. The continuity of these downs is much broken, especially on the southern side of the Pamir, by broad nullahs, which open into the Pamir almost at right-angles; every nullah having its head in a snow-field or small glacier, which drains, down a bouldery channel in the nullah bed, into the river Aksu.

The basin, or valley, of the Pamir forms a broad undulating surface, with more or less distinct remains, along its sides, of old river-terraces. These show that in past times, when probably the altitude of the mountains themselves was greater, the river Aksu ran at a much higher level than it does now. These old river terraces are most distinct at the eastern end of the Pamir, near the Mihmanyol Pass and Kizil Robát, where they appear as sharp-cut banks of recently formed conglomerate, and as abrupt hillocks of shingle and boulders.

The surface of the Pamir, although largely covered with tussocks of grass and other stunted vegetation, often consists of bare stretches of hard sand and shingle, coated with a saline efflorescence. Here and there, especially on the old river-terraces, occur colossal boulders of gneiss and masses of limestone, which, by the chance observer, might be mistaken for ice-borne erratics; but which, by their uniformity of distribution, are clearly only the remains of deep-seated beds that have been laid bare, and in great part denuded, by the action of the river and its numerous affluents.

The river runs with some rapidity in a broad bed of boulders, and often expands into marshes and lakelets; one chain of which, known as Chakmaktin Kul or Oi Kul, is of respectable size.

A very characteristic feature of the Pamir, in summer, are the tracts of deep grassy bog that skirt the river and all its tributaries. Equally characteristic is the rolled or beaten-down appearance of the surface soil everywhere, the evident result of a long-lying weight of snow.

The principal rocks of the Pamir, in order of abundance, are (1) black carbonaceous shales and hard argillaceous sandstones, (2) granitites, (3) quartzite conglomerate, (4) limestones, (5) true volcanic rocks. No fossils were met with.

The shales and sandstones form the great mass of the hills that bound the Pamir, and crushed quartzite conglomerate occurs in beds of considerable thickness along the lower slopes of these hills, especially of those of the northern range. Limestone also crops out in places, all along the lower slopes of the northern range, as well as in other places to be presently mentioned. The granitites occur largely in the open Pamir, in the form of large boulders and beds of large pebbles, the river-terraces and hillocks already mentioned being formed almost entirely of the water-worn débris of these igneous rocks, though they are also found in places as colossal boulders, on the lower slopes of the hills.

The true volcanic rocks occur mostly at the eastern end of the Pamir, and consist of andesite-rhyolites associated with hard limestone-conglomerate and limestone-breccia. The red rocks from which Kizil Robát derives its name are, in fact, a range of bold bluffs and scarps consisting largely of limestone-conglomerate coloured by a ferruginous cement, and of red volcanic rock.

Associated with these volcanic rocks, but on the opposite side of the river Aksu, is a cluster of sulphuretted hydrogen springs, the temperature of which is that of a comfortable hot-bath. These springs well out on both sides of a deep ravine, the rocks exposed in which are chiefly rhyolitic andesite of a

dark red colour. The largest spring has formed for itself a cone of calcareous sinter about forty feet high, and there is another extinct cone and crater of not much smaller size close by.

Incidentally, it may give some idea of the summer climate of the Pamirs to note, regarding this spring, that about noon on a cloudy day in the middle of August, although the water as it welled out of the top of the cone must have been of a temperature near 105° Fahr., yet as it trickled over the stalactites of sinter at the edge of the cone it was in part converted into icicles.

Another fact of interest regarding this spring is that it is held in great medicinal repute, among the Kirghiz, especially among the women. It has, therefore, been roughly walled in and somewhat imposingly decorated with rude banners and standards of yaks' tails.

The black sandstone and shale of which the downs that bound the Pamir chiefly consist, are hard, brittle, and fissile, weathering, under the action of frost, in flakes, which, on these comparatively gentle slopes, collect to form very characteristic "shoots" of tatus. On these "shoots," which as they accumulate often grow out into terraces, the "forms" of *Ovis poli* are often to be found, especially on southerly aspects.

As already stated, the Pamir, both as to its open surface and as to its slopes, is more or less covered with grasses, the commonest of which is a species identified by Mr. Duthie as *Poa attenuata*. From early times the Pamir grass has been noted for its richness. Marco Polo (Marsden's translation, London, 1818, page 142) wrote of it "such indeed is its quality that the leanest cattle turned upon it would become fat in the course of ten days." And Wood, in his journey to the source of the Oxus (London, 1841, page 365), mentions the Kirghiz telling him that "the grass of the Pamir is so rich that a sorry horse is here brought into good condition in less than twenty days." Our own experience quite accords with this, for of the many pack-animals met with on our return march from Gilgit to Kashmir, none approached our baggage-ponies in condition.

Besides grass there is a good deal of wormwood, the roots of which furnish a meagre fuel—the only fuel besides cattle-dung to be got in this part of the world.

There is no large vegetation of any kind; the biggest plant that I myself saw was a Larkspur about eighteen inches high and with a crown about a foot in diameter.

The most noticeable characters of the Pamir plants are the strength and bulk of the root; the large size and quick maturation of the flower, compared with the leaves; and the toughness and persistence of the seed-vessels. For instance, in exposed situations, it is not uncommon to find a *Primula* which consists of a large bunch of roots surmounted by a large head of flowers, with not more than two or three small leaves between, and with the dried flower-stalk and seed-capsules of the last year still attached and in perfect preservation.

These are well-known features of Alpine and boreal vegetation, and have been explained as the direct results, under Natural Selection, of a short and sudden summer following on a long and severe winter. In such circumstances the plants more likely to survive and multiply will be those in which the tendencies to store up a reserve of nutriment in a protected root rather than in an exposed stem; to mature the flower (upon which, in the first instance, the propagation of the species depends) before the leaves; and to form strong and resistent seed-envelopes, are most marked.

That the flora of the Pamir is meagre may be judged from the fact that although I gathered specimens of every plant that I saw, except of a species of Rhubarb never seen in flower, only 115 species were yielded.

The fauna of the Pamir is as poor as the flora.

Of mammals by far the commonest is the golden marmot, whose shrill danger-signal is one of the most characteristic sounds of these silent altitudes. Another common mammal is the Tibetan or Pamir hare, which from its semi-gregarious and burrowing habits resembles a rabbit rather than a hare.

Ovis poli, though certainly abundant on its own particular grounds, is more in evidence in summer by reason of the horns and portions of skulls that strew the ground everywhere.

Much the commonest bird is the horned lark. The red-billed chough is also abundant, and the common raven quickly collects about an encampment.

Along the streams the Tibetan tern is a common bird, and in every high nullah the marks of the snow-cock abound. The Ossifrage or Lammergeyer (the "Golden Eagle" of Anglo-Indians) is the principal bird of prey, and it is said that it can often be seen chasing hares.

Not a single reptile or Batrachian was found, although they were searched for in likely places; and it seems probable that neither of these classes of animals is represented at this intensely cold elevation.

Fishes, all of the Carp family, were numerous in every stream and pool, both adults and fry, the commonest being *Schizopygopsis Stoliczkæ*. It must be either this fish, or a *Schizothorax* which I identify as *S. Fedschenkoi*, that travellers in this region have spoken of as "trout." That fishes are so abundant is probably due to the facts that they have few enemies, and that food, in the form of water-snails and larvæ of chironomid flies, is plentiful. *Schizopygopsis* would generally take the small fly-spoon, and *Schizothorax* was best caught with a sunk bait of raw meat.

Insects were not numerous: the collection includes only a few species of flies and butterflies, none of which were at all abundant.

Of Crustacea, a few water-fleas and sand-hoppers were found in Chakmaktin Lake.

Two species of spiders were fairly common among boulders, in damp situations, and a third species used to frequent our tents. Unfortunately my specimens of them were lost, and with them a centipede found by Colonel Wahab in his tent, and a small collection of moths.

The Great Pamir, of which, however, I explored only a small part of the eastern end, seemed to be in all respects similar to the Little Pamir. Its surface configuration is much the same, its rocks are the same, and at Jarti Gumbaz are hot sulphuretted hydrogen springs, similar to those near Kizil Robát, but more numerous and of a higher temperature.

The vegetable and animal life is quite the same, but butterflies—chiefly meadow-browns and a species of *Parnassius*—were considerably more numerous.

It is necessary here to refer to the climate of the Pamirs only in a general way. The Commission had experience of it from the 20th July to the 16th ~~October~~ Sept. During that time the most noticeable meteorological event was the high and bitterly cold wind that, springing up nearly every day in the forenoon, would last until sunset. The nights were almost without exception intensely frosty.

A succession of many fine days was uncommon.

Snow-squalls were of frequent occurrence: there was a heavy one in the morning of the 24th July, when the snow lay thick on the ground round our tents, and did not disappear until noon; and there were two equally heavy ones in the last half of August.

There was a heavy shower of rain and sleet in the forenoon of the 15th August.

By the middle of September the ice formed at night on the marshy pools near the Aksu, did not melt until late in the morning.

Before describing the zoological collection it is necessary to correct the impression, an impression which appears to be traceable to a Kirghiz statement repeated by Wood (*Journey to the Source of the Oxus*, page 364), that in summer the Pamir Lakes swarm with aquatic birds, which have come to breed.

The bar-headed goose, the Brahminy duck, and a few other ducks, were seen on Chakmaktin Lake and on Lake Victoria, in July, and on the 25th July I saw, at a distance, on Lake Victoria, a pair of ducks or geese with a young brood. Also, all through August and the latter part of July, the Tibetan tern was seen every day, and the cormorant, the red-shank, and several species of plovers and sand-pipers might be seen any day.

But that there was any great concourse of aquatic birds, more particularly of breeding birds, was as far as possible from being the case. Neither the Chakmaktin chain, nor the Victoria chain of lakes offer any attraction as a breeding ground; for their banks are low and bare, and they are singularly deficient in aquatic vegetation, and so they afford neither the cover nor the feeding-grounds required.

At the end of August, snipe, teal, ducks and geese began to appear in gradually increasing numbers, but they were all very clearly on their winter migration southwards.

SECTION 3.

A systematic Account of the Zoological Collection made on the Pamirs.

MAMMALS.

Order *CARNIVORA.*

Family CANIDÆ.

1. VULPES ALOPEX (L.) var. FLAVESCENS, Gray.—The pale variety of the common Fox.

Vulpes flavescens, Gray, Ann. Mag. Nat. Hist. XI, 1843, p. 118: Hutton, J. A. S., B. XIV, p. 344: Adams Proc. Zool. Soc., 1858, p. 516: Blyth Cat., p. 42: Blanford, Mammals of 2nd Yarkand Mission, p. 22, pl. ii.

Vulpes alopex var. *flavescens*, Blanford, Fauna Brit. India, Mammals, p. 153: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 268.

This race of the common fox is not uncommon on the Pamirs. The single specimen obtained is very much lighter-coloured than any of those in the Indian Museum collection.

On one occasion Colonel Wahab and I, at an elevation of over 16,000 feet, came across one stalking a flock of snow-cock: it showed great curiosity, but not much fear, at seeing us.

[No other carnivora were obtained, but the following were seen :—

A wolf, probably the common wolf (*Canis lupus*) :

A bear, probably the brown bear (*Ursus arctus*) :

A weasel, probably the yellow-bellied or pale weasel (*Putorius alpinus*), a specimen of which was shot on the Burzil Pass in Kashmir, at an elevation nearly equal to that of the Pamir.]

Order *RODENTIA.*

Family SCIURIDÆ.

2. ARCTOMYS AUREUS, Blanford.—The Golden Marmot.

Arctomys aureus, Blanford, J. A. S. B., Vol. XLIV, pt. 2, 1875, pp. 106 and 123, and Mammalia of 2nd Yarkand Mission, pp. 33-36, pls. xi, xi *a*: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 43.

During July and August the golden marmot was the commonest mammal of the Pamirs, and its cry, which consists of a prolonged whirring scream followed by several short sharp expletives, was one of the most familiar sounds. In September, however, the marmot was seldom seen or heard.

The relative length of the tail in this species varies greatly, and appears to decrease with age. Of five specimens shot on practically the same spot near Lake Victoria, two young males have the tail half, or a little more than half, the length of the head and body; two females have the tail, respectively, a

little less than half, and two-fifths, the length of the head and body; while in an old male the tail is between a third and a fourth the length of the head and body.

In adults the general colour, in summer, was, as described by Blanford, tawny to rich brownish yellow, irregularly shot with black; but the tip of the tail was as often dark reddish-brown as black. The general colour, however, of a very young male was more like that of *A. hodgsoni*, Blanford — a rusty cat-grey, while half the tail was black.

The Pamir marmot is extremely alert. Severtzov states definitely that the brown bear is accustomed to dig them out of their burrows, and that the Lammergeyer also preys upon them.

Family MURIDÆ.

3. ARVICOLA BLANFORDI, Scully.—The Gilgit Vole.

Arvicola blanfordi, Scully, Annals and Magazine of Natural History (5) VI, 1880, p. 399, and P. Z. S., 1881, p. 206: Blanford, Journal, Asiatic Soc. Bengal, Vol. L., pt. 2, 1881, p. 104, pl. i., fig. 3: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II., p. 91.

Microtus blanfordi, Blanford, Fauna of Brit. India, Mammals, p. 432.

Unfortunately, the label has come off the only specimen caught, and I am not absolutely certain whether it came from the Pamir, or from the heights near by to the south-west.

4. CRICETUS PHÆUS, Pall.—The Grey Hamster.

Mus phæus, Pallas, Novæ species Quadrupedum Glirium, p. 261, pl. xvi.

Cricetus phæus, Pallas, Zoographia Rosso-Asiatica, Vol. I., p. 163: De Filippi, Viaggio in Persia, p. 344: Blanford, Zool. and Geol. of E. Persia, p. 58, and Mammals of 2nd Yarkand Mission, p. 4, and Journal, Asiatic Soc. Bengal, Vol XLVIII. pt. 2, 1879, pp. 96-97, and Fauna of Brit. India, Mammals, p. 436: Danford and Alston, Proc. Zool. Soc. 1880, p. 61: Scully, P. Z. S. 1881, p. 205: Oldfield Thomas, Trans. Linn. Soc. Zool., May 1889, p. 59: Radde and Walter, Zoologische Jahrbuch. Syst., etc., IV., 1889, p. 1032: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II., p. 85.

Cricetus isabellinus, De Filippi, Viaggio in Persia, p. 344: Blanford, Zool. and Geol. of E. Persia, p. 59, and Fauna Brit. Ind., Mammals, p. 437: Scully, P. Z. S. 1881, p. 205.

Cricetus fulvus, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLIV., pt. 2, 1875, p. 108, and Mammals of 2nd Yarkand Miss., p. 45, pl. ix., fig. 1, pl. xb. fig. 3, and Journ. Asiat. Soc., Bengal, Vol. XLVIII., pt. 2, 1879, pp. 96-97, and Fauna Brit. Ind., Mammals, p. 437: Scully, P. Z. S. 1881, p. 205.

The habits of this little animal have been noticed by all its observers. It was constantly found in our tents on the Pamirs, especially in the one containing Commissariat stores. Scully (*loc. cit.*) was the first to recognize the probable identity of the three species, and his opinion is adopted by Sclater. Our series of specimens quite confirm Sclater's synonomy.

Family LEPORIDÆ.

5. LEPUS TIBETANUS, Waterhouse.—The Hare of Little Tibet.

"Hare of Little Thibet," Vigne, Travels in Kashmir, Vol. II, p. 268.

Lepus tibetanus, Waterhouse, Proc. Zool. Soc., 1841, p. 7, and Nat. Hist. Mamm., Vol. II, p. 58: Günther, Annals and Magazine of Natural History, (4) XVI, p. 228: Blanford, Mammals of 2nd Yarkand Mission, p. 63, pl. iv, fig. 2: Scully, P. Z. S., 1881, p. 207: Oldfield Thomas, Trans. Linn. Soc. Zool., May 1889, p. 61: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 114: Blanford, Faun. Brit. Ind. Mammals, p. 452 (*partim*).

Lepus lehmanni, Severtzov, (1873) Ann. Mag. Nat. Hist. (4) XVIII, 1876, p. 169: Scully, Journ. Asiat. Soc., Bengal, Vol. LVI. pt. 2, 1888, p. 76: Radde and Walter, Zoologische Jahrbuch. Syst., etc., IV. 1889, pp. 1054 and 1055, foot-note.

Lepus pamirensis, Günther, Ann. Mag. Nat. Hist. (4) XVI, Sept. 1875, p. 229: Blanford, Journ. Asiatic Soc., Bengal, Vol. XLIV, pt. 2, 1875, p. 110, and Mammals, 2nd Yarkand Miss., p. 67, pl. v, fig. 1, pl. va, fig. 1: W. Sclater, Cat. Mamm, Ind. Mus., Vol. II, p. 114.

Lepus Stoliczkanus, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLIV, pt. 2, 1875, p. 110, and Mammals of 2nd Yarkand Miss., p. 68, pl. v, fig. 2, pl. va, fig. 2: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 115.

Lepus biddulphi, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLVI, pt. 2, 1877, p. 324.

This, the only hare seen, was extremely common on the Pamirs, and even commoner on the high slopes of the Wakhan Valley between Langar and Bezai Gumbaz, where in places it was almost gregarious.

Photo etching

Survey of India Offices, Calcutta, October, 1886.

HEAD AND SKIN OF OVIS POLI.

Vigne, who truly calls it a "lank and long-legged animal" says that it sometimes makes its "form" in holes underneath rocks, but on the Little Pamir I often saw it run into deep burrows.

In the male the black tips to the ears are often more conspicuous than in the female. Sclater (Cat. Mamm. Ind. Mus., II., 115) has already expressed the opinion that *L. Stoliczkanus* and *L. pamirensis* are, in all probability, identical with *L. tibetanus*, and I fully agree with him.

L. craspedotis, which Mr. Blanford now synonomizes with *L. tibetanus*, is at once distinguished by the enormous relative size of the ears; so that Mr. Blanford's statement, in the Fauna of British India, that *L. tibetanus* is found as low as 500 feet above sea-level—if, as appears from the context, the statement is founded on the supposed identity of *L. craspedotis* with this species—needs confirmation.

For two fine specimens the collection is indebted to Colonel Wahab.

Order *UNGULATA*.

Family BOVIDÆ.

6. Ovis poli, Blyth.—The Great Pamir Sheep.

Ovis poli, Blyth, Proc. Zool. Soc., 1840, p. 62, and Ann. Mag. Nat. Hist., Vol. VII, 1840, p. 195, pl. v, figs. 1-4, and Journ. Asiat. Soc., Bengal, Vol. X, 1841, p. 858: Horsfield, Cat. Mamm. Mus. of Hon. E. I. Co., p. 176: Sclater, P. Z. S., 1860, p. 443: Severtzov, Fauna Turkestan, etc. (Moscow, 1873), pp. 84-102, 150, pls. ii. iii. v, figs. 1-2, vi, fig. 1, and Ann. Mag. Nat. Hist. (4) XVIII, 1876, pp. 171, 210, 220: Stoliczka, P. Z. S., 1874, p. 425, pl. liii: Biddulph, P. Z. S. 1875, p. 157: V. and B. Brooke, P. Z. S., 1875, pp. 514-517, figs. 4, 5: Blanford, P. Z. S., 1875, p. 540, and Mammals of 2nd Yarkand Miss., p. 83, and P. Z. S. 1884, pp. 326-329, figs. 1-3, and Fauna Brit. India, Mammals, p. 496: Grote, P. Z. S. 1876, p. 415: Prejevalski Petrs. Mitth. Erzb., XII, 1878, pp. 5, 17: Wood-Mason and Bid dulph, Proc. Asiat. Soc., Beng., 1870. p. 289: Scully, P. Z. S., 1881, p. 209: Sclater, Cat. Mamm. Ind. Mus. Vol. II. p. 133.

Ovis Karelini, Severtzov, Fauna Turkestan, etc. (Moscow, 1873), pp. 84-102, 150, pls. i., v. figs. 3, 4, vi., figs. 3, 4, and Ann. Mag. Nat. Hist. (4) XVIII, 1876, pp. 171, 210, 217: V. and B. Brooke, P. Z. S., 1875, p. 512: Blanford, Mammals, 2nd Yarkand Mission, p. 80.

See also Travels of Marco Polo, trans. by Wm. Marsden, London, 1818, pp. 142, 143; and Yule's Book of Ser. Marco Polo, London, 1875, Vol. I, pp. 185, 186, and Wood's Journey to the Oxus, London, 1841, pp. 340, 368, and 2nd Ed., 1872, pp. 223, 241.

During the whole time of our stay (20th July to 16th September) the great Pamir sheep was often seen in large herds numbering sometimes over a hundred individuals, which, however, at this season, were all females and young males. The only large adult males brought into our camp were two shot on the 16th September, near Bozai Gumbaz, by Lieutenant Ossetinsky of the 16th Turkistan Line Battalion, one of which Mr. Ossetinsky was generous enough to give to me for the Indian Museum.

This and three other perfect specimens make a fine series, which will shortly be exhibited in the Indian Museum, to illustrate growth-change and the development of secondary sexual characters in this species.

The only other wild ungulate seen on the Pamirs was the Himalayan Ibex (*Capra sibirica*).

BIRDS.

In the identification of the birds I have been very materially assisted by Mr. F. Finn, Deputy Superintendent of the Indian Museum, without whose aid I should have been unable, within the time at my disposal, to come to satisfactory conclusions in a group in which there is so much conflict of opinion.

With regard to references, we have thought it sufficient to refer, where possible, to the Catalogues of Birds in the British Museum, and, in addition, to the Reports of the more important English and Russian Expeditions to Central Asia.

Order *CARINATÆ*.

Sub-order *PASSERES*.

Family CORVIDÆ.

1. CORVUS CORAX, L.—The Raven.

Corvus corax, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 14, and Birds of the 2nd Yarkand Mission, p. 15.

Ravens were common on the Pamirs, and collected in great numbers near the joint camp of the two Commissions at Mihmanyol.

The bell-like note referred to by Oates, on Blanford's authority, as peculiar to the Sind raven, was frequently heard. (I have often heard the same note in E. Baluchistan.)

2. GRACULUS GRACULUS (L.).—The red-billed Chough.

Graculus graculus, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 146, and Birds of the 2nd Yarkand Mission, p. 21.

The red-billed chough was extremely common on the Pamirs during the whole period of our stay. On the march up in July I did not notice it until we reached Sarhad, in the Wakhan Valley, about 10,500 feet; but on the march down, in September and October, it was common enough in the Yasin Valley, down to 8,000 feet.

Family SYLVIIDÆ.

3. PHYLLOSCOPUS HUMII (Brooks).—Hume's Willow-warbler.

Phylloscopus humii, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 67 : Sharpe, Birds of 2nd Yarkand Mission, p. 78.

A female in good plumage appears to us to correspond with this species, of which—as also of *P. superciliosus*—we have large series for comparison. It was shot on the Little Pamir, by the banks of the Aksu.

A little bird, apparently this species, used to frequent our tents at Mihmanyol.

Family TURDIDÆ.

4. ERITHACUS CÆRULECULUS (Pall.).—The red-spot Bluethroat.

Erithacus cæruleculus, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 306.
Cyanecula cæruleoula, Sharpe, Birds of 2nd Yarkand Mission, p. 89.

A single specimen was caught alive in our camp at Mihmanyol.

5. RUTICILLA ERYTHROGASTER, Güldenstadt.—Güldenstadt's Redstart.

Ruticilla erythrogastra, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 347.
Ruticilla erythrogaster, Sharpe, Birds of 2nd Yarkand Mission, p. 88.

In its habits this species very much resembles the white-cap water-redstart. On the Pamirs it was only found above 15,000 feet, in sheltered nullahs, on rocks in or alongside mountain torrents. On this account specimens were hard to get, most of those shot being lost in the torrent.

One of our specimens is immature.

6. SAXICOLA MONTANA, Gould.—Gould's Chat.

Saxicola montana, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 384; Sharpe, Birds of 2nd Yarkand Mission, p. 85.

An adult male in winter plumage, and an immature bird.

Family ORIOLIDÆ.

7. ORIOLUS KUNDOO, Sykes.—The Indian Golden Oriole.

Oriolus Kundoo, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 194, and Birds of 2nd Yarkand Mission, p. 24.

A young oriole caught, in an exhausted state, near our camp at Mihmanyol, on the Little Pamir, agrees with *O. galbula* in having the dusky marking of the head confined to the lores, but the wing-measurement is that of *O. Kundoo*.

Family FRINGILLIDÆ.

8. MONTIFRINGILLA BRANDTI (Bonap.).—The Sooty Mountain-finch.

Montifringilla brandti, Sharpe, Brit Mus. Cat. Birds, Vol. XII, p. 269, and Birds of 2nd Yarkand Mission, p. 32.

Seen in July and August, in small flocks, among the flowering grasses of the lower slopes, about 15,000 feet.

Family MOTACILLIDÆ.

9. MOTACILLA PERSONATA, Gould.

Motacilla personata, Sharpe, Brit. Mus. Cat. Birds, Vol. X, p. 479, pl. v., figs. 3, 4, and Birds of 2nd Yarkand Mission, p. 56.

This wagtail was common along the banks and marshes of the River Aksu.

10. MOTACILLA CITREOLOIDES (Hodgs.).

Motacilla citreoloides, Sharpe, Brit. Mus. Cat. Birds, Vol. X, p. 507, and Birds of 2nd Yarkand Mission, p. 60.

Also common along the Aksu.

Family ALAUDIDÆ.

11. OTOCORYS PENICILLATA, Gould., var. PALLIDA, Sharpe.—Horned Lark.

Otocorys penicillata, var. *pallida*, Sharpe, Brit. Mus. Cat. Birds, Vol. XIII, p. 533.
Otocorys pallida, Sharpe, Birds of 2nd Yarkand Mission, p. 49.

This is the common lark of the Great and Little Pamirs.

Our *male* specimens show a gradation from union of the black throat-band with the black ear-coverts, to separation.

Our series includes a fledgeling chased from its parents while being fed.

[Hirundo sp.

A species, probably the common swallow (*Hirundo rustica*), which according to Severtzov ("Ibis," 1883, p. 70) passes through the Pamirs from the end of August to the end of September, was occasionally seen near Mihmanyol in August.]

Sub-order *PICARIÆ*.

Family PICIDÆ.

12. IYNX TORQUILLA, L.—The Wryneck.

Iynx torquilla, Hargitt, Brit. Mus. Cat. Birds, Vol. XVIII, p. 560 : Sharpe, Birds of 2nd Yarkand Mission, p. 110.

A single specimen was shot on the Little Pamir, near Mihmanyol. Its colour so exactly harmonized with the tones of the country, that a casual observer might have been forgiven for supposing that it illustrated what Prof. Poulton has called anticryptic "protection."

Severtzov has already reported this species from the Pamir.

It must be remembered that for many miles round there was not a tree or bush of any kind.

Family UPUPIDÆ.

13. UPUPA EPOPS, L.—The common Hoopoe.

Upupa epops, O. Salvin, Brit. Mus. Cat. Birds, Vol. XVI, p. 4: Sharpe, Birds of 2nd Yarkand Mission, p. 110.

The common Hoopoe was almost common on the Little Pamir after the middle of August, and appeared to be perfectly at home, in spite of occasional snowstorms and excessively cold nights.

Family CROACIIDÆ.

14. CORACIAS GARRULA, L.—The European Roller.

Coracias garrula, Sharpe, Brit. Mus. Cat. Birds., Vol. XVII, p. 15: Birds of 2nd Yarkand Mission, p. 113.

Several specimens were seen on the Little Pamir about the middle of August. It does not appear to have been recorded from here before.

Sub-order *STRIGES*.

Family BUBONIDÆ.

15. CARINE BACTRIANA, Hutt.—The Bactrian Owl.

Carine bactriana, Sharpe, Birds of 2nd Yarkand Mission, p. 14, pl. iii (1891).
Athene bactrianus, Hutton, Journ. Asiatic Soc., Bengal, Vol. XVI, Pt. 2, 1847, pp. 776, 777.
Carine noctua sub sp. *plumipes*, Sharpe, Brit. Mus. Cat. Birds, Vol. II, p. 137.

A young male was caught alive among the rocks, near Bozai Gumbaz. It differs from adults in our collection, obtained by Scully, Stoliczka and Aitchison, much in the same way as the young of *C. brama* differs from the adult, namely, in being of a duller shade and in having the white markings—especially those on the back of the head—less distinct. *Donor:* Major-General M. G. Gerard.

Sub-order *ACCIPITRES*.

Family FALCONIDÆ.

16. GYPAËTUS BARBATUS (L.).—The Lammergeyer.

Gypaëtus barbatus, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 228, and Birds of 2nd Yarkand Mission, p. 6.

The Lammergeyer was common on the Pamirs.

The only specimen obtained was an adult male, in beautiful plumage, presented by His Excellency General Poválo-Schveikovsky.

17. HALIAËTUS LEUCORYPHUS (Pall.)—Pallas's Sea-eagle.

Haliaëtus leucoryphus, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 308, and Birds of 2nd Yarkand Mission, p. 8.

The only specimen obtained is a young male in dirty and abraded condition; but specimens in adult plumage were often seen along the R. Aksu.

18. MILVUS MIGRANS, Bodd.—Kite.

Milvus korschun, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 322.
Milvus ater, Severtzov, Birds of the Pamir, in "Ibis," 1883, p. 53.

Only one specimen was seen: it was shot near Mihmanyol.

[BUTEO FEROX (Gm.).

Buzzards, which were almost certainly this species, frequented our camp near Mihmanyol. They were too wary to give a shot within killing distance.]

[FALCO REGULUS, Pall.

A little hawk, which was almost certainly the Merlin, was once seen on the Little Pamir, at about 15,000 feet.]

Sub-order *HERODIONES*.

Family ARDEIDÆ.

19. ARDEA CINEREA, L.—The common Heron.

Ardea cinerea, Linn., Syst. Nat., ed. 12, I, 236. Sharpe, Birds of 2nd Yarkand Mission, p. 124.

Only a few were seen, and these only at one spot in the marshes of the R. Aksu, near Mihmanyol.

They were extremely shy, and only one was shot.

Family IBIDIDÆ.

20. PLEGADIS FALCINELLUS, L.—The Glossy Ibis.

Tantalus falcinellus, Linn., Syst. Nat., ed. 12, I, 241.
Plegadis falcinellus, Sharpe, Birds of 2nd Yarkand Mission, p. 124.

A male, with adult plumage nearly complete, was shot in the marshes of the Little Pamir.

This species does not seem to have been before recorded from the Pamirs.

Sub-order *STEGANOPODES*.

Family PHALACROCORACIDÆ.

21. PHALACROCORAX CARBO, L.—The common Cormorant.

Pelecanus carbo, Linn., Syst. Nat., ed. 12, I, 216.
Phalacrocorax carbo, Sharpe, Birds of 2nd Yarkand Mission, p. 127.

An immature female, in good condition, was shot on some pools of the Aksu. Several specimens were seen.

Sub-order *ANSERES*.

Family ANATIDÆ.

[ANSER INDICUS (Lath.).

Two specimens of the bar-headed goose were shot by a sepoy of the escort on Lake Victoria. Towards the end of August large flocks of geese were seen migrating south-westwards, flying higher than the highest peaks (18,000 to 19,000 feet); they may, perhaps, have been this species.]

22. TADORNA CASARCA (L.) et auctorum.—The Brahminy Duck.

Anas rutila, Pallas, Zoogr. Ross. Asiat., II, 242.
Tadorna casarca, Sharpe, Birds of 2nd Yarkand Mission, p. 128.

This species was seen at all times on the Pamirs.

With reference to the synonym *Vulpanser* given by Pallas, *loc. cit.*, under this species, I may mention that I myself mistook the first specimen, which was feeding alone on a dried-up marsh by the Aksu, for a fox.

23. ANAS (QUERQUEDULA) CIRCIA, L., et auctorum.—The Indian blue-winged Teal.

Anas circia, Linn. Syst. Nat., ed. 12, I, 204.
Querquedula circia, Sharpe, Birds of 2nd Yarkand Mission, p. 131.

This species was very common among the pools and marshes of the Aksu after the 20th August. No full-plumaged males were noticed.

Sub-order *LIMICOLÆ*.

Family CHARADRIIDÆ.

24. CHARADRIUS FULVUS, Gm.—The Asiatic Golden Plover.

Charadrius fulvus, Seebohm, Charadriidæ, p. 99 : Sharpe, Birds of 2nd Yarkand Mission, p. 136.

This species gradually became common on the Little Pamir, after the middle of August. All the specimens procured show much of the black underparts of the breeding plumage.

25. CHARADRIUS MONGOLICUS, Pall.—The Mongolian Sand Plover.

Charadrius mongolicus, Seebohm, Charadriidæ, p. 147.
Aegialitis mongolicus, Sharpe, Birds of 2nd Yarkand Mission, p. 137.

This species was not uncommon in August. Three of our specimens—two females and a male—are in immature plumage.

26. TOTANUS CALIDRIS (L).—The common Redshank.

Totanus calidris, Seebohm, Charadriidæ, p. 353 : Sharpe, Birds of 2nd Yarkand Mission, p. 140.

Very common, and very tame ; and very good eating, notwithstanding Sir Thomas Browne's opinion that it is " no dainty dish."

One of our male specimens is in very abraded breeding plumage.

27. TOTANUS GLOTTIS (L.)—The Greenshank.

Totanus glottis, Seebohm, Charadriidæ, 1888, p. 355 : Severtzov, Ibis, 1883, p. 74.

Only a few were seen.

28. TOTANUS STAGNATILIS, Bech.—The Marsh Sandpiper.

Totanus stagnatilis, Seebohm, Charadriidæ, p. 357.

This species does not seem to have been before recorded from the Pamirs.

29. TOTANUS GLAREOLA (L.)—The Wood Sandpiper.

Totanus glareola, Seebohm, Charadriidæ, p. 365 : Sharpe, Birds of 2nd Yarkand Mission, p. 141.

30. TOTANUS HYPOLEUCUS (L.)—The common Sandpiper.

Totanus hypoleucus, Seebohm, Charadriidæ, p. 371.
Tringoides hypoleucus, Sharpe, Birds of 2nd Yarkand Mission, p. 141.

31. TOTANUS PUGNAX (L.)—The Ruff and Reeve.

Totanus pugnax, Seebohm, Charadriidæ, p. 373.
Machetes pugnax, Sharpe, Birds of 2nd Yarkand Mission, p. 142.

Fairly common at the end of August.

32. STREPSILAS INTERPRES (L.)—The Turnstone.

Strepsilas interpres, Seebohm, Charadriidæ, p. 410 : Sharpe, Birds of 2nd Yarkand Mission, p. 139.

Our specimens include a male in breeding plumage.

33. TRINGA SUBARQUATA (Güldenstädt).—The Curlew Sandpiper.

Tringa subarquata, Seebohm, Charadriidæ, p. 419 : Sharpe, Birds of 2nd Yarkand Mission, p. 142.

One of our specimens is a male showing considerable remains of breeding plumage.

[Scolopax sp.

A few snipe began to be seen after the middle of August.]

Sub-order *GAVIÆ.*

Family LARIDÆ.

34. LARUS, sp.

An immature Herring Gull was shot on the Aksu by one of the Cossacks, and was presented to the collection by His Excellency General Povâlo-Schveikovsky. It was the only individual seen.

35. STERNA TIBETANA, Saunders.—The Tibetan Tern.

Sterna tibetana, Saunders, Proc. Zool. Soc., 1876, p. 649 : Sharpe, Birds of 2nd Yarkand Mission, p. 135.

This species was common along all the rivers and lakes of the Pamirs.

The feet and base of beak are orange red.

Sub-order *COLUMBÆ.*

Family COLUMBIDÆ.

36. COLUMBA RUPESTRIS, Pall.—The Pale Rock-pigeon.

Columba rupestris, Salvadori, Brit. Mus. Cat. Birds, Vol. XXI., p. 250 : Sharpe, Birds of 2nd Yarkand Mission, p. 116.

Not uncommon on the Little Pamir. Three immature specimens, one still showing the nestling down on the neck, but nevertheless flying strongly, were shot in the latter half of August.

37. TURTUR TURTUR (L.)—The common Turtledove.

Turtur turtur, Salvadori, Brit. Mus. Cat. Birds, Vol. XXI, p. 396.

Turtur arituş, Sharpe, Birds of 2nd Yarkand Mission, p. 118.

Severtzov ("Ibis," 1883, p. 71) has already reported the occurrence of this bird on the Pamirs, where, and for many miles around, there is not a tree or a bush to be found.

[Sub-order *GALLINÆ.*]

[TETRAOGALLUS, sp.]

[A species of Snowcock, probably *Tetraogallus himalayensis*, was common in the high nullahs up to the snowline.]

FISHES.

Order *PHYSOSTOMI.*

Family CYPRINIDÆ.

1. SCHIZOTHORAX FEDSCHENKOI, Kessler.

Schizothorax fedschenkoi, Kessler, Nouveaux Memoires, Moscou, 1872, X, p. 11, figs. 16-18, and Fedschenko's Reise in Turkistan, Pisces, p. 13, pl. ii., figs. 9-10.

Very common in the weedy reaches of the R. Aksu.

The fish caught by Stoliczka in the Oxus at Kala Panja, and described and figured by Day (P. Z. S. 1876, p. 787, and Fishes of 2nd Yarkand Mission, p. 13, pl. ii, figs. 9-10) as *S. microcephalus* appears to be extremely like Fedschenko's species: unfortunately I cannot find the specimen in the Indian Museum collection.

2. Schizopygopsis Stoliczkæ, Stdr.

Schizopygopsis Stoliczkæ, Steindachner, Verh. zool.-bot. Ges. Wien XVI, 1866, p. 786, pl. xvi, fig. 2: Günther, Catalogue of Fishes, Vol. VII, p. 170: Day, P. Z. S. 1876, p. 791, and Fishes of 2nd Yarkand Mission, p. 9, pl. ii., fig. 2, and Fishes of India, p. 531, pl. cxxiv, fig. 2, and Fauna of Brit. India, Fishes, Vol. I, p. 251, fig. 89: Herzenstein, Przejevalski Reisen, Fische, p. 191, pl. xvi, fig. 3.

This is an extremely common fish in the streams and rivers of the Pamirs, growing to a length of over thirteen inches.

3. Schizopygopsis severtzovi, Herz.—Plate I., fig. 1.

Schizopygopsis Severtzovi, Herzenstein, Przejevalski Reisen, Fische, p. 196, pl. xvi, fig. 2.

I was at first disinclined to agree with Herzenstein in separating this species from *S. Stoliczkæ*, but on comparing the large series of the latter in the Indian Museum collection with those collected by myself, among which are numerous spawning males and females, I can find five ripe males and a ripe female, all taken at the same spot, which differ constantly from ripe adults of *S. Stoliczkæ* in the following characters:—

(1) they are smaller, sexually-mature individuals not being longer than 175 millim.; whereas I can find no sexually-mature *S. Stoliczkæ* less than 200 millim. long, while most are about 250 millim., and some are nearly 350 millim.;

(2) the body is higher, its height in the adult being one-sixth of its total length; whereas in typical adults of *S. Stoliczkæ* the body height is only one-seventh or one-eighth the total length;

(3) as pointed out by Herzenstein, the anterior end of the mouth-cleft is on a level with the lower edge of the orbit, whereas in *S. Stoliczkæ* it is altogether below the level of the orbit. This is due to the fact that in *S. Severtzovi*

(4) the eye is larger, its diameter in sexually-mature adults being one-fourth, or nearly one-fourth, the length of the head; whereas in sexually-mature adults of *S. Stoliczkæ* its diameter is only one-fifth to one-sixth the length of the head.

The six adults here separated as *S. Severtzovi* all came from a small ice cold streamlet which seems to have only a periodic connexion with larger waters, so that, after all, they may be only dwarfs of *S. Stoliczkæ*.

4. Nemachilus tenuis, Day.

Nemachilus tenuis, Day, P. Z. S., 1876, p. 796, and Fishes of 2nd Yarkand Mission, p. 15, pl. v, fig. 4.
Nemachilus Stoliczkæ leptosoma (part), Herzenstein, Przejevalski Reisen, Fische, p. 23, pl. i, fig. 2.

A large number of ripe adults were taken in a streamlet on the Great Pamir, the largest being 6½ inches long.

In Day's figure, which I have compared with Day's types in our collection, the barbels are too long.

MOLLUSCA.

Order *GASTROPODA PULMONATA.*

Family LIMNÆIDÆ.

Two species, and perhaps three varieties, of freshwater snails were fairly common in Lake Victoria and in the overflow pools of the R. Aksu.

I have compared them with Stoliczka's specimens from the same locality, which were named by Nevill and are in the Indian Museum, and I have also sent specimens to Mr. Edgar Smith of the British Museum, who has kindly given me a reserved opinion upon them.

One of the Lake Victoria species is the variety of *Limnæa auricularia*, L., mentioned by Nevill in the "Mollusca of the 2nd Yarkand Expedition," page 6, and this opinion is confirmed by Mr. Smith. The other species from

Lake Victoria is the *Limnæa defilipii* var. *sirikulensis* of Nevill (*op. cit.*, page 7). Neither our specimens nor Stoliczka's correspond with Issel's figure (Moll. Persia, pl. iii. figs. 62, 63), and Nevill's determination seems open to some doubt. Mr. Smith inclines to consider this second Lake Victoria species as a variety of *Limnæa lagotis*, Schröter.

The third species, or variety, from the R. Aksu, is regarded by Mr. Smith as probably a variety of *Limnæa lagotis*, Schr. I may here mention that the Lake Victoria variety of *Limnæa auricularia*, L., is extremely like figs. 4, 4*a* of plate 17 of Jacquemont's "Voyage dans l'Inde."

INSECTS.

Order *LEPIDOPTERA.*

Sub-order *RHOPALOCERA.*

In the preparation of the report upon the butterflies, both of the Pamirs and of Kashmir, I have been greatly indebted to Mr. L. de Nicéville, the well-known authority on this branch of entomology, who not only identified such species as I could not make out, but also was kind enough to examine the entire collection, criticizing and correcting the identifications and synonomy, and giving to the whole the sanction of his high authority. With regard to references, we have given only such as are necessary.

Family NYMPHALIDÆ.

KARANASA HUEBNERI (Felder).

Satyrus huebneri, Felder, "Novara" Lepidoptera, Vol. III, p. 494, No. 855, pl. lxix, figs. 8, 9. ♀: Romanoff Mémoires sur les Lépidoptères, Vol. IV, Le Pamir et sa Faune Lépidoptérologique par Groum-Grshimaïlo, p. 463, No. 153, pl. XV, figs. 3*a*, 3*b*, ♂, ♀.

Hipparchia huebneri, Marshall and de Nicéville, Butterflies of India, Vol. I, p. 189, No. 183.

Hipparchia cadesia, Moore, P. Z. S., 1874, p. 565, No. 1, p. lxvi, fig. 7, ♂, and Butterflies of 2nd Yarkand Mission, p. 1: Marshall and de Nicéville, Butterflies of India, Vol. I, p. 190, No. 184.

Karanasa huebneri, Moore, Lepidoptera Indica, Vol. II, p. 39, pl. 101, figs. 3, 3*a*, ♀, ♂.

This was by far the commonest butterfly of the Great Pamir, near Lake Victoria, at the end of July. All our specimens are small, and all but one are extremely light in colour. In repose this species used always to lie over on its side, to escape the high wind.

2. CHORTOBIUS HILARIS (Staudinger).

Epinephele hilaris, Staudinger, Stettin Entomol. Zeitschr, Vol. XLVII, 1886, p. 249.

Several specimens were taken on the Great Pamir in July.

Groum-Grshimaïlo, *Faun. Lép. Pamir*, p. 493, appears to regard this species as identical with, or at most a variety of, *C. pulchella* (Feld.). Our specimens all correspond exactly with an authentic specimen of *C. hilaris* in the Indian Museum collection.

3. ARGYNNIS VITATHA, Moore.

Argynnis vitatha, Moore, P. Z. S., 1874, p. 568: de Nicéville, Butterflies of India, Vol. II, p. 136, No. 427.

Found on both the Great and the Little Pamir. Groum-Grshimaïlo, *Faun. Lép. Pamir*, p. 439, regards this butterfly as identical with *Argynnis aglaia*, L., with which opinion we are inclined to agree.

4. PYRAMEIS CARDUI (Linn.).

Pyrameis cardui (L.), Kirby, Synon. Cat. Diurnal Lepidoptera, p. 185: Moore, Butterflies of 2nd Yarkand Mission, p. 2: de Nicéville, Butterflies of India, Vol. II, p. 227, No. 520.

Vanessa cardui, Groum-Grshimaïlo, Faun. Lép. Pamir, p. 426, No. 118.

The Painted Lady was found only near Jarti Gumbaz, on a slope covered

with the labiate plant *Nepeta supina*, which has, perhaps, the most attractive flower of this region.

Family LYCÆNIDÆ.

5. LYCAENA LEHANA, Moore.

Polyommatus lehanus, Moore, Ann. Mag. Nat. Hist. (5) I, 1878, p. 230, and Butterflies of 2nd Yarkand Mission, p. 6, pl. i, fig. 6.

Lycæna pheretes, Hb. var. *lehana* (Moore), Groum-Grshimailo, Faun. Lép Pamir, p. 389, No. 87, pl. x, figs. 4*a*, 4*b*, ♂. ♀.

Found on the Great Pamir.

6. LYCAENA HUNZA, Groum-Grshimaïlo.

Lycæna hunza, Groum-Grshimailo, Faun. Lép. Pamir, in Romanoff's Mem. Lep., IV, 1890, p. 397, No. 93, pl. xv, fig. 2.

From the Great Pamir.

Our specimens, two in number, were determined by Dr. Standinger of Dresden.

Family PAPILIONIDÆ.

7. MANCIPIUM DEOTA, de Nicéville.

Mancipium deota, de Nicéville, Journ. Asiatic Soc., Bengal, Vol. XLII, pt. 2, 1883, p. 82, No. 24, pl. ix, fig. 10, ♂.

Pieris roborowskii, Alphéraky, Memoires sur les Lépidoptères, Vol. V, p. 69, No. 5, pl. iv, figs. 3*a*, 3*b*, ♂, ♀.

A single specimen, the only one seen, was taken on the Great Pamir.

8. COLIAS EOGENE, Felder.

Colias eogene, Felder, "Novara" Lepidoptera, Vol. II, p. 196, No. 197, pl. xxvii, fig. 7: Groum-Grshimailo, Faun. Lép. Pamir, p. 329, No. 39, pl. v., figs. 1*a*, 1*b*, 1*c*, ♂, ♀.

A male and two females from the Great Pamir, and a female from the Little Pamir.

9. PARNASSIUS EPAPHUS, Oberthür.

Parnassius jacquemontii, Blanchard, in Jacquemont's Voyage dans l'Inde, Vol. IV, Zool., Insectes, p. 16, No. 5, pl. i, figs. 3, 4: Gray, Catalogue of Lepidopterous Insects, Brit. Mus., pt. I. *Papilionida* p. 75, No. 348, pl. xii, figs. 1, 2: Moore, Butterflies of 2nd Yarkand Mission, p. 5.

Parnassius epaphus, Oberthür, Etudes d'Entomologie, Vol. IV, 1879, p. 23, No. 20.

Not uncommon on the southern slopes of the Great Pamir at about 15,000 feet.

Family HESPERIDÆ.

10. HESPERIA CASHMIRENSIS (Moore).

Pyrgus cashmirensis, Moore, P. Z. S., 1874, p. 274, No. 103, pl. xliii, fig. 7.

A single specimen, the only one seen, was caught on the Great Pamir.

Order *DIPTERA*.

Family TIPULIDÆ.

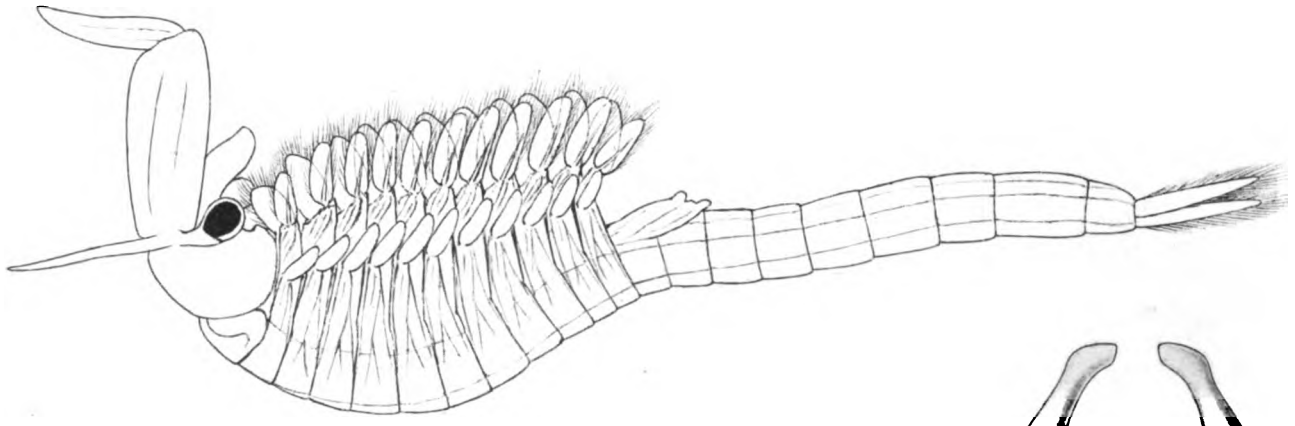
[1. CHIRONOMUS sp.

A species of *Chironomus* was extremely common on the Pamirs; but unfortunately my specimens were all lost along with my specimens of Pamir spiders and moths.

On sunny days these flies were an indescribable nuisance by getting into one's eyes, ears and nostrils.

On the 24th July the surface of the shallow pools at the eastern end of Lake Victoria was covered with a thick layer of their drowned bodies.

None of these flies were observed to be luminous.]



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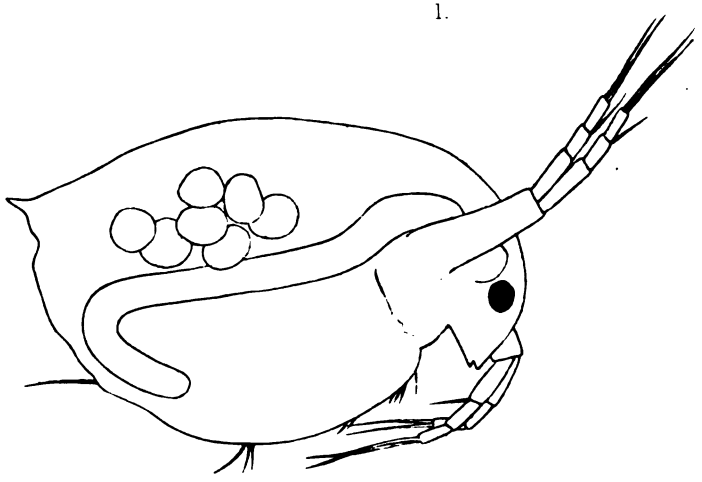

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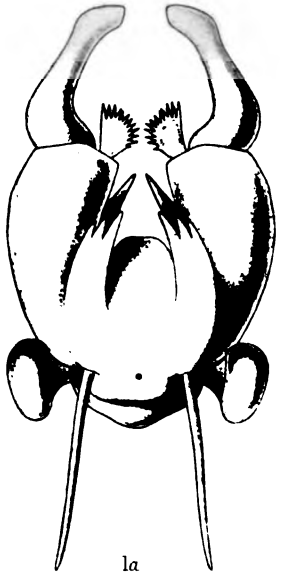


1*a*

1. BRANCHIPUS BOBRINSKII, × 10. ♂.

2. DAPHNIA BOGOIAVLONSKII, × 18. ♀. 1*a*. HEAD OF BRANCHIPUS BOBRINSKII, × 12 ♂.

Photoetching. Survey of India Offices, Calcutta, July 1896.

2. PACHYRHINA PRATENSIS, L.

Pachyrhina pratensis, Macquart, Hist. Nat. des Insectes Diptères, Vol. I, p. 88.

A single specimen was taken on the Great Pamir. It is not in the best preservation; but it agrees with Macquart's description, and with authentically named specimens from Europe in the Indian Museum collection.

Family TABANIDÆ.

3. TABANUS sp.

A species of *Tabanus* was common on the Pamirs, especially in damp grassy nullahs at an elevation of about 15,000 feet—the feeding ground of *Ovis poli*.

I am unable to name it from the Indian and European specimens in the Indian Museum collection.

Family TACHINIDÆ.

4. ECHINOMYIA sp. 1.

A single specimen of an *Echinomyia* near *E. ferox* (of which there are authentically named specimens in the Indian Museum) was taken in the Wakhan Valley, near the entrance into the Little Pamir.

5. ECHINOMYIA sp. 2.

Another Tachinid, differing only from Macquart's definition of the genus in having the whole abdomen thickly covered with long bristles, was found on the Little Pamir. It resembles a bumble-bee even more remarkably than do the species of Volucella, not only in hairiness but also in coloration.

CRUSTACEA.

Order *AMPHIPODA*.

Family GAMMARIDÆ.

1. GAMMARUS PULEX, L.

Gammarus pulex, Milne Edwards, Hist. Nat. Crust., Vol. III, p. 48.

Gammarus fluviatilis, Spence Bate, Cat. Amphipod. Crust., Brit. Mus., pp. 207 and 380, pl. xxxvii, fig. 1.

My specimens have not been compared with European specimens, but they agree with the descriptions and figures of Spence Bate and other authors. This species was found in some of the Pamir lakes as well as in L. Zartighar near the Baroghil Pass.

Order *PHYLLOPODA*.

Family BRANCHIPODIDÆ.

2. BRANCHIPUS (CHIROCEPHALUS) BOBRINSKII, n. sp.—Plate III, figs. 1, 1*a*.

Closely resembles *Chirocephalus diaphanus* (*vide* Baird, Nat. Hist. of British Entomostraca, p. 53, pls. iii, iv, v; and Monograph of the *Branchipodidæ*, Proc. Zool. Soc., 1852, p. 23) in all particulars except (1) that it is much smaller (both sexes); (2) that the antennules of the male are much larger, their length, when extended, being nearly equal to that of the thorax; and (3) that the toothed plate of the base of the second joint of the antennules is smaller and is distinctly pedicled.

Males and ovigerous females were caught in July, in the Chakmaktin Lake, by M. Bogoyevleuski, naturalist with Count Bobrinski.

The latter gentleman very generously gave them to me, and I have therefore named the species after him.

Family DAPHNIIDÆ.

3. DAPHNIA sp.—Plate III, fig. 2.

A single female, with large eggs in the brood-sack, was taken along with *Branchipus* in the Chakmaktin Lake.

It agrees closely with *Daphnia pulex*, except that it is very much larger, its length being nearly 4 millim., and it has a beak shaped like a turtle's. It differs from the description of *D. magna* in the form of the shell. If, as appears probable, it is an unnamed species, I would propose the name *bogoiavlenskii* for it.

SECTION 4.

A List of the Plants collected on the Pamirs, by J. F. Duthie, Esq., B.A., F.L.S., Director of the Botanical Department of Northern India.

RANUNCULACEÆ.*

1. RANUNCULUS AQUATILIS, *Linn.*, var. trichophyllus, *Chaix.*

Shores of Lake Victoria and neighbouring lakelets 13-14,000 ft. Herb. No. 17673; in marshes by the R. Aksu. Herb. No. 17672.

This variety is abundant in North-West India, extending from the plains up to 13,000 ft. on the Western Himalaya; it also occurs in Kashmir and W. Tibet. As an aggregate species *R. aquatilis* is widely distributed in temperate regions.

2. RANUNCULUS PULCHELLUS, *C. A. Meyer*, var. longicaulis, *C. A. M.*

Passing into var. pseudo-hirculus, *Trautv.*

Occurs abundantly on both the Great and Little Pamir, in marshy and boggy land bordering running streams up to an elevation of at least 14,000 ft. Herb. No. 17676.

R. pulchellus and its varieties occur on the inner Himalayan ranges, in Afghanistan and through W. Tibet to Siberia and Mongolia.

3. RANUNCULUS HYPERBOREUS, *Rottb.*, var. natans.

In marshes along the R. Aksu, 13-14,000 ft. Herb. No. 17671.

Inner Alpine Himalaya, extending to the Arctic regions.

var. PARVISPATULUS (*Bruhl*).

Sandy shore of Lake Victoria, 13-14,000 ft. Herb. No. 17674.

4. RANUNCULUS RUFISEPALUS, *Franchet.*

In moist or drying ground up to at least 15,000 ft. Herb. No. 17675.

Found also in Turkistán.

5. DELPHINIUM CASHMIRIANUM, *Royle*, var. Jacquemontianum (Camb.).

Rare: found only in stony ground alongside running water in sheltered situations near the heads of nalas, not lower than 15,000 ft. Herb. No. 17677.

W. Himalaya and Tibet.

* For the identification of the plants belonging to this family I have availed myself of the kind assistance of Mr. P. Bruhl, of the Sibpur Engineering College, who has made a special study of the Ranunculaceæ. To Surgeon-Captain Prain, Curator, Royal Botanic Garden, Sibpur, I am also much indebted for the help he has afforded, especially with regard to the families Papaveraceæ and Labiatæ, and the genus Pedicularis. For the correct naming of the grasses I owe many thanks to Sir Joseph Hooker, who is at present preparing a monograph of this family for the final volume of the "Flora of British India."

PAPAVERACEÆ.

6. PAPAVER NUDICAULE, *Linn.*, var. rubro-aurantiaca, *Fischer* (P. croceum *Ledeb*).

Not common; found in sheltered situations, usually over 14,000 ft. Herb. No. 17686.

Kashmir, W. Tibet, Afghanistan, Alps of Europe, extending to the Arctic region.

7. CORYDALIS STRICTA, *Steph.*

Seen only once, on a dry slope near Jarti Gumbáz at about 13,500 ft. Herb. No. 17687.

W. Tibet, Ladák, Siberia.

Surgeon-Captain Prain informs me that this is the true original form of *C. stricta*, Steph., which differs somewhat from the plant described in Fl. Brit. Ind., I. 126.

CRUCIFERÆ.

8. DRABA ALPINA, *Linn.* ?

Pamir region, 13-14,000 ft. Herb. No. 17683.

Alpine and Arctic regions in Asia, Europe, and America.

9. DRABA LASIOPHYLLA, *Royle.*

Pamir region 13-14,000 ft. Herb. No. 17679.

Alpine Himalaya, Tibet, Turkistán.

10. ? DRABA HYPERBOREA, *Desv.*—(D. grandis, DC.; Delless, Ic. Sel. II., t. 47).

Pamir region, 13-14,000 ft. Not very common, and rarely found in flower. Herb. No. 17678.

Northern America and Arctic region.

The absence of sufficiently developed ovules renders the identification of this plant uncertain, though very distinct-looking as a crucifer. It has bright red flowers, and the leaves resemble those of *Christolea crassifolia*.

11. MALCOLMIA NANA, *Boiss.*—(Sisymbrium binerve, *C. A. Meyer*; Jaub. and Spach. Ill. Or. t. 298).

Pamir region. Not common: found only on bare shaly ground, 13-15,500 ft. Herb. No. 17681.

Caspian and Mediterranean regions.

12. ? SMELOVSKIA sp

Fairly common, occurring usually in mass on the dry parts of the open Pamir, 13-14,000 ft. Herb. No. 17685.

A remarkable looking plant, 6-7 inches high, with a thick woody root-stock, and pectinately pinnatifid leaves, which are densely white tomentose; flowers cream-coloured, crowded in a compact paniole; pods short ovoid; cotyledons incumbent.

13. ? SMELOVSKIA sp.

Shores of Lake Victoria, 13-14,000 ft. Herb. No. 17682.

This looks like an annual, or at most a biennial. The pinnatifid leaves are greener and less tomentose than in the preceding; the flowers are rather smaller, and the racemes laxer in fruit.

14. ERYSIMUM sp., near E. lanceolatum, *R. Br.* (E. pumilum, *Gaud.*).

Fairly common and growing usually in masses on the dry parts of the open Pamir, 13-14,000 ft. Herb. No. 17684.

15. CHORISPORA SABULOSA, *Camb.*

Pamir region, 13-14,000 ft. Herb. No. 17680.

W. Himalaya, Tibet, Afghanistan.

CARYOPHYLLEÆ.

16. LYCHNIS HIMALAYENSIS, *Edgew.*

Found only once, growing in sandy soil on the open Pamir, alongside the R. Aksu, 13-14,000 ft. Herb. No. 17689.

Alpine Himalaya, W. Tibet, Ladák.

17. CERASTIUM TRIGYNUM, *Vill.*

Abundant amongst the grass in the open Pamir, 13-14,000 ft. Herb. No. 17690.

W. Himalaya, Tibet, Afghanistan to Siberia and Arctic regions.

18. CERASTIUM sp.

Pamir region, 13-14,000 ft. Herb. No. 17690 (a).

19. STELLARIA GLAUCA, *With.*

Amongst damp grass along the R. Aksu, 13-14,000 ft. Herb. Nos. 17688, 17691, 17692.

W. Himalaya, Tibet, to Europe and Siberia.

TAMARISCINEÆ.

20. MYRICARIA GERMANICA, *Desv.*

Seen only once in a dried-up channel of the R. Aksu, 13-14,000 ft. Herb. No. 17693.

Temperate and Alpine Himalaya, W. Asia, Europe.

GERANIACEÆ.

21. GERANIUM, TUBERARIA, *Camb.*

In sheltered nalas in the Pamir region, not common; 13-14,000 ft. Herb. No. 17694.

W. Himalaya and Kashmir.

LEGUMINOSÆ.

22. ASTRAGALUS TIBETANUS, *Benth.*

Pamir region, 13-14,000 ft. Herb. No. 17699.

W. Tibet, Ladák, Afghanistan, Kashmir.

23. ASTRAGALUS sp., near A. purpurascens, *Bunge.*

Pamir region, 13-14,000 ft. Herb. No. 17700.

24. OXYTROPIS sp., near O. tatarica, *Jacquem.*

Pamir region, 13-14,000 ft. Herb. No. 17701.

25. OXYTROPIS MICROPHYLLA, *D. C.*

In stony dry water-courses in the Pamir region, at about 13,000 ft.; not common. Herb. No. 17702.

Alpine Himalaya and Tibet.

26. OXYTROPIS sp.

One of the commoner plants of the Great and Little Pamir growing in clumps in dry ground, 13-14,000 ft. Herb. Nos. 17695, 17698.

A very showy plant with reddish-purple flowers, and silvery pubescent foliage; rootstock woody and much branched.

27. OXYTROPIS sp.

Pamir region, 13-14,000 ft. Herb. No. 17696.

Flowers purple, on elongated peduncles.

28. OXYTROPIS sp., near O. glacialis, *Benth.*

Growing in masses amongst grass in sandy soil along the R. Aksu, 13-14,000 feet. Herb. No. 17697.

ROSACEÆ.

29. POTENTILLA FRUTICOSA, *Linn.*, var.

Pamir region, 13-14,000 ft. Growing among boulders in certain nalas, but not common. Herb. No. 17703.

Temperate and Alpine Himalaya, Kashmir, W. Tibet, to Northern Asia and Europe.

30. POTENTILLA BIFURCA, *Linn.*

One of the commoner plants of the Great and Little Pamir, growing on dry ground in the open Pamir, 13-14,000 ft. Herb. No. 17705.

Inner Alpine Himalaya, Tibet, to E. and N. Europe.

31. POTENTILLA SERICEA, *Linn.*, var.

Common on the Great and the Little Pamir, 13-14,000 ft. Herb. No. 17704.

W. Alpine Himalaya, Tibet, Afghanistan to N. China and N. America.

32. POTENTILLA SERICEA, *Linn.*, var., approaching P. multifida, *Linn.*

One of the common plants of the Great and Little Pamir, growing on dry ground everywhere, 13-14,000 ft. Herb. No. 17706.

SAXIFRAGACEÆ.

33. SAXIFRAGA CERNUA, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17707.

W. Himalaya and Tibet to Europe, N. America, and Arctic regions.

34. SAXIFRAGA HIRCULUS, *Linn.*

Very common in boggy ground along the R. Aksu and its affluents, up to nearly 15,000 ft. Herb. No. 17709.

Alpine Himalaya, Alps of Europe, Caucasus, Arctic region.

35. SAXIFRAGA FLAGELLARIS, *Willd.*

Among boulders near melting snow, at about 15,000 ft. Herb. No. 17708.
Alpine Himalaya, N. Asia, Arctic region and Rocky Mountains.

CRASSULACEÆ.

36. SEDUM RHODIOLA, *D. C.*?

Pamir region 13-14,000 ft. Herb. No. 17710.
Alps of Asia, Europe and America, extending to the Arctic regions.

37. SEDUM CRENULATUM, *H. f.* and *T.*

In rocky dried-up water-courses up to about 14,000 ft. Herb. No. 17711.
Alpine Himalaya.

HALORAGEÆ.

38. HIPPURIS VULGARIS, *Linn.*

In marsh pools by the R. Aksu, 13-14,000 ft. Herb. No. 17713.
Kashmir, Tibet, and Afghanistan to Europe and N. and S. America.

UMBELLIFERÆ.

39. TRACHYDIUM ROYLEI, *Lindl.*

In nalas alongside running water, 14-15,000 ft. Herb. No. 17712.
Alpine Himalaya and W. Tibet.

COMPOSITÆ.

40. ASTER HETEROCHÆTA, *Benth.*

Plentiful near melting snow at about 15,000 ft. Herb. No. 17723.
Alpine Himalaya, Tibet, Altai.

41. ASTER sp. near A. turkestanicus, Franchet (Diplopappus turkestanicus, *Regel and Schmalh.*

Pamir region, 13-14,000 ft. Herb. No. 17716.

42. ERIGERON ALPINUS, *Linn.*, var. pulchella (*Trautv*).

Pamir region, 13-14,000 ft. Herb. Nos. 17717, 17718.

In the Saharanpur herbarium are specimens of the same variety collected by Younghusband in 1891, near the Tagh-dum-bash Pamir; from near Gilgit 15,000 ft. (Colonel Tanner); and from the Drás Valley, 11-12,000 ft. (Duthie). The specimens bearing the number 17718 resemble as nearly as possible a plant received from St. Petersburgh under the name of Erigeron azureus, *Regel*, and collected in Turkistán in 1882.

43. ERIGERON ANDRYALOIDES, *Benth.*

Found on the northern slope of a hill near the Urta Bel Pass, at about 15,000 ft. Herb. No. 17729.

Inner W. Himalaya and Tibet. I have specimens also from the Tagh-dum-bash Pamir collected by Younghusband in 1891.

44. LEONTOPODIUM ALPINUM, *Cass.*

Very common on the slopes up to 15,000 ft. Herb. No. 17721.

Alpine Himalaya, Tibet, Central Asia, and Alps of Europe ("Edel-Weiss").

45. ALLARDIA GLABRA, *Dcne.*

Usually on stony ground near running water, at about 14,000 ft., but not common. Herb. No. 17732.

Inner Alpine Himalaya, W. Tibet, and Ladák.

46. CHRYSANTHEMUM RICHTERIA, *Benth.*

Fairly common, but not often found in flower, 13-14,000 ft. Herb. No. 17721.

Kashmir, W. Tibet, Sungaria.

47. TANACETUM TIBETICUM, *H. f.* and *T.*

Fairly common in dry places on the open Pamir, 13-14,000 ft. Herb. No. 17734.

W. Tibet.

48. TANACETUM NANUM, *C. B. Clarke.*

Pamir region 13-14,000 ft. Herb. No. 17733.

W. Tibet.

49. ARTEMISIA, sp., near A. minor, *Jacquem.*

One of the commoner plants of the Great and Little Pamir, growing on dry ground everywhere, 13-14,000 ft. Herb. No. 17730.

50. ARTEMISIA DESERTORUM, *Spreng.*

Pamir region 13-14,000 ft. Herb. No. 17724.

W. Himalaya, Kashmir, Tibet, Turkistán, Siberia. There are specimens in the Saharanpur herbarium collected by Russian botanists in the Pamir region and in Turkistán, and named A. pamirica, *C. Winkl.* I do not see how they differ from A. desertorum.

51. SENECIO CORONOPIFOLIUS, *Desf.*

Pamir region, 13-14,000 ft. Herb. No. 17722.

W. Himalaya, Kashmir, Afghanistan to Europe and N. Africa.

52. SENECIO, sp. (Section Ligularia).

In drying water-courses, sometimes alongside running streams, 14-15,000ft., but not of wide distribution. Herb. No. 17715.

Collected also by Younghusband near the Tagh-dum-bash Pamir in 1891. The flower-heads are of about the size of those of S. Jacquemontianus, *Dcne*, but the panicle is more compact; the leaves are very different, being quite entire, lanceolate or obovate, and coriaceous.

53. SAUSSUREA SALSA, *Boiss.*

Found on dry sandy soil, not common. Herb. No. 17719.

Caucasus and N. Asia.

There is a specimen of this plant at Saharanpur, which was collected in 1878 by a Russian botanist on the banks of the Aksu River.

54. SAUSSUREA SOROCEPHALA, *H. f.* and *T.*

In boggy ground at the top of the Bendersky Pass at 15,000 ft. Herb. No. 17714.

Inner W. Himalaya and Tibet to Siberia.

55. TARAXACUM OFFICINALE, *Wigg.* var.

In dampish sandy soil, 13-14,000 ft. Herb. Nos. 17726, 17727.

Temperate regions of the N. and S. Hemispheres. A very variable species. The Pamir plant is dwarf, with very narrow leaves.

56. TRAGOPOGON GRACILE, *Don.*

Only two specimens of this were found, one at over 15,000 ft. Herb. No. 17725.

Central and W. Himalaya, Kashmir, Tibet.

PLUMBAGINEÆ.

57. ACANTHOLIMON DIAPENSIOIDES, *Boiss.*

One of the commonest plants of the Great and Little Pamir, growing on dry soil in clumps resembling a sponge or brain-stone coral. It does not flower very freely. Herb. No. 17735.

Found in Afghanistan 14-15,000 ft. (Griffith); Chitral Expedition (Dr. Giles).

PRIMULACEÆ.

58. PRIMULA SIBIRICA, *Jacq.*

Very common in marshy ground along the banks of the R. Aksu and its affluents, 13-14,000 ft. Herb. No. 17737.

W. Tibet, Europe, North America, Arctic region.

59. PRIMULA STUARTII, *Wall.*, var. purpurea.

In boggy ground by streams of melting snow at about 15,000 ft.; not very common. Herb. No. 17736.

Alpine Himalaya, Tibet, Afghanistan.

GENTIANACEÆ.

60. GENTIANA PROSTRATA, *Hœnke.*

In damp ground amongst grass, on the open pamir, 13-14,000 ft. Herb. Nos. 17738, 17739.

61. GENTIANA DETONSA, *Rottb.*

Amongst grass in the open pamir, 13-14,000 ft. Herb. No. 17740.

Alpine Himalaya, Kashmir, Tibet to Europe, N. Asia and N. America.

62. PLEUROGYNE sp., near P. carinthiaca, *Griseb.*

Common amongst grass in damp or recently dried ground, up to 15,000 ft. Herb. No. 17742.

63. PLEUROGYNE THOMSONI, *C. B. Clarke.*

Growing in masses amongst grass in sandy rather moist soil, 13-14,000 ft. Herb. No. 17743.

Western Tibet.

64. SWERTIA sp., near S. marginata, *Schrenk.*

Common in moist ground up to at least 15,000 ft. Herb. No. 17741.
Collected also by Younghusband in 1891 on the Wakhijrui Pass near the Little Pamir.

BORAGINEÆ.

65. PARACARYUM HELIOCARPUM, *A. Kerner.*

In hollows and shallow ravines of the open pamir, 13-14,000 ft.; not very common, and rarely found in flower. Herb. No. 17745.

W. Himalaya, W. Tibet, Kashgár.

66. ECHINOSPERMUM BARBATUM, *Lehm.*

Pamir region, 13-14,000 ft. Herb. No. 17746.

W. Himalaya, Tibet, Baluchistan, Afghanistan, N. Asia, and N. Africa.

67. MYOSOTIS SYLVATICA, *Hoffm.*

In sheltered nalas, 14-15,000 ft., but not common. Herb. Nos. 17744, 17747.

W. Himalaya, Kashmir to N. Asia, Europe, and Canary Islands.

SCROPHULARINEÆ.

68. SCROPHULARIA sp., near S. scabiosæfolia, *Benth.*

In stony dried-up water-courses, not common, 13-14,000 ft. Herb. No. 17748.

69. PEDICULARIS RHINANTHOIDES, *Schrenk* (typical).

In marshy land along the R. Aksu, common in places; 13-14,000 ft. Herb. No. 17749.

Afghanistan, Alatau, Turkistán.

70. PEDICULARIS ULIGINOSA, *Bunge.*

Marshy ground by the R. Aksu, 13-14,000 ft. Herb. No. 17751.

Sungaria, S. Altai, Transbaikalia.

71. PEDICULARIS CHEILANTHIFOLIA, *Schrenk.*

Common in damp ground all along the banks of the R. Aksu and its affluents, up to at least 14,000 ft. Herb. No. 17752.

W. Himalaya, W. Tibet, Sungaria, Kansu.

72. PEDICULARIS ŒDERI, *Vahl.* (typical).

Marshy land along the R. Aksu, 13-14,000 ft. Herb. No. 17750.

W. Himalaya, Kashmir, Alps of Europe and Siberia, Arctic Europe, Asia, and America.

LABIATÆ.

73. NEPETA SUPINA, *Stev.* (Fl. Brit. Ind., in part).

Occurs in masses on the slopes of the hills up to at least 14,000 ft., but is not very common. Herb. No. 17755.

W. Himalaya, W. Tibet, Caucasus.

74. DRACOCEPHALUM ORIGANOIDES, *Steph.*

On bare shaly ground from 13,000 to 16,000 ft., not common, but abundant when it does occur. Herb. No. 17754.

Siberia.

75. DRACOCEPHALUM PALMATUM, *Steph.*

One of the common plants of the Great and Little Pamir, growing in clumps on dry ground in the open pamir. Herb. No. 17753.

Siberia.

CHENOPODIACEÆ.

76. ATRIPLEX LACINIATA, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17756.

N. America.

77. EUROTIA CERATOIDES, *C. A. Meyer.*

One of the commonest plants of the Great and Little Pamir, growing everywhere on dry soil. It was found to be the most useful plant as fuel. Herb. No. 17728.

Inner Himalaya, Tibet, Afghanistán, Siberia, Europe, N. America.

78. HALOGETON GLOMERATUS, *C. A. Meyer.*

Found only once on a bare gravel hillock between Kizil Robát and Mihmanyol. Herb. No. 17761.

W. Tibet, Afghanistán, Caspian region, N. Asia.

POLYGONACEÆ.

79. POLYGONUM PARONYCHIOIDES, *C. A. Meyer.*

On bare shaly ground at about 16,000 ft. Herb. No. 17760.

W. Himalaya, Afghanistán, Persia.

80. POLYGONUM VIVIPARUM, *Linn.*

Very common in the boggy turf on the banks of streams of the Oxus system. Herb. No. 17758.

Alpine Himalaya, W. Tibet to Arctic regions.

81. POLYGONUM MOLLIIÆFORME, *Boiss.*

Pamir region, 13-14,000 ft. Herb. No. 17759.

W. Tibet, Persia.

82. OXYRIA DIGYNA, *Hill.*

In stony ground near running water, at about 14,000 ft., but not common. Herb. No. 17757.

Alpine Himalaya, W. Tibet to Arctic regions.

GENTACEÆ.

83. EPHEDRA GERARDIANA, *Wall.*

In a sheltered nala over 14,000 ft., not common. Herb. No. 17762.

Inner Himalaya, W. Tibet, W. and Cent. Asia, Europe.

LILIACEÆ.

84. ALLIUM BLANDUM, *Wall.*

On hill sides, at about 14,000 ft. Herb. No. 17765.
W. and Cent. Himalaya, W. Tibet.

NAIADACEÆ.

85. TRIGLOCHIN MARITIMUM, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17763.
W. Himalaya, W. Tibet to N. Temp. regions.

86. POTAMOGETON PECTINATUS, *Linn.*

Common in marsh pools along the R. Aksu, 13-14,000 ft. Herb. No. 17764.
Temperate regions of the world.

CYPERACEÆ.

87. SCIRPUS sp.

Very common along the R. Aksu, 13-14,000 ft. Herb. No. 17767.

88. KOBRESIA SCHŒNOIDES, *Boeck.*

Pamir region, 13-14,000 ft. Herb. No. 17766.
Himalaya, W. Tibet, Caucasus, Cent. Asia, Siberia.

89. KOBRESIA ROYLEANA, *Nees.*

Pamir region, 13-14,000 ft. Herb. No. 17768.
Alpine Himalaya, W. Tibet, Afghanistán, Central Asia.

90. CAREX NIVALIS, *Boott.*

Pamir region, 13-14,000 ft. Herb. No. 17773.
Alpine Himalaya and W. Tibet, Afghanistán, Cent. Asia.

91. CAREX MELANANTHA, *C. A. Meyer.*

Fairly common along the banks of the R. Aksu and its affluents, 13-14,000 ft. Herb. Nos. 17771, 17772.
Kashmir, Afghanistán, Cent. Asia.

92. CAREX AMPULLACEA, *Good.*

In marshy ground along the R. Aksu, 13-14,000 ft., but not common. Herb. Nos. 17769, 17770.
Kashmir, Lahoul, and N. Temp. regions.

GRAMINEÆ.

93. ALOPECURUS ALPINUS, *Sm.*

Pamir region, 13-14,000 ft. Herb. No. 17774.
Northern and Arctic regions, Chili.

94. STIPA ORIENTALIS, *Trin.*

Pamir region, 13-14,000 ft. Herb. No. 17786.
N. Asia.

95. DESCHAMPSIA sp.

Pamir region, 13-14,000 ft. Herb. Nos. 17785, 17782.

96. DESCHAMPSIA KOELERIOIDES, *Regel.*

Pamir region, 13-14,000 ft. Herb. No. 17780.
Temperate Asia.

97. POA ATTENUATA, *Trin.* (Poa sterilis Bieb).

One of the commonest grasses of the Great and Little Pamir, growing in thick tussocks, both on the open pamir and on the slopes up to the limit of vegetation, 14-16,000 ft. Herb. No. 17777.
N. Kumaon, Kashmir, Asia Minor, Tauria.

98. POA PRATENSIS, *Linn. var.* alpigena.

Pamir region, 13-14,000, ft. Herb. Nos. 17783, 17789, 17790.
Alpine Himalaya, Kashmir to Northern and Arctic regions.

99. FESTUCA OVINA, *Linn.* var. pubescens, *Hack.*

Pamir region, 13-14,000 ft. Herb. No. 17776.

100. FESTUCA OVINA, *Linn.* var. valesiaca (*Hack*).

Pamir region, 13-14,000 ft. Herb. No. 17778.

101. BROMUS CRINITUS, *Boiss.*

Pamir region, 13-14,000 ft. Herb. No. 17781.
W. Tibet, Afghanistán, Persia, Turkistán.

102. BROMUS ERECTUS, *Huds.*

Pamir region, 13-14,000 ft. Herb. No. 17775.
Europe, Asia Minor.

103. AGROPYRON STRIATUM, *Nees.*—Triticum striatum, Stend.

Flourishes in the neighbourhood of sites of old Kirghiz encampments 13-14,000 ft. Herb. No. 17792, 17793, 17794.

104. HORDEUM VIOLACEUM, *Boiss* and *Hohen.*

Pamir region, fairly common, 13-14,000 ft. Herb. No. 17791.
Asia Minor.

105. ELYMUS DASYSTACHYS, *Trin.*

Pamir region, 13-14,000 ft. Herb. No. 17795.
Siberia.

FILICES.

106. CYSTOPTERIS FRAGILIS, *Bernh.*

Under boulders near melting snow, at about 15,000 ft., not common. Herb. No. 17796.

MUSCI.

107-111. Specimens comprising five species of mosses have been forwarded to Dr. Brotherus for determination.

CHARACEÆ.

[CHARA sp.

Sarkhin Lake, near the Baroghil Pass, Hindu Kush, at about 12,000 ft. Herb. No. 17802.]

112-115. ALGÆ. Four species were collected, one of which has been identified by Mr. George Murray of the British Museum as NOSTOC ZETHERSTEDTII, *Aresch*, previously known only from a lake in Sweden.

SECTION 5.

A Notice of the Specimens of Rocks collected on the Pamirs.

By T. H. Holland, Esq., A.R.C.S., F.G.S., Geological Survey of India.

The 13 specimens collected in the Pamirs and sent to me for examination are, on account of their similarity to rocks obtained in Kashmir and further east in the Himalayas, decidedly interesting to the Geological Survey.

Four of them resemble the common so-called *gneissose granite* of the Himalayas (Dr. Stoliczka's "central gneiss"), especially in the frequent association of biotite with muscovite as the principal ferro-magnesian constituents, and in the presence of sufficient plagioclase-felspar to lower the silica percentage to that of rocks now generally known as granitites—rocks which form a link between the granites proper and the quartz-diorites.

Two are specimens of volcanic rocks representing the group of andesitic rhyolites, and thus belonging to a class which must very nearly resemble the volcanic representatives of the gneissose granite of the same area.

Although the evidence relating to the field characters of these two groups is wanting, to make any conclusions concerning their genetic connexion free of question, yet their lithological similarity is certainly suggestive.

Whilst there is little doubt, from internal evidence, that some, if not the main mass, of the so-called central gneiss of the Himalayas is a true intrusive granitic rock of igneous origin, the absence of proof of the existence of its volcanic representatives adds value to any evidence like this which bears directly on the subject.

The remainder of the specimens are, with one exception, sedimentary in origin, and are quite as interesting as the igneous rocks in the resemblances they bear to some representatives of a great system of strata occurring in different parts of the Himalayas, whose age, in the absence of fossils, remains undetermined, and in which therefore the correlation of the representatives in isolated areas is necessarily based on purely lithological resemblances and similarity of succession.

The lithological characters of the specimens under report can be completely matched by rocks found further south-east.

The specimen of crushed quartzite-conglomerate, for instance, resembles the conglomerate of the Pir Panjal system of Kashmir, described by Lyddeker. The occurrence of this rock with red quartzite, banded carbonaceous fœtid limestone, and black carbonaceous shales with sulphuretted-hydrogen springs, gives an association similar to that found in the carbonaceous system whose members occur over a large area south of the snowy range, from Kashmir to Nepal, and probably still further east.

Although there is no palæontological evidence to fix the age of these beds, yet the constant presence of a boulder bed of assumed glacial origin suggests a correlation with the boulder-bed which is associated with a fauna of carboni-

ferous age in the Punjáb Salt Range, and with a boulder-bed occurring in the Talchir stage at the base of the Gondwána system of Peninsular India.

There are, however, certain resemblances to the Silurian portion of Mr. Griesbach's *Haimanta* series in the Central Himalayas of Hundes and Spiti, and to the limestones in Kulu, Jaunsar, and Kumaon, in which imperfect stromotoporoid structures also suggest a lower Palæozoic age; but as the points of evidence are inconclusive, it is impossible to settle at present whether these beds belong to the Lower or to the Upper section of the Palæozoic groups of stratigraphical systems.

The following is a description of the specimens:—

I. IGNEOUS ROCKS.

A.—PLUTONIC.

No. 1.—Muscovite-biotite-granitite, from the river-terraces of the Little Pamir.

A large pebble, in which the quartz, felspar, and mica are easily distinguished by the naked eye. There is no appearance of foliation in the hand-specimen, but under the microscope signs of mechanical deformation appear in the form of undulose extinctions in the quartz-crystals, and in the crumpled condition of the bundles of mica. The felspars, which are largely plagioclastic, have suffered a considerable amount of kaolinization with the formation of minute, spindle-shaped, secondary crystals possessing the high double refraction of muscovite. The muscovite occurs in large quantities in nests, and the biotite has become almost completely converted into green chlorite by hydration. The presence of large quantities of free silica in the form of quartz, and of potash in the muscovite, would give a chemical composition very nearly approaching that of a normal orthoclase-granite; but the presence of so much plagioclase gives an appearance under the microscope which more strongly recalls that of typical granitites, and indicates a closer relationship with the less acid types associated with it—types that form a link with the quartz-diorites—than with the normal orthoclase-granites, which pass by reduction of silica into the syenites. Classification by silica-percentage alone might thus very easily bring together rocks which, according to the microscopic evidence, show no relationship; and might just as easily separate rocks whose mineralogical characters show a strong family likeness.

No. 2.—Muscovite-biotite-granitite, from the lower slopes of the hills bounding the Little Pamir.

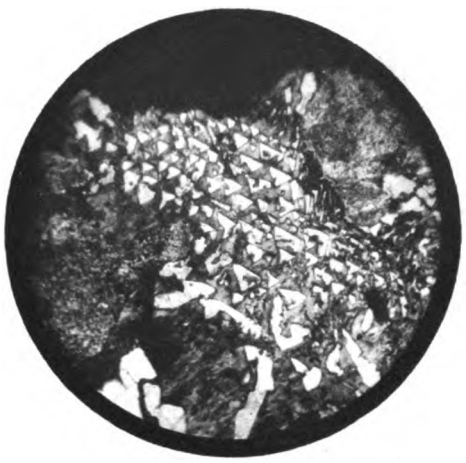
There is a slightly smaller quantity of quartz than in No. 1, and the biotite is less decomposed, but the muscovite and felspars occur in about the same proportion and give a similar granitic structure.

No. 3.—Biotite-granitite from the river-terraces of the Little Pamir.

In this rock muscovite is practically absent, and as the plagioclase-felspar still predominates, the rock forms a link with the quartz-diorites, by increase of soda over potash and by reduction of silica. The zoning of the plagioclase-felspars, by gradual increase of acidity, from the centre, recalls a similar feature very characteristic of the porphyritic felspars of andesites. Around these felspars, which generally show well-defined crystal-outlines, the quartz has been moulded, and in some sections even shows an ophitic disposition. The kaolinization of the more basic, and consequently more decomposable, cores of the felspar, and the conversion of biotite into chlorite along the margins of the mica-bundles, show the effect of weathering-agents on the rock.

No. 4.—Biotite-granitite from the lower slopes of the hills bounding the Little Pamir.

The principal feature noticeable in this rock is the advanced stage of change due to weathering-agents. The biotite-crystals, which retain their



"QUARTZ DE CORROSION" IN BIOTITE GRANITITE, FROM THE LITTLE PAMIR. × 25, NICOLS +.

T. H. Holland, Photo. Photo-etching - Survey of India Offices, Calcutta, July 1896.

crystal-outlines, are almost completely changed into chlorite, with the formation of colourless epidote; and the felspars are quite brown with the products of kaolinization. Probably connected with this decomposition and secondary silicification is the presence of beautiful specimens (see *Geology of the Pamir Commission*, Plate I) of micropegmatitic intergrowths of quartz, forming the *quartz de corrosion* of French petrographers. When large quartz-crystals disfigured with bands of minute cavities are in crystallographic continuity with irregular clear extensions of the same material in the adjoining decomposed felspars, the secondary origin of the irregular outgrowths is beyond question, and there is no reason why a similar origin should not be assumed for the more characteristic micrographic structures, which are remarkable for the regularity and parallelism of crystal-outline in the isolated sections. The micropegmatitic portions are generally fine-grained in the centre, and gradually increase to broad plates further from the centre of growth. Since Professor Judd showed, in 1889, the connexion between the secondary enlargement of crystals in igneous rocks after their consolidation, and the structures known as granophyric and micropegmatitic (*Quarterly Journal of the Geological Society*, Volume XLV, page 175), a sufficient number of similar cases has been described to warrant my ascribing, without further discussion, a secondary origin to the present instance of micropegmatitic intergrowth.

B.—VOLCANIC.

No. 5.—Biotite-rhyolite, or andesitic-rhyolite from the bluffs of Kizil Robát.

The porphyritic crystals are mostly plagioclase-felspar and the blackened relics of decomposed biotite crystals. The fine-grained ground-mass sometimes shows the fluidal structure characteristic of lavas, and is considerably devitrified. The whole rock has been highly decomposed; the iron compounds, having been oxidized and hydrated, give the ground-mass of the rock a rusty-red colour; opaline silica has been deposited in cavities, and much of the original plagioclase has been replaced by calcite. The rock has evidently been exposed to springs in the neighbourhood of limestone beds and probably containing strong sulphur acids.

No. 6.—Rhyolitic andesite from the neighbourhood of the hot sulphuretted-hydrogen springs near Kizil Robát.

The porphyritic crystals of plagioclase and ferro-magnesian silicates indicate a composition as basic as ordinary andesite; but the glassy ground-mass is probably much more siliceous, and a considerable quantity of secondary silica has been deposited in cavities. The fluidal and spherulitic structures of the ground-mass have survived the extreme decomposition which the more decomposable ferro-magnesian silicates have suffered. From the shapes preserved these were probably both hornblende and biotite. Calcite is the most abundant of the secondary constituents. The minute plates lining the cavities recall those of tridymite often found in volcanic rocks. This decomposition has taken place within range of limestone beds, and has probably been aided by the hot springs.

II. SEDIMENTARY ROCKS.

No. 7.—Limestone-conglomerate.

With a ferruginous and calcareous cement: Kizil Robát.

No. 8.—Limestone breccia.

Kizil Robát.

No. 9.—Banded limestone.

With a small quantity of magnesia and carbonaceous matter: Lower slopes of the Little Pamir.

No. 10.—Black argillaceous sandstone.

Hardened by secondary silicification like Lydian stone: Hills bounding the Pamirs.

No. 11.—Black carbonaceous shale.

Hills bounding the Pamirs.

No. 12.—Crushed quartzite-conglomerate.

Lower slopes of hills bounding the Little Pamir, near Bendersky Pass.

No. 13.—Calcareous sinter (travertine).

Associated with hot sulphuretted-hydrogen spring near Kizil Robát.

SECTION 6.

A brief notice of some of the features of the road from Kashmir to the Pamirs.

From Bandipur the road ascends over the Tragbal Downs, a height of more than 11,000 feet, and thence descending, runs along the beautiful wooded valleys of the Kishenganga basin towards the Burzil Pass.

At the time of our upward march, in June, the open southern slopes of the hills along this part of the road were vivid, past all expressing, with colour; and to have to leave untouched all the plants that were seen demanded the inflexible resolution of the philosopher of Horace's ideal:

"Quisquis ingentes oculo irretorto spectat acervos."

The snow had not yet melted from the summit of the Tragbal, but where the ground was clear it was carpetted with Primulas and with Ranunculaceous and Iridaceous flowers, while innumerable little skink lizards basked on the rocks. These skinks (*Lygosoma himalayanum*) as well as an *Agama* (*A. tuberculata*), and the pit-viper *Ancistrodon himalayanus*, were very common all along the road, as far as the Burzil.

Amid the still unmelted snows of the Burzil we found a brilliant Alpine flora in full bloom, the most conspicuous and most numerous plants being *Primulas*, with flowers of scarlet and purple and pale-yellow, purple Larkspurs, large-leaved Saxifrage, and wild-onions with fine yellow flowers; and the patches of blood-red Primula stretching into the expanse of snow made an effect of unique beauty, even under a dull cloudy sky. In many places also the snow was pink with some microscopic organism.

Not much animal life was noticed in the neighbourhood of the Burzil: the principal forms seen were the Alpine weasel, a marmot, a mouse-hare (*Lagomys macrotis*, I am nearly sure), the Himalayan vulture, the lammergeyer, the Himalayan skink, and some beetles for the most part of, or closely allied to, European species.

From Chilam Chowki, on the far side of the Burzil, to Doyan, the road follows, crosses, and follows again the Astor river. The scenery is only less beautiful, and the flora only less brilliant, than that of Kashmir; but as one passes northwards the trees, which are now almost entirely conifers, become fewer, and the wild-flowers give place more and more to wormwood, which at last becomes the principal small plant. Along this part of the road the lizard *Agama himalayana* is extremely common, and in the river the water-ouzel.

From Doyan to Gupis the road suddenly descends in the precipitous gorge through which the Astor river flows to meet the Indus, then runs along and crosses the Indus, and then gradually ascends along the alternating rocky gorges and stony alluvial stretches of the Gilgit river. Except for occasional oases of cultivation dependent on irrigation, this part of the country is barren and desolate. Of the few wild trees seen the commonest were a tamarisk—then in flower, and growing plentifully in the beds of the rivers—and a willow; and almost the only small plants were a wormwood, and where that

even failed, the common caper. Very little could be added to the zoological collections along this part of the road, except fishes, which were numerous in the river.

From Gupis to Darkot the road, after crossing the Gilgit river, ascends gradually towards the sources of the Yasin river. The river-bed was full of flowering tamarisk, and numerous oases of cultivation were passed, but though the country was by no means bare, yet vegetation on the whole was stunted and scanty, and animal life was scarce.

Near the village of Darkot the river runs through a large osier swamp, in which also were many spreading poplars, the leaves and small twigs of which were most extensively affected with galls.

Above the village of Darkot are several fine glaciers.

On the 14th July we crossed the Darkot Pass into the Yarkhun basin. The pass is a glacier bounded by bare precipitous rocks, and is devoid of life.

From the far side of the Darkot to Bozai Gumbaz, where the Little Pamir is entered, the highlands traversed are very much like the Pamir country already described, only the valleys are much narrower and deeper and the hills are much steeper. The rocks are much the same, consisting largely of hard sandstones and fissile black shales. At Sarhad is a hot sulphuretted hydrogen spring, around which however is no deposit of sinter. The vegetation is of much the same character as that of the Pamir, only it is considerably more abundant and varied: for instance, in the beds of the rivers and nullahs there are frequent thickets of a small willow and of birch and wild-rose, and on the slopes many flowering plants are common which on the Pamir are rarely seen. The animal life also is much the same, the golden marmot being very common on the heights.

SECTION 7.

A systematic account of the Zoological Collection made on the road to the Pamirs.

MAMMALS.

Order CARNIVORA.

1. PUTORIUS ALPINUS (Gebler).—The pale Weasel.

Mustela alpina, Gebbler, Mem. Soc. Imp. Nat. Mosc., VI, 1824, p. 213: Radde Reisen in Ost-Siberien I p. 48, pl. ii: Horsfield, Cat. Mamm. Mus. H. E. I. C. S., p. 104 (? *syn.*).

Mustela temon, Hodgson, J. A. S. B., Vol. XXVI, 1857, p. 207: (?) Blanford: Mammals of 2nd Yarkand Mission, p. 32: Scully, P. Z. S., 1881, p. 203, and Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 97.

Putorius alpinus, Blanford, Fauna Brit. India, Mammals, p. 168: W. Sclater, Cat. Mamm. Ind. Mus. II, 281.

An adult male from the Burzil Valley, about 11,000 feet.

The other mammals seen and recognizeda long the road were the pale variety of the common fox, two species of marmots, the Gilgit vole, the grey hamster, and the Tibetan hare.

BIRDS.

As in the case of the Pamir birds, Mr. F. Finn is again my collaborateur.

Order *CARINATÆ*.

Sub-order *PASSERES*.

Family CORVIDÆ.

1. PICA PICA (L).—The common Magpie.

Pica pica, Sharpe, Cat. Birds Brit. Mus., Vol. III, p. 62, and Birds of 2nd Yarkand Mission, p. 19.

The common magpie was especially numerous in September above Darkot village, at a height of over 9,000 feet. Our specimens show no unusual amount of white on the primaries.

2. NUCIFRAGA MULTIPUNCTATA, Gould.—The Large-spotted Nutcracker.

Nucifraga multipunctata, Sharpe, Cat. Birds Brit. Mus., Vol. III, p. 55, and Birds of 2nd Yarkand Mission, p. 20.

Very common in the Astor Valley in September-October. The crops of our specimens were full of pine seeds. Fine specimens were presented to the collection by Colonel Holdich and Captain McSwiney.

Family PARIDÆ.

3. PARUS (LOPHOPHANES) RUFONUCHALIS, Blyth.

Parus rufonuchalis, Gadow, Cat. Birds Brit. Mus., Vol. VIII, p. 29.
Lophophanes rufinuchalis, Sharpe, Birds of 2nd Yarkand Mission, p. 66.

Astor Valley, 8,000 feet.

Family CRATEROPODIDÆ.

4. TROCHOLOPTERUM LINEATUM, Vigors.—The Striped Babbler.

Trochalopterum lineatum, Sharpe, Cat. Birds Brit. Mus., Vol. VIII, p. 377, and Birds of 2nd Yarkand Mission, p. 100.

Astor Valley, 8,000 feet.

Family TURDIDÆ.

5. MONTICOLA CYANUS (L).—The blue Rock-thrush.

Monticola cyanus, Seebohm, Cat. Birds Brit Mus., Vol. V, p. 316.

Gilgit Valley, about 5,000 feet.

6. RUTICILLA RUFIVENTRIS (Vieillot).—The Indian Redstart.

Ruticilla rufiventris, Seebohm, Cat. Birds Brit. Mus. Vol. V, p. 342: Sharpe, Birds of 2nd Yarkand Mission, p. 87.

Darkot Valley, 10,000 feet.

7. CHIMARRHORNIS LEUCOCEPHALUS (Vigors).—The White-cap Water-redstart.

Chimarrhornis leucocephala, Sharpe, Cat. Birds Brit. Mus., Vol. VII, p. 47.
Chaemorrhornis leucocephala, Sharpe, Birds of 2nd Yarkand Mission, p. 86.

Only occasionally seen in June and July, and then only in streams near their sources (8,000 to 11,000 feet); but fairly common in October, and at much lower elevations.

8. SAXICOLA PICATA, Blyth.—The Pied Chat.

Saxicola picata, Seebohm, Cat. Birds Brit. Mus., Vol. V, p. 367: Sharpe, Birds of 2nd Yarkand Mission, p. 83.

Gilgit Valley, 5,000 to 7,100 feet.

9. ORIOLUS KUNDOO (SYKES).—The Indian Golden Oriole.

Common in the orchards of the Gilgit Valley up to 7,100 feet.

Family FRINGILLIDÆ.

10. EMBERIZA CIA, L.—The Foolish Bunting.

Emberiza cia, Sharpe, Cat. Birds Brit. Mus., Vol. XII, p. 537.
Emberiza cia and *Stracheyi*, Sharpe, Birds of 2nd Yarkand Mission, p. 47.

Darkot Valley, 10,000 feet.

Family MOTACILLIDÆ.

11. ANTHUS MACULATUS, Hodgs.—The Indian Tree-pipit.

Anthus maculatus, Sharpe, Cat. Birds Brit. Mus., Vol. X, p. 47.

Yasin Valley, 7,500 feet.

12. MOTACILLA HODGSONI, Blyth.—Hodgson's Pied Wagtail.

Motacilla hodgsoni, Sharpe, Cat. Birds Brit. Mus., Vol. X, p. 486, and Birds of 2nd Yarkand Mission, p. 57.

Astor Valley, 8,500 feet.

13. MOTACILLA CITREOLOIDES.—(Hodgs.).

Family ALAUDIDÆ.

14. GALERITA CRISTATA (L).—The Crested Lark.

Galerita cristata, Sharpe, Cat. Birds Brit. Mus., Vol. XIII, p. 625 (see also Birds of 2nd Yarkand Mission, p. 55.)

Gilgit Valley, 5,000 feet.

Sub-order *PICARIÆ*.

Family CORACIIDÆ.

15. CORACIAS GARRULA (L.)—The European Roller.

Gilgit Valley, 5,000 feet.

Sub-order *ACCIPITRES*.

Family VULTURIDÆ.

16. GYPS HIMALAYENSIS, Hume.—The Himalayan Vulture.

Gyps Himalayensis, Sharpe, Cat. Birds Brit. Mus., Vol. I, p. 8.

A magnificent male from near the Burzil Pass, about 11,000 feet.
Shot and presented by Captain E. F. H. McSwiney.

Family FALCONIDÆ.

17. CERCHNEIS TINNUNCULUS (L.).—The Kestrel-hawk.

Cerchneis tinnunculus, Sharpe, Cat. Birds Brit. Mus., Vol. I, p. 425, and Birds of 2nd Yarkand Mission, p. 12.

Common along the Gilgit Valley.

Sub-order *LIMICOLÆ*.

18. VANELLUS CRISTATUS, Wolf and Meyer.—The common Lapwing.

Vanellus cristatus, Seebohm, Charadriidæ, p. 210: Sharpe, Birds of 2nd Yarkand Mission, p. 138.

A single specimen—a female in immature plumage, and the only one seen—was taken at Sarhad in the Wakhán Valley, 10,500 feet.

REPTILES.

Order *SQUAMATA*.

Sub-order *LACERTILIA*.

Family AGAMIDÆ.

1. AGAMA HIMALAYANA, Stdr.

Agama himalayana, Boulenger, Cat. Lizards Brit. Mus., Vol. I, p. 362, and Fauna of Brit. Ind., Reptiles, etc., p. 149.

Stellio himalayanus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 3.

Adults were very common at the end of June and beginning of July, and

young ones at the beginning of October, on the Gilgit road between the Burzil and Doyan at 11,000 to 9,000 feet.

In life, in the males at any rate, even in non-adults, the gules are dusky red.

AGAMA TUBERCULATA, Gray.

Agama tuberculata, Boulenger, Cat. Lizards Brit. Mus., Vol. I, p. 361, and Fauna of Brit. Ind., Reptiles, etc., p. 148.

Stellio tuberculatus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 25.

Common in June between Karagbal and the Burzil, 8,000 to 10,000 feet, but none were seen on the return march in October.

Family SCINCIDÆ.

3. LYGOSOMA HIMALAYANUM (Gthr.).

Lygosoma himalayanum, Boulenger, Cat. Lizards Brit. Mus., Vol. III, p. 257, pl. xvii, fig. 2, and Fauna of Brit. Ind., Reptiles, etc., p. 200.

Mocoa himalayana, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 19.

This little skink was very common, at the end of June, on the Tragbal Pass at a height of about 11,000 feet, and on the ascent to the Burzil Pass at 11,000 to 12,000 feet. At these heights its habits were quite gregarious, numerous individuals living together in separate little burrows among the grass and stones. It was also frequently found along the road between the Tragbal and the Burzil. This was during the breeding season, and the ventral surface, which in spirit is leaden or greenish white, was orange or red in both sexes.

4. LYGOSOMA HIMALAYANUM, var. TRAGBULENSE.—Plate III, figs. 1, 1*a*.

Founded on two specimens.

In this variety, which was found on the descent from the Tragbal Pass, at an elevation of about 9,000 feet, the crown of the head is beautifully mottled; and the back, from the nape to the root of the tail, is traversed longitudinally by ten or eleven sharply-defined, alternate dark brown and greyish-white stripes.

There are 21 scales on the under-surface of the fourth toe.

In one specimen the 6th upper labial enters the orbit, in the other the 5th as usual.

Sub-order *OPHIDIA*.

Family VIPERIDÆ.

5. ANCISTRODON HIMALAYANUS (Gthr.).

Ancistrodon himalayanus, Boulenger, Fauna of Brit. Ind., Reptiles, etc., p. 424.

Halys himalayanus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 24.

This pit-viper was very common in June on the Gilgit road between Karagbal and the Burzil, especially at about 8,000 feet.

All our specimens have 21 rows of scales round the body.

AMPHIBIA.

Order *ECAUDATA*.

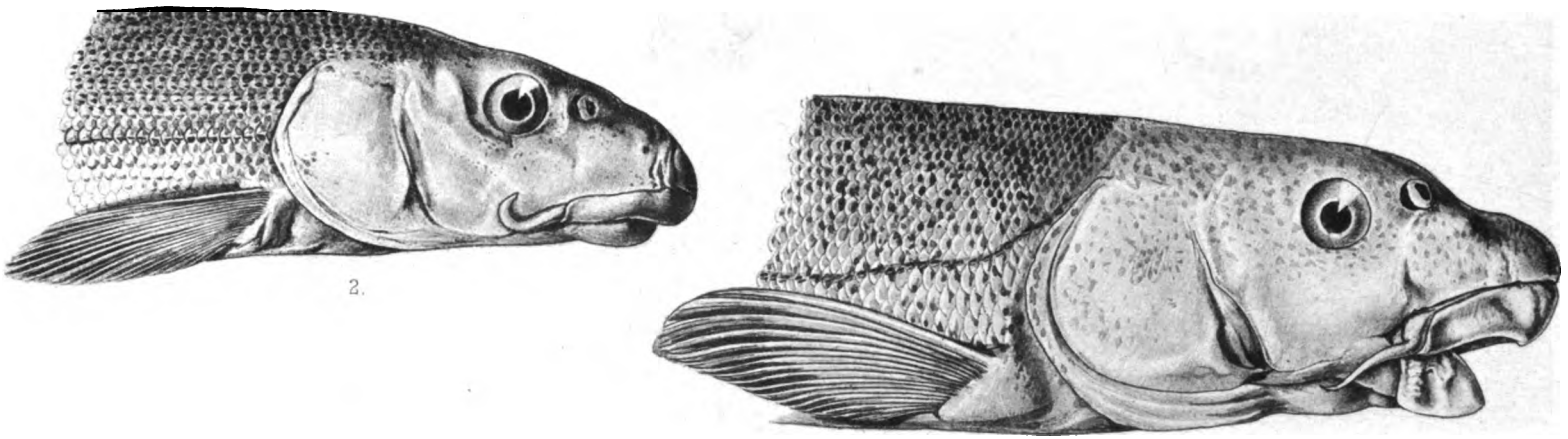
Family BUFONIDÆ.

1. BUFO VIRIDIS, Laur.

Bufo viridis, Boulenger, Cat. Batrachia Salientia Brit. Mus., p. 297, and Fauna of Brit. Ind., Reptiles and Batrachia, p. 504.

Bufo viridis, Blanford, Rept. and Amphibia of 2nd Yarkand Mission, p. 26; and Boulenger in Aitchison's Zool. of the Afghan Boundary Commission, Trans. Linn. Soc. Zool. (2) V, 1889, p. 105.

This toad was very common about the numerous water-courses at Gilgit,



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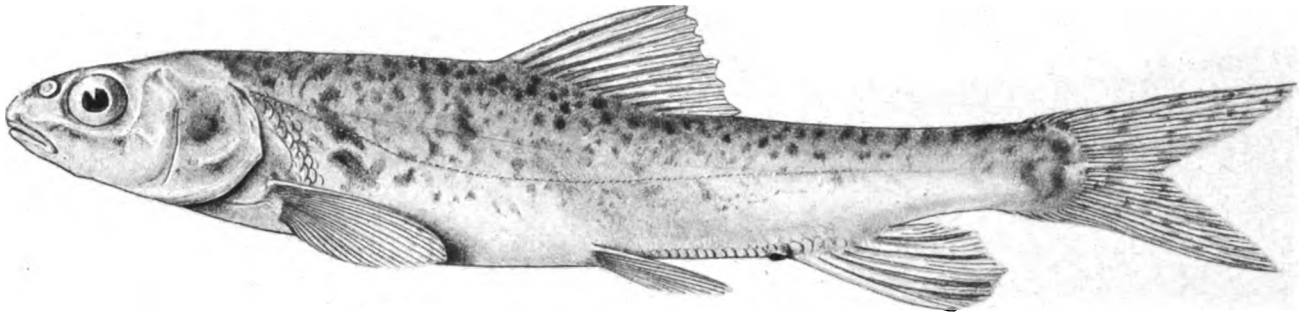


1

1. SCHIZOPYGOPSIS SEVERZOVI. HERZ. 2, 3. PTYCHOBARBUS CONIROSTRIS. STDR. ♂. ♀.

Photo-etching.

Survey of India Offices, Calcutta, July 1896.

in the beginning of July; but on the return march, at the end of September, I did not see any.

It is worthy of mention that our ducks ate these toads greedily.

2. Bufo himalayanus, Gthr.

Bufo sikkimensis and *himalayanus*, Boulenger, Cat. Batrachia Salientia Brit. Mus., p. 305, pl. xx.
Bufo himalayanus, Boulenger, Fauna Brit. Ind., Reptiles and Batrachia, p. 505.

Numerous young, with the metamorphosis recently complete, found in an overflow pool of the River Yasin at about 8,500 feet, are probably referable to this species.

They agree closely with the description of *B. sikkimensis* given by Boulenger *loc. cit.*, and by Stoliczka in the Proc. A. S. B., 1872, p. 112.

FISHES.

Order *PHYSOSTOMI.*

Family CYPRINIDÆ.

1. Schizothorax nasus, Heckel.

Schizothorax nasus, Heckel, Fische aus Caschmir, p. 32, pl. vi.: Günther, Cat. Fishes Brit. Mus., Vol. VII, p. 166.

Specimens from the Yasin river at 7,500 feet agree perfectly with Heckel's figure and description. On the other hand, the fish, now in the Indian Museum collection, figured by Day (Fishes of 2nd Yarkand Mission, pl. iv., fig. 3) as *S. nasus*, Heckel, has no likeness whatever to Heckel's figure. Heckel's fish is represented with a short wide mouth-cleft and an overhanging snout, whereas the fish of Day's figure has a long mouth-cleft and a projecting mandible.

2. Schizothorax hodgsonii, Gthr.

Schizothorax hodgsonii, Günther, P. Z. S., 1861, p. 224, and Cat. Fishes Brit. Mus., Vol. VII., p. 167.

Found in the Yasin river between 7,000 and 8,000 feet. The fish that I identify with Dr. Günther's description does not correspond with the *S. progastus* of Day, with which Day has, wrongly I think, synonomized *S. hodgsonii* of Günther.

In Day's typical specimen of *S. progastus*, which is in the Indian Museum collection, the scales are comparatively large, and fall into regular cross-rows in every part of the body; the mouth is without the broad fleshy upper lip, with its remarkable sub-triangular excrescence at the snout, of *S. hodgsonii*; and the anal fin is short, falling far short of the base of the caudal when laid back.

3. Ptychobarbus conirostris, Stdr. Plate I., fig. 2 ♂, fig. 3 ♀.

Ptychobarbus conirostris, Steindachner, Verh. zool.-bot. Ges. Wien, XVI., 1866, p. 790, pl. xvii., fig. 4: Günther, Cat. Fishes Brit. Mus., Vol. VII., p. 169: Day, P. Z. S., 1876, p. 789, and Fishes of 2nd Yarkand Mission, p. 7, pl. iii., fig. 3, and Fishes of India, p. 533, pl. cxxv., fig. 3, and Fauna Brit. Ind., Fishes, Vol. I., p. 254, fig. 91.

From the Yasin river at about 8,500 feet. The fine male figured, which is $10\frac{1}{2}$ inches long, has the eye relatively smaller than that of the figures and descriptions of authors, its major diameter being but $\frac{2}{13}$ the length of the head, while in two fine females 13 inches long—one of which is figured—the eye is even smaller, its major diameter being only $\frac{2}{15}$ the length of the head.

These two females—one of which is nearly ripe, while the other appears to be just spent—are singular in having the upper lip greatly broadened and thickened, and the profile of the snout conspicuously concave.

If they did not agree with *P. conirostris* in every other particular, and if they had not been taken in the same pool with males of this species, they might have been regarded as distinct.

4. NEMACHILUS STOLICZKÆ, Stdr.

Cobitis Stoliczkæ and *tenuicauda*, Steindachner, Verh. zool.-bot. Ges. Wien, XVI., 1866, pp. 793 and 792, pls. xiv., fig. 2, and xvii., fig. 3.

Nemachilus Stoliczkæ, Günther, Cat. Fishes Brit. Mus., Vol. VII., p. 360: Day, P. Z. S., 1876, p. 795, and Fishes of 2nd Yarkand Mission, p. 14, pl. v., fig. 2, and Fishes of India, p. 620, pl. clv., fig. 10, and Fauna Brit. Ind., Fishes, Vol. I., p. 235, fig. 84: Herzenstein, Prejevalski Reisen, Fische, p. 14 (part), pl. vii., fig. 4.

? *Cobitis uranoscopus*, Kessler, Fedschenko's Reise in Turkestan, Pisces, p. 40., pl. vi., figs. 24, 25.

Very common in the small tributaries of the Yasin river, at about 9,000 feet.

In the young the cross-bars along the back are very distinct.

5. NEMACHILUS YASINENSIS, n. sp.—Plate II., figs. 2, 2*a*.

D. 9 A. 6.

Distinguished by the long narrow tail and forked caudal fin.

The greatest height of the body is one-seventh to one-eighth of the total without the caudal: the least height of the tail, in a specimen over four inches long, is equal to the major diameter of the orbit.

The length of the head is a little more than two-ninths the total without the caudal.

The snout is slightly longer than the post-orbital part of the head, and is broad, rounded and depressed.

The eyes and visual axis are distinctly superior (uranoscopic), the diameter of the eye being about one-sixth the length of the head.

The dorsal fin arises immediately above the origin of the ventrals, midway between the tip of the snout and the base of the caudal: its height is half again that of the body below it, or more.

The anal when laid back reaches but little over halfway to the base of the caudal.

The caudal is conspicuously forked.

The pectorals are as long as the head, and reach considerably beyond halfway to the ventrals, which latter reach a little beyond the origin of the anal.

No scales. The lateral line is remarkably prominent and conspicuous in the anterior fourth of the body, and remarkably inconspicuous, or obsolete, in the posterior two-fourths.

Colours: back yellowish green with numerous indefinite blackish-green cross-bars: head, and sides of body, yellowish with much fine dark-green mottling: under-surface, yellow. Fins yellowish, the caudal and first one or two rays of the dorsal speckled.

From the Yasin river at about 8,500 feet.

MOLLUSCA.

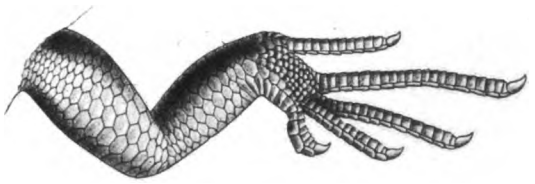
Order *GASTROPODA PULMONATA*.

Family LIMNÆIDÆ.

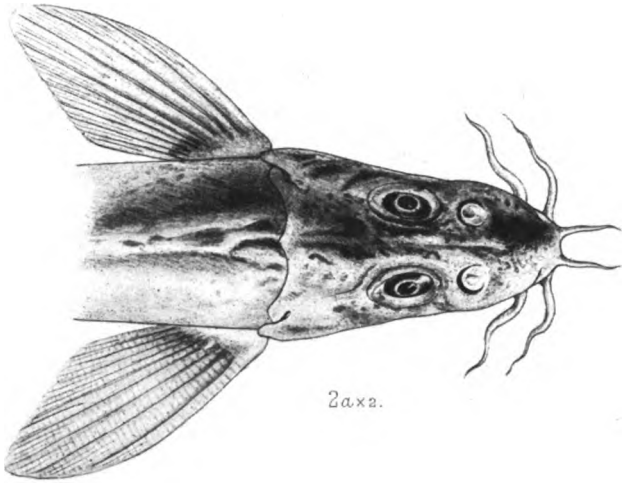
1. LIMNÆA LAGOTIS, Schröter, var. COSTULATA, von Martens.

Limnæa lagotis var. *costulata*, von Martens, Fedschenko Reise, Mollusca, p. 26, pl. ii, fig. 24.

Our specimens exactly resemble von Marten's figure. Abundant in stagnant overflow pools of the Yasin river at Handur, at an elevation of about 8,500 feet.



1a×4.



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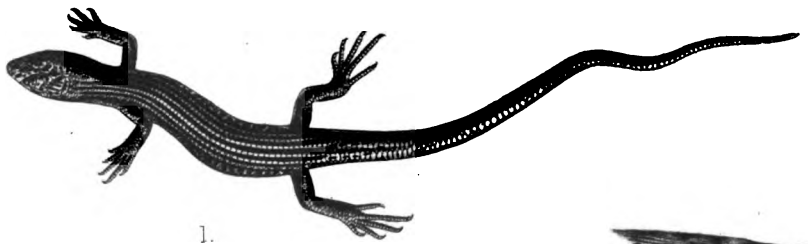

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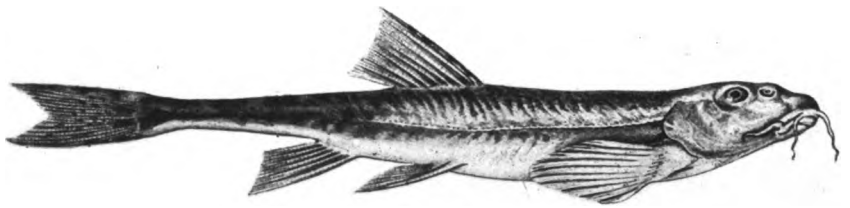


2.

1. 1a. LYGOSOMA HIMALAYANUM, (GTHR.) VAR: TRAGBULENSE. 2. 2a. NEMACHILUS YASINENSIS.

Photo etching. Survey of India Offices. Calcutta. July 1896.

INSECTS.

Order *HYMENOPTERA.*

Family APIDÆ.

1. ANTHOPHORA sp.

A species from Bunji in the Indus Valley, closely resembling specimens in the Indian Museum collection, of *Anthophora senex* from Yarkand (Smith, Hymenoptera of 2nd Yarkand Mission, p. 7), and of *Anthophora atroalba*, from Hari-rud and Badghis (W. F. Kirby in Aitchison's Zool. of Afghan Boundary Commission, Trans. Linn. Soc., Zool. (2), V., 1889, p. 137).

In the undetermined collection of bees in the Indian Museum collection are specimens of the Bunji species from Bushire and Baluchistan.

2. BOMBUS sp. 1 and 2.

Two species of bumble-bee were taken in June, one near the top of the Tragbal Pass (at about 10,000 feet), the other on the ascent to the Burzil Pass (at about 11,000 feet).

They do not agree with any of the species collected by the 2nd Yarkand Mission, or with anything in the Indian Museum.

Family VESPIDÆ.

4. VESPA ORIENTALIS, Fabr.

Vespa orientalis, Amedée Lepeletier de Saint Fargeau, Hist. Nat. Insectes, Vol. I, p. 507: de Saussure, Monogr. Guêpes Sociales, p. 132: W. F. Kirby in Aitchison's Zoology of the Afghan Boundary Commission, *tom. cit.*, p. 135.

Very common at Bunji on ripening galls.

5. VESPA GERMANICA, Fabr.

Vespa germanica, Saint Fargeau, Hist. Nat. Ins., Vol. I., p. 515: de Saussure, Monogr. Guêpes Sociales, p. 116, pl. xiv, figs. 4, 4*a*—*c*: F. Smith, Hymenoptera of 2nd Yarkand Mission, p. 17.

Very common at Bunji on ripening galls.

6. POLISTES sp.

A species of *Polistes* bearing a very close resemblance to *P. gallica*, Fabr. (St. Fargeau, Hist. Nat. Ins., Vol. I, p. 527, pl. ix, figs. 4, 5, 6, and de Saussure, Monogr. des Guêpes Sociales, p. 48), was common at Bunji on ripening galls.

It appears to differ from *P. gallica* only (1) in being rusty brown where that species is black, and (2) in having the pronotum traversed fore and aft, in the middle, by two nearly parallel bright yellow lines.

Order *COLEOPTERA.*

Family DYTISCIDÆ.

1. DYTISCUS (HYDROPORUS) GRISEOSTRIATUS, de Geer.

This small water-beetle, which I identify from specimens in the Indian Museum collected by the 2nd Yarkand Mission (Coleoptera of 2nd Yarkand Mission, p. 37), was common in July in Lake Sarkhin, near the Baroghil Pass, about 14,000 feet.

Family SILPHIDÆ.

2. SILPHA OPACA, L.

Fairly common in June on the Gilgit Road as far as the Burzil Pass, and up to 11,000 feet.

It corresponds completely with a specimen from the Jhelum Valley determined, for the Indian Museum, by M. Grouvelle.

Family SCARABÆIDÆ.

3. SCARABÆUS SYLVATICUS, Panz.

Scarabæus sylvaticus, Panzer, Index Entomologicus, Vol. I, p. 2, and Fauna Coleopt. German. XLIX, tab. 8 : Sharpe in Coleoptera of 2nd Yarkand Mission, p. 46.

Found on the ascent to the Burzil Pass about 11,000 feet.

Identical with, but a little larger than, the Yarkand specimens so named by Sharpe: identical with Panzer's coloured figure.

Family MALACODERMIDÆ.

4. LAMPROPHORUS sp.

A single specimen almost exactly resembling specimens in the Indian Museum collection that have been identified by the Rev. H. S. Gorham as *L. nepalensis*, Gray.

Found on the Gilgit road, in June, at an elevation of 8,700 feet. Strongly luminous.

Family TENEBRIONIDÆ.

5. PROSODES TRISULCATA, Fk. Bates.

Prosodes trisulcata, Fk. Bates in Coleoptera of the 2nd Yarkand Mission, p. 63, pl. ii fig. 11.

Ascent to Burzil Pass, about 11,000 feet.

Family CANTHARIDÆ

6. MELOE PROSCARABÆUS, L.

Meloe proscarabæus, L., Olivier, Hist. Nat. Insectes Coleoptères, Vol. III., pp. 5, 6, and Vol. VII., pl. No. 45 l., figs. 1, *a*, *b*, *c*, *d*, *e*.

A male and female, from the ascent to the Burzil Pass, 11,000 feet, agree in every particular with Olivier's description and copious figures.

7. MYLABRIS MACILENTA, Marseul.

Mylabris macilenta, Fk. Bates in Coleoptera of 2nd Yarkand Mission, p. 78.

Very common in June along the Gilgit road between 8,000 and 9,000 feet, on the flowers of a sort of hemlock.

8. MYLABRIS sp. 2.

In the Wakhan Valley, at 13,000 feet.

Family CURCULIONIDÆ.

9. CATAPIONUS BASILICUS, Bohem.

Catapionus basilicus, Lacordaire, Hist. Nat. Insectes Coleoptères, Vol. VI., p. 42, pl. 62, fig. 1.

Ascent to Burzil Pass, 11,000 feet.

Order *LEPIDOPTERA*.

Sub-order *RHOPALOCERA*. Butterflies.

Mr. de Nicéville has again been the directing collaborateur in this report upon the butterflies. In fact, had it not been that I was officially responsible

for the preparation of the report, I should have preferred to leave these insects entirely to him.

Family NYMPHALIDÆ.

1. LASIOMMATA MENAVA, Moore.

Lasiommata Menava, Moore, P. Z. S. 1865, p. 499, pl. xxx., fig. 3, ♂, and Lepidoptera ndica, Vol. II., p. 9, pl. 96, figs. 4, 4*a*, ♂, ♀.

Lasiommata mæroides, Felder, "Novara" Lepidoptera, Vol. III., p. 496, No. 859, pl. lxix., fig. 1, ♀.

Pararge nashreddini, Christoph, Horæ Soc. Entomol. Ross, Vol. XII, 1876, p. 240, No. 9, pl. v., figs. 13, 14, ♂, ♀.

Pararge menava, Groum-Grshimailo, Faun. Lép. Pamir, in Mém. Lép. IV, 1890, p. 489, No. 167.

On the Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

2. EUMENIS BALDIVA, Moore.

Lasiommata baldiva, Moore, P. Z. S., 1865, p. 499, No. 84, pl. xxx., fig. 4, ♂.

Hipparchia baldiva, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 188, No. 180.

Eumenis baldiva, Moore, Lepidoptera Indica, Vol. II., p. 18, pl. 98, figs. 1, 1*a*, ♂, ♀ (*ubi synon.*).

Hipparchia lehana, Moore, Ann. Mag. Nat. Hist. (5) I. 1878, p. 227, and Lepidoptera of 2nd Yarkand Mission, p. 1, pl. i, fig. 4, ♂; Marshall and de Nicéville, Butterflies of India, Vol. I., p. 188, No. 181, pl. xvi., fig. 48, ♀.

Eumenis lehana, Moore, Lepidoptera Indica, Vol. II., p. 19, pl. 98, figs. 2, 2*a*, ♂, ♀.

Two perfect specimens were taken in July on the heights of the Wakhan Valley, between 12,000 and 13,000 feet.

In one the inner edge of the tawny band on the forewing runs obliquely inwards posteriorly, and the small ocellus at the anal angle of the hindwing is present: in the other there is no special inclination inwards posteriorly of the tawny band, and the ocellus is absent. For these among other reasons we consider ourselves justified in uniting Moore's two species.

3. EUMENIS THELEPHASSA (Hübner).

Hipparchia thelephassa, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 187, No. 179.

Eumenis thelephassa, Moore, Lepidoptera Indica, Vol. II., p. 20 (*ubi synon.*).

Very numerous in July on the Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

4. AULOCERA SWAHA, Kollar.

Aulocera swaha, Kollar in Hügel's Kaschmir, Vol. IV., pt. ii., p. 444, No. 1, pl. xiv., figs. 1, 2, 1844: Moore, Lepidoptera of 2nd Yarkand Mission, p. 2, No. 4, and Lepidoptera Indica, Vol. II., p. 33, pl. 100, figs. 2, 2*a*, ♂, ♀ (*ubi synon.*): Marshall and de Nicéville, Butterflies of India, Vol. I., p. 197, No. 188.

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

5. KARANASA HUEBNERI (Felder).

Heights of the Wakhan Valley, 12,000 to 14,000 feet.

These specimens are much darker and much larger than those from the Great Pamir.

6. KANETISA PIMPLA (Felder).

Satyrus pimpla, Felder, "Novara" Lepidoptera, Vol. III., p. 494, No. 856, pl. lxix., figs. 10, 11, ♀, 1867.

Hipparchia pimpla, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 185, No. 177, ♂, ♀.

Kanetisa pimpla, Moore, Lepidoptera Indica, Vol. II., p. 43, pl. 102, figs. 3, 3*a*, ♂, ♀ (*ubi synon.*).

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

7. MANIOLA CHEENA, Moore.

Epinephele cheena, Moore, P. Z. S., 1865, p. 501, No. 93, pl. xxx., fig. 6, ♂, ♀: Marshall and de Nicéville, Butterflies of India, Vol. I., p. 205, No. 194.

Maniola cheena, Moore, Lepidoptera Indica, Vol. II, p. 50, pl. 104, figs. 1, 1*a*, ♂ ♀ (*ubi synon.*).

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

8. Chortobius hilaris (Staudinger).

Northern side of Darkot Pass, 12,000 feet.

9. Paralasia jordana (Staudinger).

Erebia jordana, Staudinger, Berlin. Entomol. Zeitschr. XXVI, 1882, p. 171 : Groum-Grshimailo, Pamir te sa Faune Lépidoptérologique, Mem. Lép IV, 1890, p. 449, No. 141, pl. xiii, figs. 4*b*, 4*c*.
Paralasia jordana, Moore, Lepidoptera Indica, Vol. II., p. 106.

A single specimen was taken at about 14,000 feet near the Baroghil Pass.

10. Argynnis vitatha, Moore.

Northern side of Darkot Pass, about 12,000 feet, and also near the Baroghil Pass, at about 14,000 feet.

11. Melitæa trivia, Wien. Verz.

Melitæa trivia, Wien. Verz. (Schiff.), p. 179, No. 8, 1776 : Lang, Rhopalocera Europæ, p. 187, No. 9, pl. 44, fig. 5.

Common in July on certain barren slopes of the Wakhan Valley at about 12,000 feet.

12. Melitæa balbita, Moore.

Melitæa balbita, Moore, P. Z. S. 1874, p. 268, No. 26, pl. xliii., fig. 5 : de Nicéville, Butterflies of India, Vol. II., p. 26, No. 311, pl. xviii, fig. 71, ♂, ♀.

Wakhan Valley, about 12,000 feet, and also on the ascent to the Tragbal Pass, about 9,000 feet.

Family Lycænidæ.

13. Lycæna omphissa (Moore).

Polyommatus omphissa, Moore, P. Z. S. 1874, p. 573, pl. lxvi, fig. 2, ♂.
Lycæna omphissa, de Nicéville, Butterflies of India, Vol. III., p. 84, No. 667.

Between Dashkin and Doyan, 8,000 to 9,000 feet.

14. Lycæna ariana (Moore).

Polyommatus ariana, Moore, P. Z. S. 1865, p. 504, No. 103, pl. xxxi, fig. 2, ♂, and Lepidoptera of 2nd Yarkand Mission p. 6, No. 22.
Lycæna ariana, de Nicéville, Butterflies of India, Vol. III., p. 72, No. 649 (*ubi synon.*).

Northern side of Darkot Pass, about 12,000 feet.

15. Chrysophanus kasyapa.

Chrysophanus kasyapa, Moore, P. Z. S. 1865, p. 506, No. 111, pl. xxxi., fig. 10, ♂ : de Nicéville, Butterflies of India, Vol. III., p. 319, No. 88 (*ubi synon.*).

Ascent to Tragbal Pass, 8,000 to 9,000 feet.

16. Thecla sassanides, Kollar.

Thecla sassanides, Kollar, Denk. Ak. Wien, Vol. I, 1850, p. 51 : de Nicéville, Butterflies of India, Vol. III., p. 298, No. 862, pl. xxvii., fig. 202, ♂ (*ubi synon.*) : Groum-Grshimailo, Faun. Lépidopt. Pamir, p. 354, No. 48.

Near Dashkin, Gilgit road, about 8,000 feet.

Family Papilionidæ.

17. Synchloe callidice (Esper).

Papilio callidice, Esper, Schmett, I. 2, pl. cxv., figs. 2, 3.
Pieris kalora, Moore, P. Z. S. 1865, p. 489, pl. xxxi., fig. 15, ♂.
Pieris callidice, var. *kalora* Groum-Grshimailo, Faun. Lép. Pamir, p. 226, No. 27.

Northern side of Darkot Pass, about 12,000 feet.

18. Colias hyale (L.).

Papilio hyale, Linn. Syst. Nat., ed. 10, I. 2. 469, No. 71, 1758.
Colias hyale, Moore, Lepidoptera of 2nd Yarkand Mission, No. 14, p. 4: Leech, Butterflies from China, Japan, and Corea, pt. II., p. 431, pl. xxxiv, figs. 1—14.
Colias nerieus, Fisch. *apud*, Gray, Lep. Ins. Nepál, p. 9, pl. v, fig. 3.

Singal, Gilgit river valley, 7,100 feet.

19. Colias fieldii, Ménétriès.

Colias fieldii, Ménétriès, Cat. Lep. Mus. Petrop. pt. II., p. 79, No. 252, pl. i., fig. 5, ♂, 1855. Moore, Lepidoptera of 2nd Yarkand Mission, p. 4, No. 15: Leech, Butterflies from China, Japan and Corea, pt. II., p. 438, pl. xxxv., figs. 6, 7, ♂, ♀.
Colias edusa, Gray (*nec* Linn.), Lep. Ins. Nepál, p. 9, pl. v., fig. 2, ♀.

Chorwán, Gilgit road, 8,100 feet, and also at Singal, Gilgit river valley, 7,100 feet.

20. Mancipium brassicæ (L.).

Papilio brassicæ, Linn., Syst. Nat., ed. 10, I. 2. 467, No. 58, 1758.
Pieris nepalensis, Gray, Lep. Ins. Nepál, p. 9, pl. vi., fig. 3, ♂, fig. 1, ♀.
Synchloe brassicæ, Moore, Lepidoptera of 2nd Yarkand Mission, p. 4, No. 10 (*sic syncm.*).
Pieris brassicæ var. *nepalensis*, Groum-Grshimailo, Faun. Lep. Pamir, n Mem. Lep. IV, 1890, p. 214, No. 15.

Singal, Gilgit river valley, 7,100 feet.

21. Gonepteryx rhamni (L.).

Papilio rhamni, Linn. Syst. Nat., ed. 10, I. 2. 470, No. 73, 1758.
Rhodocera rhamni, var., Gray. Lep. Ins. Nepál, p. 9, pl. v., fig. 1, ♂.
Gonepteryx nepalensis, Doubleday, Gen. Diurn. Lep., Vol. I., p. 71, No. 9.

Gilgit road, 8,100 feet.

22. Parnassius epaphus, Oberthür.

Common on the northern side of the Darkot Pass, at about 12,000 feet.

23. Parnassius charltonius, Gray.

Parnassius charltonius, Gray, Cat. Lep. Ins. Brit. Mus., Vol. I., p. 77, No. 355, pl. xii., fig. 7, ♂, 1852: Moore, Lepidoptera of 2nd Yarkand Mission, p. 5, No. 17, pl. i., fig. 3, ♀: Groum-Grshimailo, Faun. Lep. Pamir, in Mem. Lep. IV, 1890, p. 189, No. 10, pl. ii., figs. 1 *a*, *b*, *c*, ♂, ♀.

Northern side of Darkot Pass, about 12,000 feet.

24. Papilio ladakensis, Moore.

Papilio ladakensis, Moore, Journ. Asiat. Soc. Bengal, Vol. LIII., pt. 2, 1884, p. 46.
Papilio machaon sphyrus ladakensis, Rothschild, Novitates Zoologicæ II, 1895, p. 275.

Ascent to Burzil Pass, 11,000 feet, and also near the Baroghil Pass, about 14,000 feet.

LEPIDOPTERA HETEROCERA,—Moths.

Family SPHINGIDÆ.

25. Macroglossa Stellatarum, L.

Macroglossa stellatarum, Hampson, Faun. Brit. Ind., Moths, Vol. I., p. 113.

Astor valley, about 7,000 feet.

26. Macroglossa sp. 2.

From the ascent to the Burzil Pass, about 10,800 feet, a species nearer to *M. vialis*. Butler, than to any other Indian species.

Order *DIPTERA*.

The only dipterous insect in the collection is a large and rapacious species of Asilid fly, which was very common in June, along the Gilgit road, at about 8,000 feet. One of these was caught flying with a moth several times its own size in its forelegs.

Order *HEMIPTERA*.

Family PENTATOMIDÆ.

1. EURYDEMA sp.

A species closely allied to *E. pulchrum*, Westwood, and still more closely to *E. ornatum*, Linn. (*vide* Wolff, Icones Cimicium, I., p. 15, pl. ii., fig. 15) and to *E. herbaceum*, Herrich-Schäffer (*vide* Panzer, Faun. Ins. German., 115, 12, and Hahn, Wanzenartig. Insekt. III, 13, pl. lxxvii., fig. 239), with the last of which (which from a comparison of Hahn's and Panzer's figures appears to be a somewhat variable species) it is perhaps identical.

From the ascent to the Burzil Pass, about 11,000 feet.

Family REDUVIIDÆ.

2. REDUVIUS (HARPISCUS) REUTERI, Distant.

Reduvius (*Harpiscus*) *reuteri*, Distant, Trans. Entomol. Soc. Lond., 1879, p. 125, and Rhynchota of 2nd Yarkand Mission, p. 11, fig. 9.

From the ascent to the Burzil Pass, about 11,000 feet. Compared with Yarkand specimens in the Indian Museum.

Family APHIDÆ.

At Bunji the aspens were profusely affected by a gall-insect, the resulting galls being objects of great interest to the three species of wasps above mentioned.

Near the village of Darkot also the poplar trees were most remarkably infested by gall-insects.

Specimens of the galls and their contents were sent to Mr. G. B. Buckton, F.R.S., who has been kind enough to furnish the following account of them:—

"Unfortunately the galls have been cut and their constructors have, therefore, with the exception of 5 or 6 individuals, escaped. Out of such slender materials I cannot do more than hesitatingly express an opinion that the galls are the work of two new species of *Pemphigus*. I will make a short diagnosis of each."

7. "PEMPHIGUS NAPÆUS, n. s. (?), G. B. Buckton.

Winged female: Head and thorax black. Abdomen green. Antennæ six-jointed: third joint the largest and much annulated: 4th, 5th, and 6th nearly equal: the sixth ends with a 'nail.' Eyes large. Rostrum about equal to the width of the thorax. Nectaries none. Legs black: tarsi rather long: claws 2. Wings as in *Pemphigus*: stigma and veins brown.

Pupa: all green and of a long oval form.

Larva: forms galls on the poplar trees growing in the Yasin River Valley, at an elevation of 9,000 feet, near Darkot.

The *galls* measure about 0·90 inch, have a smooth and shiny exterior, and bright green colour mottled with yellow. They consist of one chamber, and their interior is smooth. They are unlike the galls of the European *Pemphigus bursarius*, but the insects are closely allied."

8. "PEMPHIGUS IMMUNIS, n. s. (?), G. B. Buckton.

Winged female: Head and thorax shiny piceous brown. Head and eyes small. Antennæ short, composed of six joints: the 3rd the longest, not annulated, and not longer than the 4th and 5th together. Abdomen green and mottled with yellow. Wings as in *Pemphigus bursarius*. Body 0·11 × 0·04 inch.

Pupa: ovate, without nectaries, and green: 0·08 inch.

Larva: constructs hard woody rugose galls on the twigs of the aspen trees at Bunji on the Gilgit Road, at an elevation of 4,000 feet. Size of galls 0·80 inch. Externally the galls are in colour and texture like a walnut shell. The natural exit of the flies is at the summit of the gall. Afterwards the gall appears to split open. The interior has deep furrows, and it has only one chamber."

Order *ORTHOPTERA.*

Family ACRIDIIDÆ.

1. PACHYTYLUS CINERASCENS, Fabr.

Pachytylus cinerascens, DeSaussure, Prodr. Oedipodiorum Ins. ex ord. Orthopterorum, p. 120, and Additamenta ad. Prodromum, pp. 43, 167.

Common in the cornfields of Sarhad in the Wakhan Valley, 10,500 feet.

I have compared ours with Indian specimens determined by M. DeSaussure.

2. SPHINGONOTUS INDUS, Sauss.

Sphingonotus indus, DeSaussure, Prod. Oedipod. ex ord. Orthopt., p. 204, and Additamenta, p. 78.

Common in the fields about Sarhad in the Wakhan Valley, about 10,500 feet.

3. SPHINGONOTUS NEBULOSUS, Fisch. ?

? *Sphingonotus nebulosus*, DeSaussure, Prod. Oedipod. ex ord. Orthopt., p. 205, and Additamenta, pp. 78, 87.

Having nothing for comparison, I have some hesitation in identifying this species, which is very common near Gilgit. But although it was so common, it was so alert, and such a powerful flyer, that I could only manage to get one specimen.

It differs most conspicuously from *S. indus* in being larger; in having the head, thorax and abdomen very much lighter in colour; in having the elytra beyond the second cross-band much more, and more definitely, spotted; in having the black (in life prussian-blue) band on the hind-wings more than twice as broad; and in having the hind-angle of the wings more marked.

It agrees with DeSaussure's description of *S. nebulosus* in all particulars except in having the inner side of the femora of the hind legs dark blue, instead of black.

I am much indebted to Mr. E. Barlow, Assistant in the Entomological Department of the Indian Museum, for assistance in comparing my specimens with those in the Museum collection.

ANNELIDA CHÆTOPODA.

Three species of earthworms were obtained, one in the Kishenganga Valley at 8,100 feet, one in the Gilgit River Valley at over 7,000 feet, and one in the Yasin Valley at 8,000 feet. Specimens of all of these were sent to Mr. F. E. Beddard, F.R.S., who writes as follows concerning them:—

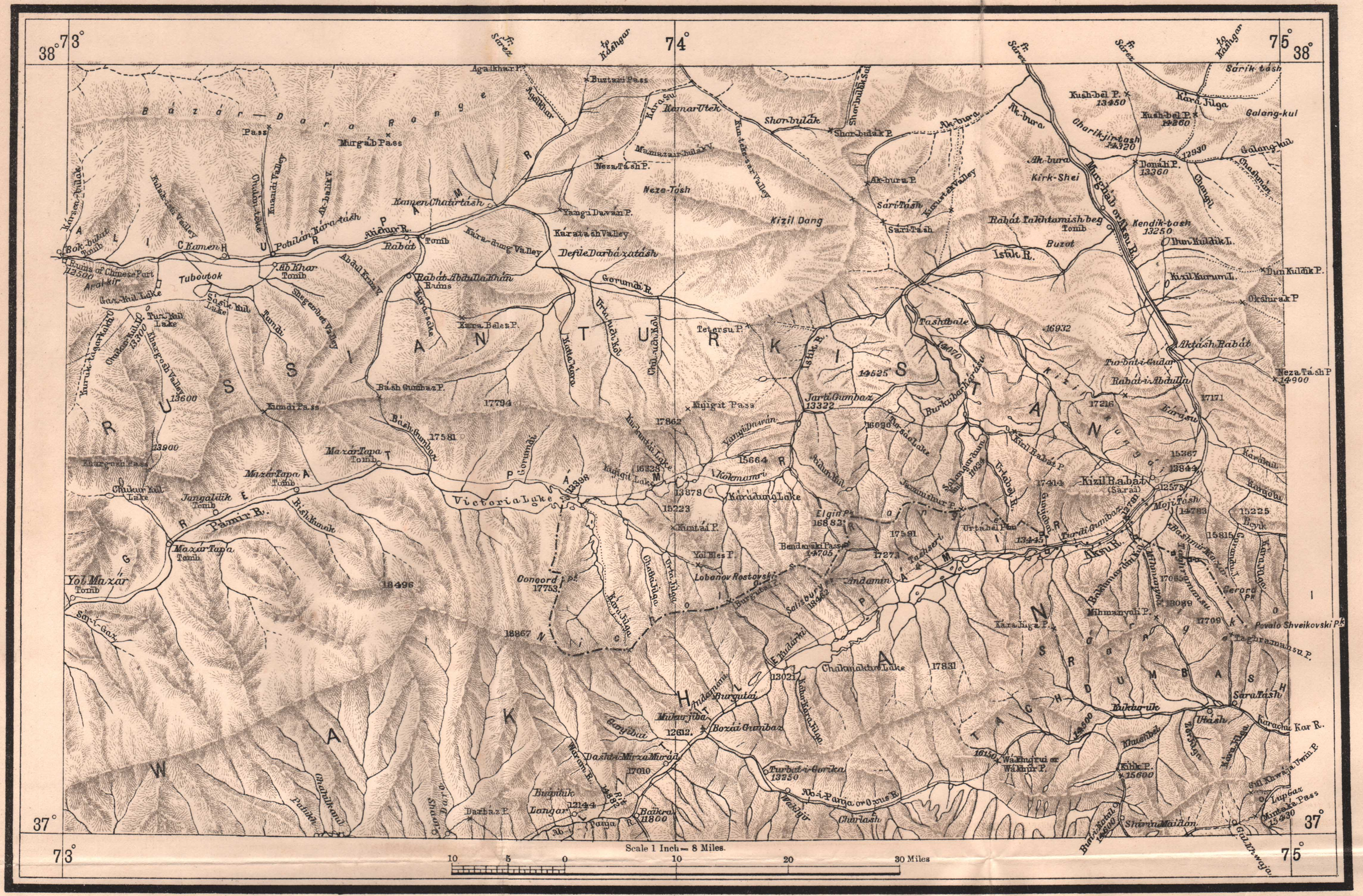
"They are entirely European, *i. e.*, Palæarctic species: they belong, in fact, to the usual British forms. This is of interest, as being an approximation to discovering the limits of the Oriental region for worms."

Government of India Central Printing Office.—No. 9 F. D.—16-11-97.—250.—[H. R.]

MAP TO ILLUSTRATE THE REPORT ON THE PROCEEDINGS OF THE

PAMIR BOUNDARY COMMISSION 1895.

Scale 1 Inch to 8 Miles, or 1:506,880.



NOTES.

Heights determined trigonometrically are shown thus 19149

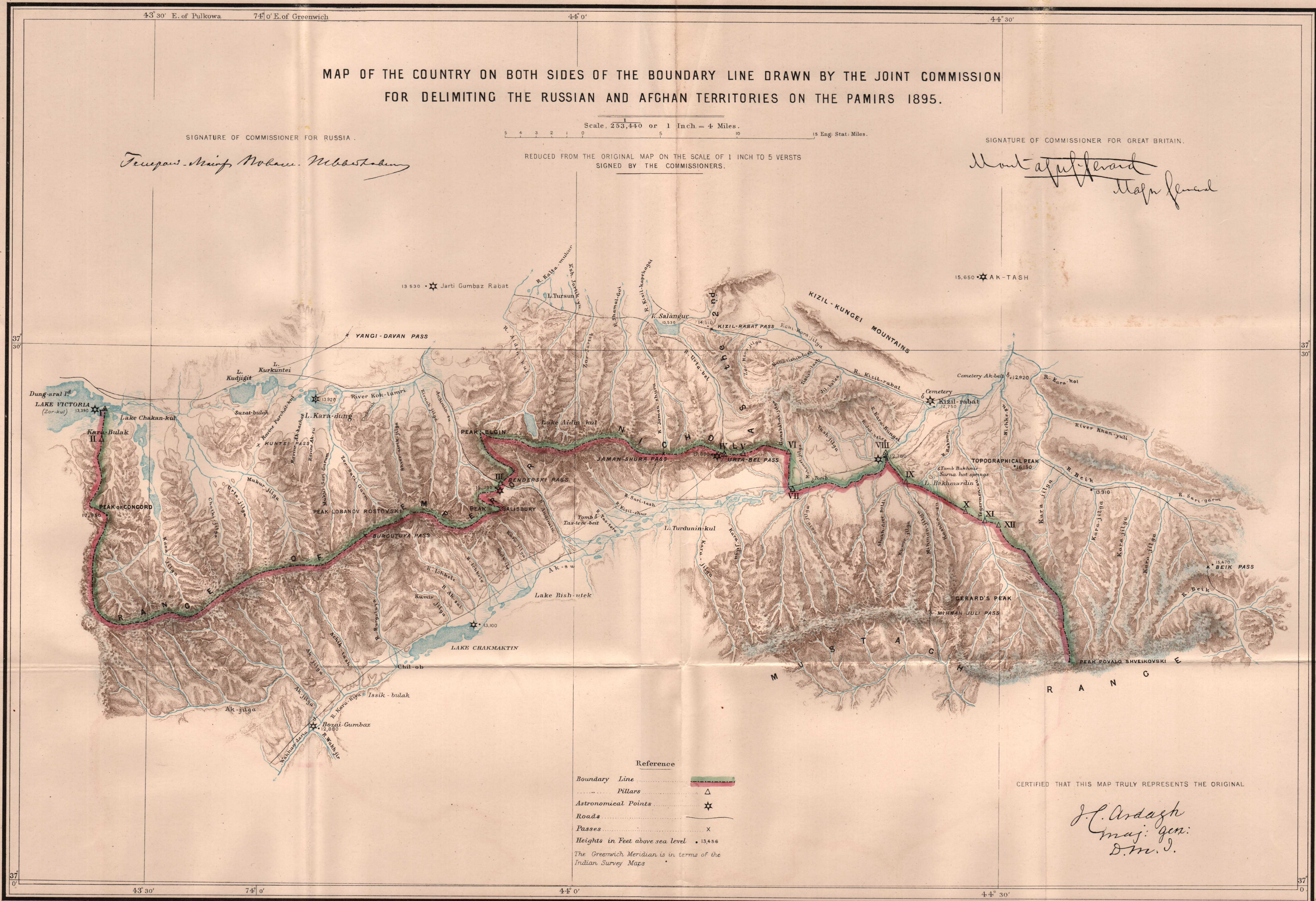
Do. do. from barometer observations do. *7170*

Published under the direction of Major General C. Strahan, R.E., *Surveyor General of India, March 1898.*

Photo-Lithographed at the Survey of India Offices, Calcutta, March 1898.

The Longitudes are referrible to the Greenwich Meridian, taking that of Madras Observatory as 80°-17′-21″ East. They require a correction of —2′-30″ to make them accord with the most recent value of that Observatory, *viz.*, 80°-14′-5″ East.

Reg. No. 102, F. O.—Mar 98.—200.



I.D.W.O. Nº 1162.

Lithographed at the I.D.W.O. April, 1896.

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Scale 1 Inch to 8 Miles, or 1:506,880.