

The Geographical Journal.

No. 2.

AUGUST, 1900.

VOL. XVI.

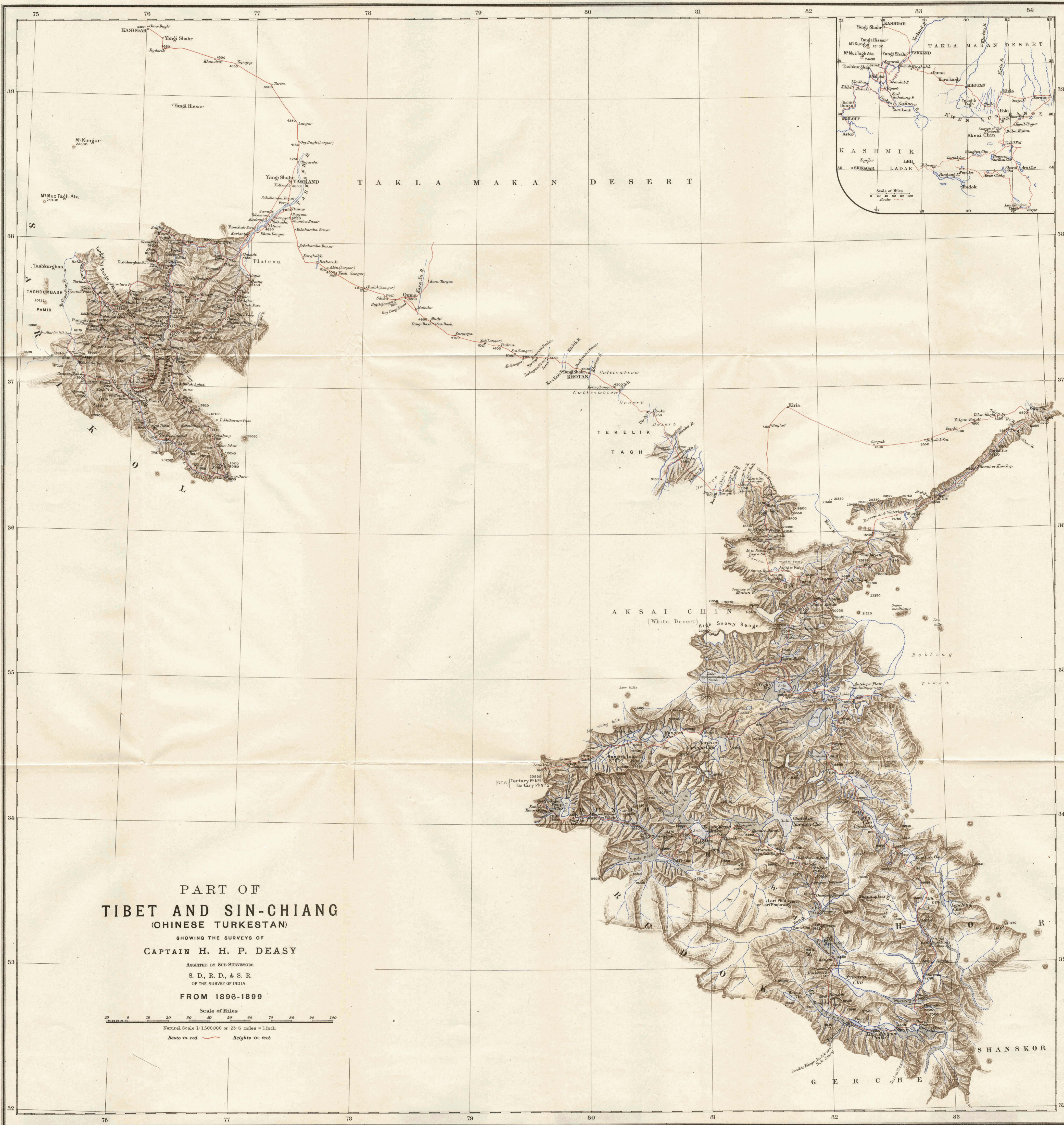
JOURNEYS IN CENTRAL ASIA.*

By Captain H. H. P. DEASY.

FOR several years I had looked upon the portion of the map of Tibet marked "unexplored" with the greatest interest and curiosity, but it was not till the spring of 1896 that I eventually obtained sufficient leave from my regiment to undertake a journey into this prohibited and but little-known area. I was very fortunate in having for a companion my friend Arnold Pike, with whom I had travelled in the Caucasus some years previously. The object of the expedition was to survey as accurately as possible as much of the unexplored parts of Tibet as circumstances would permit. Being most anxious to carry on triangulation, and to ascertain the heights of the principal peaks, it was necessary to sacrifice to some extent linear for square measurement. In order to enter this inhospitable country without meeting any of its inhabitants at the outset, it was decided to travel by the celebrated valley of Kashmir to Ladak, and thence to the Lanak La pass.

After a brief stay in Srinagar with the hospitable Captain G. Chenevix-Trench, we left the City of the Sun for Leh, the capital of Ladak, or Kashmirian Tibet, on April 27, when the Zoji La, the pass over the Western Himalayas, was still deep in snow. The latter was, moreover, in that intermediate stage when it is most inimical to traffic, as it was soft enough to retard considerably the progress of the 105 coolies carrying our baggage. Leh was, however, reached without misadventure, and here, through the great kindness of Captain Chenevix-Trench, who had purchased for me twenty-five splendid mules in the

* Read at the Royal Geographical Society, April 2, 1900. The map will be issued with the next instalment of the paper.



PART OF
TIBET AND SIN-CHIANG
(CHINESE TURKESTAN)

SHOWING THE SURVEYS OF
CAPTAIN H. H. P. DEASY

ASSISTED BY SUB-SURVEYORS
S. D., R. D., & S. R.
OF THE SURVEY OF INDIA.

FROM 1896-1899

Scale of Miles
Natural Scale 1:1,500,000 or 23.6 miles = 1 inch.
Route in red. Heights in feet.

previous autumn, and arranged for the supply of the balance of transport animals in the spring, no delay was experienced on this head in the organization of the expedition. As soon as minor matters had been attended to, supplies obtained, bread made, the loads weighed, and the details of the caravan equipment attended to, it was despatched from Leh on May 25, in charge of sub-surveyor S— D—, whom we christened Leno, a few days ahead of us, as the Chang La was still impracticable for animals, necessitating a *détour* for them.

The wretched village of Fobrang, not far from the Pangkong Lake, where our remaining stock of barley, suttoo, etc., was obtained through the good offices of the Wazir of Ladak, was the last village we were destined to see until our return to British territory in about five months' time. Our caravan of sixty-six baggage and riding ponies and mules, although aided by several yaks, had great difficulty in crossing the Marsemik La, which, though free from snow on the Fobrang side, was still deeply covered with it on the Tibetan side. The animals soon began to flounder about in the deep and soft snow, and in a very short time after beginning the descent, most of the loads of the first section of the caravan were strewn over the track in deplorable confusion. Finding it hopeless to reach the small camping-ground of Rimdi with the whole expedition in a single day, I had the tents, bedding, cooking-things, etc., loaded up on the freshest beasts, which contrived to struggle on through soft snow, often up to their girths, and thus reached Rimdi before dark, while the unfortunate caravan, both the men and their charges, had to face a bitterly cold night in a bleak, barren, and cheerless spot close to the pass.

Having overtaken the sheep, most of which carried 20 lbs. of barley, and the hired transport close to the Lanak La, which, though 18,000 feet, was perfectly free from snow on June 18, it was decided to halt for a day before entering the to us unknown land of Tibet. Our intention was to follow Bower's route more or less closely for a few marches; then keep to the north of it, so as to visit the north shores of Horpa or Gurmen Cho; and subsequently to travel east, keeping away from Bower's and the Polu route. The western end of the wide valley in which Mangtza and Horpa or Gurmen Cho are situated being suitable for triangulation, a halt was made there to admit of measuring a base and obtaining a trigonometric value for longitude by means of the peak fixed by the Great Trigonometrical Survey of India, and known as Mangtza Lake, No. 1 peak. Unfortunately, neither the height of this prominent peak nor of Tartary peaks Nos. 1 and 2 had been previously determined, so all the heights shown on my maps of "Portion of Tibet," etc., are based on the readings of a portable mercurial barometer kindly given to me by Prof. Norman Collie, F.R.S., and not on the height of any peak fixed by the Great Trigonometrical Survey of India.

After crossing the Lanak La, neither guides nor information

about the country were obtainable, as the Tankse men who accompanied us as far as Horpa or Gurmen Cho, denied all knowledge of places or route east of this pass. Perhaps it may be interesting to note that the minimum thermometer fell to $+ 8^{\circ}$ or 24° of frost during the night of June 16 at camp 1, the altitude of which is 17,450 feet. Measuring bases at camp 11 was made more tedious and complicated by the men who were sent to erect pillars at hill stations having done so, in two cases, on the sides of mountains instead of on the actual summits, as they were ordered. Unfortunately, these mistakes could not be noticed until I got close to the pillars. From the neighbourhood of this camp most extensive views are obtainable, the finest being that of the snow range



SNOW BRIDGE ON DRAS RIVER.

south of Horpa or Gurmen Cho. Some of the peaks in this range proved to be over 21,000 feet, being considerably lower than a fine double peak on the range south of the Aksai Chin, which is 23,490 feet.

Soon after starting from camp 13, Pike, who was on ahead of the caravan in pursuit of yak, saw a large lake in the distance, so we deviated from our course in order to check its position. This proved to be Yeshil Kul, a most cheerless place to camp by, on very soft ground thoroughly impregnated with salt, and destitute of either grass or fresh water. Fortunately for me, two small springs with a fair amount of grass close by were found not far from the south-east corner of the lake, and camp was moved to the most northerly spring. As it is in a most exposed place, it was by no means a pleasant place to halt in for ten

days, most of which I spent in bed with high fever. For a short time I was quite in the dark as to the nature of my ailment, but after a diligent study of that excellent book 'Moore's Family Medicine of India' as was feasible, I either diagnosed the case or imagined I did so, and then turned to lighter literature. During the enforced halt at camp 15, or fever camp, the sub-surveyor made a short excursion for topographical purposes, and shortly after his return to this bleak and most uninviting spot, where one of the men became seriously ill and several ponies died from the severity of the weather, we gladly struck camp and moved eastwards.

Yeshil Kul, like most of the lakes we visited, must have been formerly considerably higher, and covered a very much larger area. After passing a very small salt lake close to the big one, we once more found ourselves in a country with plenty of grass and a moderate amount of fresh water.

Between camps 19 and 20 one of the most striking sights lay to the north of our route. The country was simply alive with antelope, females and young ones only, and, owing to the thousands seen, the name "Antelope Plain" was given to this, comparatively speaking, fairly level ground. As Pike, who reconnoitred for some distance east of camp 20, reported that as far as he could see, which was for many miles, in a very broad valley, there was neither grass nor water, and as the animals were by no means in a fit state to go on, with only a few handfuls of corn each, we very reluctantly decided to retrace our steps for one march, and follow the line which both of us had previously considered to be probably the more suitable, but which had been rejected owing to its leading too much south of east.

The extensive snow range south of camp 20 rendered it necessary to make a large *détour* before an eastward course was resumed. With the exception of camp 20, which was on the shore of a lake whose waters are so full of soda and other substances as to be almost undrinkable, fresh water was always obtained, but at one place the stream by which we camped only flowed for a few hours daily, being fed by the melting of the glaciers on the south side of the valley. When close to Aru Cho the scheme of going for at least a few marches along Bower's route was much favoured for a short time, but the country south-east of that lake, which was *terra incognita* to us, allured us in that direction. Considering it unwise to halt long near Aru Cho owing to the enfeebled state of the mules and ponies, I was successful in fixing the heights of only a few of the fine snow-peaks west of Aru Cho. It was not long before we bitterly regretted our keenness for keeping away from Bower's route, but, alas! it was then too late to return to it. Thinking that the alleged inability of the caravan to find all the animals at camp 31 was due to their being anxious for a day's rest, and as we had not the slightest idea that there were any

inhabitants near, we decided to leave three men behind to search for the eleven missing animals, and to rejoin us as soon as possible. To our dismay, one of these men turned up early on the second day at the next camp with the news that a few chukpas, or professional robbers, had visited our old camp soon after our departure, that they had stolen as much as they could carry away, and that one of our men was missing. At a council of war hastily convened after the receipt of this crushing news, it was decided that Pike with an escort of three men should track the chukpas to their tents, after despatching the baggage not appropriated by the robbers to the headquarter camp, while I remained behind to guard the camp and see that the animals were tied up and watched at night. I fully expected the chukpas to be watching the camp, and that as soon as Pike and his men had got well away they would pay me a visit. Hoping to encourage them and crediting them with very faint hearts, I ordered the men left behind after a search party had been sent away to look for the missing man, to remain in their tent, with the exception of one man whose duty it was to prevent the animals from straying far. As I felt very doubtful about any of the men keeping awake in the small hours of the morning following Pike's departure, I turned out at 2 a.m. and did sentry-go till day-break. This proved to be by no means a needless precaution, as the previous sentry had allowed most of the animals who were tied up close to camp to break loose. Much to my disappointment, the chukpas did not honour me with a visit, but contented themselves with the booty already obtained.

In the afternoon of the day after Pike's departure, my mind was relieved from a considerable amount of anxiety when I saw him accompanied by the three men approaching camp. His very plucky punitive mission had been so well carried out that the chukpas, who were fortunately in very small numbers in the immediate vicinity of those whom Pike called on at the early hour of daybreak, were completely surprised. When the first of the band left his tent he must have received a rude shock to his feelings, as he found Pike's revolver in close proximity to his head, and if his disturbed brains permitted, he might have noticed the rest of the force close by with their carbines presented at him. There was no sign of the missing animals, and as there were several tents and numerous yak not far off, Pike considered it expedient to be satisfied with recovering all the property stolen from us, and taking away as ransom the only two ponies that were near and the chukpas' arms. During the fighting that took place, two robbers were wounded and, as we were told long afterwards, subsequently died of their wounds, much to the gratification of our informant, a Tibetan who acted as our guide on our enforced return journey to Ladak. Further delay in hopes of getting back the lost animals, which were the best and most sound-backed, being waste of valuable time, we

decided to go south-east, or as near that direction as the country would allow, in hopes of soon meeting inhabitants. The only point which was perfectly clear was that it would be madness to think of retracing our steps to Ladak, as all the animals were in far too emaciated a condition to reach British territory, or anywhere near it. None of our men had the slightest knowledge of the country, and ours was limited to what is afforded by a blank on the map. In order that the chukpas should not benefit any further from us, we burned everything that would burn, including a Berthon boat, which was the most inflammable article of baggage, and destroyed the superfluous things which could not be disposed of by flames. Our large stock of bovril and other food-stuffs prepared by the Bovril Company, as well as all other stores, spare shoes, nails, etc., were brought on for another march, and "cached" on the off chance that some other traveller may find them useful. The tents that could not be carried were soon used up by the caravan-men for clothes, a very welcome addition to their scant and ancient wardrobes, as they had expended on clothes in the legitimate way little or none of the allowance given to each man before starting. Owing to the mountainous nature of the country, we were obliged to steer in a more or less southerly direction.

After leaving camp 33, where our stores, etc., were cached, we followed a well-defined trail, trusting that it would lead to some inhabitants from whom we hoped to obtain fresh transport; but after some miles it suddenly pegged out, and, judging from the numerous offshoots from it, must have been made by kyang and game going to and from water, which was now exceedingly scarce. Distrusting the freshness of the large lake in the distance, we tried to obtain water by digging; but, finding this plan of no avail, I went on a short distance, and from the top of a low ridge saw a few pools of water with a profusion of excellent grass all around, so I signalled to the caravan to follow me. Pike was so seedy, it was marvellous how he managed to last out this march; and, plenty of excellent grass being close by, it was deemed advisable to halt for a day by these small pools of water of very inferior quality. During the halt I went off in search of water, and to reconnoitre for the next march. The result was most disappointing, as the very necessary water was nowhere to be seen from the commanding peak I ascended, except at a great distance in a south-westerly direction, but there was a profusion of grass. Trusting to find water by digging lower down in the valley, where I had seen a stream, we chanced this plan of quenching our thirst, but without avail. The stream had been so thoroughly absorbed by the porous nature of its bed that not a drop was to be had. Pike, with his usual energy, and although still weak, went up a fairly high hill above where camp was pitched to try and discover water, or some more likely spot in which to dig for that precious liquid. From this hill very

distant views were obtained, but no water, except that which I had previously seen, was at once discerned; however, the presence of some tents and yak 5 or 6 miles away cheered us up. Although the men had been warned to husband the supply of water which each one started with from the previous camp, all of them consumed their supply on the march, the only person besides Pike and I who bore in mind the warning being S—— D——. Some of the men having expressed a wish to go in search of water, leave was given them, and although there was bright moonlight all night, and camp was at the foot of a prominent and outlying hill, these men lost their way, and did not return to camp till the next morning, when they came in from the opposite direction to that which they had taken when setting out.



CAMP SCENE IN TIBET.

As the occupiers of the tents seen by Pike might be inclined to relieve us of more animals and baggage if opportunity offered, we thought it best to approach their camp well armed and accompanied by several men, who in all probability would be of far more use with their tongues and heels than with the magazine carbines with which they were armed. In the preliminary negotiations there was a very fair chance of obtaining a guide and some yak, but unfortunately the surly headman of these nomads proved to be as unwilling to accept a present as to allowing the people under him to satisfy any of our wants. After this interference nobody would consent to guide us anywhere, even for a few marches, except for the monstrously exorbitant demand of

100 rupees, which we declined to give. After much talk, the caravan bashi Ramzan, who has now gone back to his original profession of tailoring, induced some of the nomads, under the pretence of giving them medicine, to return our visit the next day, when one of them finally consented to indicate what direction we should take for the modest sum of five rupees, while his companion was detained in camp nominally to answer our queries. This arrangement proved very disastrous to me, as, when I was shown what direction to take, an erroneous one was pointed out. When starting the next morning, a couple of hours ahead of the caravan, I foolishly followed it, and came across a pool of muddy water. After resting for a short time, I went up some hills close by, hoping to get a good view of the neighbouring country, but other heights intervened, and it was not till I had ascended three or four that my object was achieved, and then I thought it time to look out for the caravan. With the exception of some kyang and a few antelope, not a living thing was to be seen, and no water except the small muddy pool; so I descended to it, and went as quickly as I could towards the next valley, hoping to reach it before dark, but I was not successful in doing so, the distance being much greater than I had estimated. In the clear and dry atmosphere of Tibet it is, even after much practice, very hard to judge distances with any pretension to accuracy; objects that appear to be, say, only a few miles away are really 8 to 12 miles distant. By the time the adjoining valley was reached, it was far too dark to see if there were any tracks of the caravan, so I thought of resting for a few hours until the moon had risen; but, although partially sheltered from the wind by lying down in a small watercourse, this idea had to be abandoned owing to the cold, which compelled me to keep moving on. After several hours of anxious marching, varied by occasionally firing off my rifle in the hopes of attracting the attention of some of the caravan, and by continually stumbling over stones, etc., the upper part of the valley was reached, and after a short time the moon had risen sufficiently to enable me to definitely ascertain that the caravan had not ascended the valley. I now recognized that the odds against my getting anything to eat till after daybreak, at the very earliest, were very large; so I tightened my belt, took a few sips of muddy water from my three-parts empty water-bottle, and sallied off to find a short cut back to the spot I had started from, in search of the caravan. Very probably the route on my return was shorter, but several nullahs and watercourses had to be crossed, as well as a couple of steep ridges covered with rocks, over which I continually stumbled. Rest for more than a few minutes at a time was out of the question, as the cold wind soon chilled me so much that, in order to avoid being frostbitten, it was absolutely necessary to keep moving. Fortunately, it was a fine clear night, and with the help of the stars—for I never carried a compass, fearing that the chronometer

watches would be affected by it—I guided myself back to the place I wanted to reach by daybreak. From this spot, which is on comparatively high ground, the very faint smoke from the camp fire was seen very far away in the main valley, so I dragged my weary limbs towards it, and in a couple of hours was met by Pike, who came out provided with meat, biscuits, and last, but not least, rum and water, all of which were greatly appreciated. The minimum thermometer at camp registered 10° of frost, while I was wandering about on an empty stomach, with fewer clothes than usual, owing to our having entered a lower and warmer part of the country, so the discomforts of the situation were fully felt.

Not very far from camp 36, or "lost camp," we came across some rather extensive diggings, where probably gold had been found. Two days after leaving this camp, the river whose course we were following had completely sunk into the ground, and as there was not a trace of water to be seen further on, we had to halt while Pike made a long reconnaissance and spotted a very small spring, to which a move was made the next day after interviewing a native. This man professed to be in search of some of his ponies that had strayed, but it is most probable that he had been sent out from Gerge, which is not far distant, to search for us, as no doubt they had been warned of our presence by the nomads recently met. By the aid of the information extracted from this man, we found our way to Gerge, where there are a few tents, with many more in the various side valleys. Some hours after our arrival, a man, who said he was the servant of the headman of the place, nominally came to ascertain who we were and all about our intentions, but really to find out the size of our caravan. Owing to wild statements about us having been sent to Lhasa from Leh, some time before our departure, strict orders were sent every fortnight from Lhasa warning the people to be on the look-out for about 20 British officers and 3000 soldiers, who were invading Tibet from Ladak, to promptly turn them back, and report to Lhasa. In consequence of these orders, men had been sent out to search for us on the known routes, but we escaped this delicate attention by finding a way for ourselves. Some of the visitors to our camp were much surprised at the smallness of our force, but when they were informed by one of the caravan-men that countless soldiers were packed away in the yak dans and baggage, they seemed to consider the explanation quite satisfactory. When the headman of the scattered encampments, all of which are included in Gerge, came to see us, we endeavoured to get fresh transport and more supplies, but found that this could not be done without an order from the Rudok authorities. Feeling quite sure that no assistance would be obtained from that quarter, and as it was useless to wait there any longer, we gave notice of our intention to go on without it, which rather startled the headman, as he was evidently not accustomed to

having any one not conform with his orders. The messenger who announced our intention to this petty official returned with a request that we should halt for a few days longer, when he would endeavour to furnish sufficient supplies until a reply was received, probably in five or six days, from some higher official not so far distant as Rudok. This request was coupled with the intimation from the headman that our advance could only be made over the dead bodies of himself and all the Gerge people, who considered being killed by us quite as good as being executed in Lhasa for allowing us to proceed. Even talking of fighting was too much for our cowardly caravan-men, Argoons, who soon let it be known that we need not rely on them to fight in case of a row. As no signs of any instalments of supplies promised to us for waiting were visible within the appointed time, and as constant reinforcements were being received by the enemy, we settled to leave Gerge and try to strike a road, which S—— D—— had heard of from a Kulu merchant who was buying wool and gold here, leading towards a place called Kangri, where there is said to be a large bazaar during the autumn. Both Pike and I fully expected a row, so plenty of ammunition was issued to our six armed men, in hopes that they would at least loose off their weapons in the direction of the enemy, and not in ours; strict orders were issued to maintain a slow pace, admitting of the sheep marching with the ponies and mules, thus keeping the caravan in close order. To have started in an easterly direction would have certainly ensured a row, so we at first went about south-west, in the direction the Kulu trader had pointed out as being an alternative route to Kangri. Unfortunately, the information about this route proved to be false. The large crowd of Tibetans, all well mounted and armed with muzzle-loading guns, some with swords as well, who had watched us carefully, knowing that there is no other route in the direction we took except to Ladak, allowed us to depart in peace, much to our surprise, ignorant as we were at the time of the reason, for it was not till we had travelled several miles that we found out we had got false news about the road.

In the main valley (Dalung (?)) grass and fuel were scarce, and the water was of very inferior quality, but in the numerous side valleys grass is said to be plentiful. On the south side of the valley the range of high mountains, very few of which are covered with snow, appears to block the way until close to camp 45, where there is a road leading to Thok yalung, Kangri, and Rudok. Finding it hopeless to obtain any more transport, or procure barley, which was much needed, unless we promised to go to Ladak by the route which would be shown to us, and as the caravan-drivers were by this time too much afraid to go in any other direction except that which the Tibetans wished us to follow, we were compelled to submit to their terms. Besides these factors in the case, there were two others equally important: many of our animals were covered with sores, and all of them were in

far too weak and deplorable a condition for us to think of attempting forced marches in an inhabited country where further progress could very easily be effectively stopped, without the slightest risk to the Tibetans, by their driving away our animals while grazing at night. There was now nothing else to be done but to agree to return to Ladak by the route along which we should be guided. As soon as some very ancient ponies had been purchased at high prices, and sufficient transport obtained locally, we began our return march to Ladak, relieved, at least temporarily, of the anxiety about finding grass and water at the end of every march, as two guides were provided. Up to this point we had found our own way for the last three months over about 460



GLACIER NEAR NABO LA PASS.

miles of, to us, unknown country. Now that there was an opportunity of relieving from loads the animals that were in a very bad way from sores and galls, I commenced to wash and dress the wounds, many of which were far too bad to describe. Although this was done on every possible occasion—not by the caravan-men, whom I could not trust to do the unpleasant work satisfactorily—only one of the animals with sore backs, and that a very slight one, lived to reach Ladak.

The Tibetans evidently feared that we would endeavour to go straight to Rudok, and, no doubt with the intention of preventing us from doing so, led us up a very narrow valley on the north side of the main one, most of which was said to be called Dalung, and accompanied us in

large numbers for five marches, the excuse for taking us by this long route being that if the direct route was followed several high passes would have to be crossed. This proved very fortunate, as the sub-surveyor was thus enabled to sketch the country between the outward and homeward routes. In order to make certain of the guides following this route, which towards the end they were not at all well acquainted with, we expressed great eagerness to go direct to Rudok, and it was only after we had been repeatedly informed that numerous high passes had to be negotiated that we ceased to express any desire to deviate from the line our guides were instructed to show us. I do not know what the Tibetans' idea of high passes may be, but as the height of one we crossed is 18,880 feet, we rejoiced at not having been obliged to attempt those which were said to be very high.

The country for the next few marches was much closer than that which we had previously been travelling in. Water was exceedingly scarce, and, except for our having guides who knew the country not far distant from Lima Ringmo Chaka, it would have been almost impossible to find our own way. For five marches the small springs were almost impossible for any one not thoroughly acquainted with the country to locate, and grass was very scarce, so that our wretched ponies and mules suffered considerably. Besides the scarcity of grass, another matter which caused anxiety was the risk of some of our escort noticing me observing at night, or Leno sketching during the day; but the latter was so well managed that only once were questions asked as to why Leno and the men with him were punished by having to ascend mountains and reach camp after every one else. In order to shelter ourselves from the prevalent strong winds, camp 51 was pitched in a very narrow valley, which rendered the task of measuring bases more troublesome. This, however, was a mere nothing to observing in a very strong and equally cold wind at the hill stations of this camp, when it was necessary for Leno and myself to continually relieve each other, one recording while the other was observing. Even with this division of labour, both of us suffered temporarily from the exposure, but a judicious use of some of the contents of the medicine-chest curtailed the unpleasant effects of the severe weather. Although this camp was only 16,630 feet, nearly all the Ladaki caravan-drivers complained of headaches, etc., which they attributed to the great height, and as they abstained from eating meat until the inconvenience ceased, it was only reasonable to believe their complaints. It is certainly very strange that men who live at heights of between 8000 and 12,000 feet should suffer from the effects of rarefied air when neither Pike nor I, who generally frequent places not much above sea-level, experienced any such symptoms. Owing to the wretched condition of the mules and ponies, and to the scarcity of water, we were obliged to make very short marches. The state of our animals served as an excuse for occasional halts, which were necessary for survey purposes,

to which neither of the guides ever raised the slightest objection; in fact, they several times helped to erect pillars, being quite content with the assertion of the caravan bashi that sahibs do strange things, and that once the all-powerful "hokum" (command) had been given, it was to be obeyed whether its purport was understood or not.

A few days after our Tibetan guard left us, a couple of men arrived with supplies for the guides and with news that two men, who had been wounded near camp 31 by Pike's force, which consisted of only four men all told, had died of their wounds. They also informed us that a large body of chukpas were in our vicinity; whereupon our brave guides, after due consultation amongst themselves, formed up and suggested that we should attack the robbers, whose property was to be divided between them and ourselves. According to their proposition, all the yaks, goats, sheep, guns, and everything else, in fact nine-tenths of the plunder, was to be given to the guides, who would assist the enterprise by remaining in camp, nominally to guard it, while any animals capable of carrying baggage might be retained by us. These creatures seemed quite disappointed when we refused to fall in with their plans, and did not understand that we wished to travel peacefully through the country, and would not attack or punish any one unless we were first attacked or robbed. As soon as friendly relations were established between the guides and our men, who invariably made the former fag for them, every endeavour was made to obtain simultaneously from both men when apart corroboration for the names of places previously visited, as well as the names of camps, etc., on this route. One of the guides proved to be a great acquisition in many ways, and seemed to be most anxious to serve us in every way, so a much greater value was placed on his replies, most of which were, I am strongly inclined to believe, fairly true. As a rule, neither Pike nor I were ever present when the names of places, etc., were asked, as we considered that the Tibetan would be far more likely to tell our Ladakis the true names when neither of us was within hearing. When possible corroboration was sought for names, and when this was not to be had, the replies of whoever had confirmed the statements *re* custom, taxes, etc., of men previously questioned, or who did not appear to have anything to gain by telling lies, were accepted. Though every endeavour to ascertain the real names of places was made, I do not wish to assert that all the names given in my map are correct. Wellby calls the pass, which is designated Napo La on my map, Napula, and the lake on the west side of it, called Dyap Cho by me, Lake Treb, and as it is well known that Tibetans generally give travellers erroneous names for places, I fail to see any reason why the names Napo La and Dyap Cho should be considered more correct than those given to Wellby.

One of the hardest parts of the surveying during this journey was

undoubtedly the ascent to the very high hill station south of camp 57. The exceedingly steep mountain-side was covered with very loose shale, necessitating a great amount of energy and determination in order to reach the summit, where the heavy theodolite was eventually brought, and successful observations carried out. Another drawback to observing was the very high wind, which at times necessitated piling large stones round the legs of the theodolite-stand to prevent the instrument being blown over. The rarefied air, combined with a very low temperature, was a constant cause of delay and annoyance when taking astronomical observations at night, as the candles gave very bad light and continually went out, very often fifteen to twenty times each night. The low temperature not only tended to make the candle stick in the holder, but also froze the ink, which could only be used occasionally and when the inkstand was kept in the lantern, the temperature of which was just high enough to keep the ink liquid. Very often the wind disturbed the compass so much that when setting up the theodolite previous to taking astronomical observations to determine the deviation error, which was repeatedly done, it was necessary to shelter the instrument by means of rugs held up by some of the caravan-men until the needle became quite steady. Though many attempts were made to observe occultations, bad luck, in the shape of clouds, continually proved obstructive, and also debarred me from observing transits of the moon and stars culminating near it. Much as I regretted not being able to take lunar observations more frequently, the omission proved to be of no great consequence, as, thanks to the chronometer watches which were kindly lent me by the Royal Geographical Society, and to "travelling rates" having been several times ascertained, good chronometric values for longitude were obtained. By "travelling rates" I mean rates while travelling between places, the difference in longitude of which was determined trigonometrically as we went on. This method of obtaining travelling rates has, I believe, never been used by explorers in unknown and unsurveyed country. Comparatively narrow valleys, with high mountains on either side, and lakes, mostly salt, scattered about, are the main features of this part of Tibet, but scarcity of grass and water are by no means unimportant minor facts worthy of notice. Judging from the well-defined marks near the west end of Keze Chaka, this lake must have been formerly considerably deeper, and its area proportionately larger.

When approaching camp 67 much curiosity and anxiety were experienced about water, as none could be seen, although a good-sized stream was observed close by from a hill near the previous camp, which was a waterless one. This proved to be an intermittent stream which existed for only about six hours daily, its breadth being about 12 feet, and the average depth approximately 9 inches. Owing to the exceedingly porous nature of the soil, we were not able to store up any water

by damming the river, which for the three days we halted appeared and disappeared daily with the greatest regularity. As soon as it was decided to halt for a few days for survey purposes at Chagnagma, or camp 67, one of the guides was sent on with Ramzan, the caravan bashi, to try and locate Rundor, the existence of which we had begun to doubt. They were successful in doing so, and met us on the day we left that almost barren camp, accompanied by a few natives of the long and very sparsely populated valley whose head is at the Napo La, and which is known as Rundor. Ramzan, who was mounted on my riding-pony, procured a guide and went on ahead quickly to Lutkum, from which place he sent back some transport, without which we should not



DIFFICULT PART OF ROUTE THROUGH HUNZA.

have been able to cross the last two passes and halt at two consecutive waterless camps.

Besides the repeated scarcity of grass, many of the springs by which we had to camp were small and so well frozen that often no water was to be had, so that our wretched animals suffered considerably, and at times one or two would not leave the vicinity of camp for a long time after the loads were removed. On one occasion a fine mule, which had lost less condition than any of the others, and which had invariably carried the instruments, would not depart from the close proximity of my tent until driven away, when she speedily returned, until at length she fell down and nearly levelled the tent in doing so. It turned out that the poor brute was suffering

from colic, which made her frequent the camp; but it was certainly very curious that she returned so often to the neighbourhood of the medicine-chest. I was in great hopes that she would survive the journey; but, although the attack of colic did not last long, she succumbed in about a week afterwards to the effects of great cold and semi-starvation. When we reached Rundor, the pombo, or headman, and many of the inhabitants were away in Ladak purchasing supplies, so it was rather hard to obtain transport to convey our baggage over the Napo La, a pass 18,880 feet, over which, although it was free from snow and the approaches comparatively gradual, our impoverished animals were quite unable to carry even small loads, while one had to be shot near the top of the pass. From the broad valley lying west of this pass there is a magnificent panorama of very high mountains, many of which are perpetually covered with snow, and it was here that a serious accident happened to the theodolite. The wind was so strong at my last hill station that, although stones were piled round the lower part of the theodolite-stand, it was blown over by an unusually strong gust, and so damaged that further work was out of the question. This, however, was not of great consequence, as the surveying had been satisfactorily finished, and the instrument was soon repaired at Dehra Dun.

Altogether about 24,000 square miles of country had been surveyed on the side of 8 miles to 1 inch, and the heights of seventy-nine peaks determined. Triangulation was carried on as far as possible, a 6-inch theodolite being used, and a 10-foot subtense bar for measuring bases by; but, owing mainly to my want of previous practice in this class of work, it was not without breaks, when longitudes were checked either chronometrically or by latitudes and azimuths. The heights are barometric, a Collie's portable mercurial barometer being read twice daily, except when I was laid up with fever, and are based on a series of observations at camps the relative heights of which had been determined by triangulation, and were computed differentially from Leh. As a proof of the great accuracy and skill of Leno, it may be stated that his average error in latitude for each camp was only about one-third of a mile. Since crossing the Lanak La, astronomical observations, including numerous ones to determine the deviation of the compass, were taken at all but four camps. Very careful meteorological observations were regularly taken by Pike, who was of the utmost service in every way, especially in reconnoitring, issuing rations, and looking after the natural history and botanical collections. I have not the slightest hesitation in saying that only for the very valuable co-operation and companionship of Arnold Pike, the results of the expedition in every way would have been far smaller, and I feel that I owe a great debt of gratitude to him for having accompanied me. Although topographical work had now been carried on right up to the frontier, the

journey was by no means ended—three high passes and some almost barren camps had to be negotiated before reaching the few houses at Lutkoum.

Of the sixty-six mules and ponies which composed our caravan when it left Leh in May, only six survived to reach Lutkoum in November, and they were only just able to crawl along unladen. Sheep proved to be the best transport animals, very few being unable to carry loads of about 20 lbs., which were subsequently increased after the loss of the ten mules and ponies. After a few days' rest in Leh, I said good-bye to Pike, who wished to remain some time longer in Ladak for shooting, and, setting out for the Zoji La, which was crossed with great difficulty, reached Srinagar on December 10, after walking 600 miles, mostly in Tibet.

Once again Srinagar was the starting-point, and on September 14, 1897, I set out for the Pamirs, *via* Gilgit and Hunza, as the Indian Government had very kindly given me permission to use that route, thus enabling me to commence surveying a few days after crossing the frontier, and before any heavy snow had fallen. I was accompanied as far as the Taghdumbash Pamir by R. P. Cobbold, who was so much impressed by the tales of excellent shooting related to us by an American named Isidore Morse, who met us close to the Kilik pass, that he was eager to go direct to Kashgar and apply for permission to shoot in the so-called Eldorado of sportsmen in Russian territory. My party consisted of a sub-surveyor and an orderly, both of whom were kindly lent to me by the Indian Government, a cook, a native collector, and six Argoons headed by Abdul Khalik, who was soon proved to be one of the greatest scoundrels and robbers in Central Asia.

Owing to the demand for ponies for the Tirah Field Force, it was very difficult to obtain suitable animals in Srinagar, but this difficulty was removed by Major Yeilding, D.S.O., C.I.E., who rendered me very valuable assistance by hiring some ponies to go as far as the frontier, and in addition twelve mules in charge of four Pathans, who met me at Gilgit. The Pathans stuck to me for six months, and proved such hard-working and faithful fellows, that I parted from them with the very greatest regret. The miserable cowardly liars who came with the ponies from Astor continually gave plenty of trouble, and although they were most anxious, in Srinagar, to be engaged for six months, they refused for some time to go beyond Hunza, until the matter was reported to Captain McMahon, C.I.E., C.S.I., political agent, Gilgit, who soon arranged matters very satisfactorily. The smallness of my own caravan was a source of much unfavourable comment on the part of Abdul Khalik, the caravan bashi, against whom I had soon accumulated sufficient evidence to convict him, while he swaggeringly informed the rest of the caravan-men and others that I was a poor sort of sahib who bought everything

himself, and who had very few animals of his own, and that he could not make anything out of me, whereas from other sahibs he had pocketed large sums daily. This was speedily reported to me, and in a short time afterwards he was, greatly to his surprise, arrested at Gilgit, where, after a very tedious and impartial trial by the wazir, or native governor, who utterly ignored the threats to murder me which Khalik made in court, he was sentenced to a year's imprisonment for robbing me. This sentence was afterwards commuted considerably, much to my disgust, as it was well known that he had robbed other Europeans and innumerable natives in the sahibs' name; but then, some native states are by no means hostile to men who would soon be turned out of India. While marching from Srinagar to Gilgit, my orderly, Abdul Karim, of the 3rd Madras Lancers, in answer to my query as to his opinion of the caravan bashi, said, "Sahib, he is a very bad man and a robber; kill him, and then there will not be any more trouble." As I did not at once concur with him, he added, "If you do not like to kill him, give me the order, and I will do so at once, then all the trouble will be over." Not wishing to utterly damp my orderly's spirits, I partially contented him by stating that I would make arrangements for the cessation of the trouble in a quieter way.

After a few days' stay in Gilgit, where we were most hospitably received by Captain and Mrs. McMahon, we continued our journey, escorted by the former and the genial and very good natured agency surgeon, Captain Roberts, I.M.S., who most kindly acted as cicerone during the march to Baltit. Captain McMahon was most anxious for us to postpone our departure from the charming Hunza valley until he could accompany us as far as the Kilik pass, whither he was going on tour; but it was now so late in the season that we were reluctantly obliged to deny ourselves this pleasure, and hasten on in hopes of reaching the Taghdumbash Pamir before any heavy fall of snow had rendered the passes more difficult. On October 22 I commenced work in the west end of the Taghdumbash Pamir, and obtained a good value for my longitude by triangulation, as well as by latitudes and azimuths to some peaks fixed by the Survey of India, but not before my hands were frost-bitten at the highest hill station, which is about 16,000 feet. After spending some days trying to shoot some *Ovis poli*, I moved to Ujadbai and Mazar Sultan, where a halt was made for some days while fresh values for the longitude of my starting-point of mapping were obtained, as I was not quite satisfied with the previous ones. The task of identifying peaks from positions the longitudes of which were not accurately known was rendered still more difficult by being unable to go to a sufficiently high altitude, whence the more prominent peaks could be easily discerned. Deep snow on the higher mountains necessitated lower sites being selected for the hill stations, but even on these the strong biting cold wind was a serious hindrance, not to say discomfort, to surveying

at the altitude of 16,000 feet in the month of November. Several of the peaks which had been previously fixed by the Survey of India, and which I was anxious to observe, were not very prominent ones, and from my observing-stations appeared to be so close to peaks of similar height that the slightest movement of the ruler on the plane-table aligned them on to other peaks, thus adding great doubt and uncertainty to some of the observations. In order to be sure of obtaining satisfactory results, I four or five times went up to the highest hill station near Mazar Sultan, and, when feasible, camped the previous night close to the foot of the mountain, so that by starting a couple of hours before day-break work might be commenced soon after sunrise, and, if possible,



SCENE IN BASKAM.

completed before the strong wind, always trying to the temper, had sprung up. The instruments were carried up the steep mountain-side, which was covered with loose shale and large stones, on a yak, and two more of these most useful and exceptionally hardy and sure-footed beasts transported the sub-surveyor and myself, until the gradient became so steep that it was infinitely preferable to crawl up by hanging on to the yaks' tails than to endeavour to remain in the saddles, which continually slipped back. Much as the ascents were disliked by some, if not all of us, I have no doubt that the yaks resented their being employed in this way, and as a rule required much force, sometimes applied in the shape of a stirrup-iron until it became bent, to make them continue the ascent

even at a very slow pace. However, the results proved satisfactory, as the greatest difference between any two of the three values for the longitude of this starting-point was only some seconds, and the height of Muz Tagh Ata (father of ice mountains) was only about 20 feet less than the two values obtained in the next year from the Wacha or Uchi valley. It was during this halt at Mazar Sultan that obstruction from the natives was first experienced. They tried hard to dissuade me from travelling to the valley of the Yarkand river by stating that the roads had become, and still were, quite impassable, owing to earthquakes, that no guides were obtainable, and that nobody would supply me transport to go there. After some delay, one man, who owned to having formerly known the route to the west end of Raskam, was discovered and induced to accompany one of my men as far as the Raskam or Yarkand river, in order to see how much of the information already obtained was true. While these two went reconnoitring, I moved camp to Oprang, and sent another man accompanied by a native from there to report on another route to the Yarkand river. The native who accompanied my man Islam assured him that there was no route *via* the Oprang pass, and did his best to dissuade him from going; but Islam obeyed the strict orders received from me, and reported the route to be quite easy. Cobbold, who had reached Oprang before me, sent back word that it was only about 10 miles from my camp at Mazar Sultan; but his estimate proved to be so much below the actual distance, that I did not reach his camp till after eight o'clock at night, while one of my men, who declined to be guided, was rewarded for the exalted opinion he had of his own power of guiding himself to a place whose whereabouts he did not know, by spending the night in the open—a far from delightful experience, as the thermometer fell near zero before morning. At length, the headmen, seeing that I was determined to go to the Yarkand river, arranged for transport, and no doubt issued orders to the men who accompanied it that they were to feign ignorance of the route, as was undoubtedly done. I was for some time inclined to attribute these difficulties to the stay-at-home propensities of the Tajiks, but I subsequently ascertained that strict orders had been sent from Kashgar to the Amban of Tashkurghan to warn the people that no attention was to be paid to the public orders issued on my behalf, and that they were to do their best to prevent me from going to the Yarkand river, but that if I proved obstinate and really meant to go there, then transport was to be provided, but no guides on any account. Curious to relate, two shocks of earthquake were felt the night before crossing the Ilisu pass, into what may be called forbidden ground, whereupon I was greeted with the proverbial "I told you so." It was with rather a considerable amount of surprise that those who thought fit to remind me of their previous statements departed from my tent on being told that they were annoying me exceedingly by preventing me from going to sleep.

The descent from the top of the Illisu pass towards the Yarkand river is fairly gradual, and a great contrast to the steep and rocky ascent from the north. Unfortunately, the route lay along the bottom of the valley of the Talde Kol Su, which was now frozen hard in the upper part of its course, necessitating the frequent use of pickaxes to roughen the ice, and to improve the track where it was impracticable to closely follow the river, while lower down the jungle was so dense that baggage animals were much impeded, and one of them lost an eye. Finding no suitable camping-ground at the mouth of the Talde Kol Su, we ascended the Yarkand river to Sarok Kamish (? Tugrok), and halted there while I followed the well-marked track which crosses the Topa Dawan and



PECULIAR FORMATION IN ASGAN SAL VALLEY.

leads in the direction in which I desired to go. None of the Tajiks who accompanied me from the Taghdumbash Pamir would agree to accompany me along this track, and as I was dependent on them, it was necessary to ascend the Yarkand river to Bazar Dara, where a messenger was sent to arrange for fresh transport. The mountains on the left bank of the river near Sarok Kamish being far too steep to think of getting any instruments carried up them, I was forced to content myself with those on the opposite bank, which are too low to afford a view of any of the peaks fixed from near Mazar Sultan, thus increasing the difficulties of surveying. The only untoward incident of the march through Raskam was the loss of one pony, which stumbled on a very

bad part of the track and fell on to the rock below, where his load was completely smashed up. Although the river was then very low, the fording of it was not easy for laden animals, and between Surukwat and Bazar Dara the difficulty was increased by the thick slippery ice, which extended for several yards from each bank. Here the very necessary pickaxes were in constant use, as passages through this ice had to be cut before the caravan could proceed with any degree of safety. In the march to Bazar Dara the river has to be repeatedly crossed, and as it was frozen over in only two or three places the march occupied a very long time. When close to this place, which consists of a small fort with a nominal garrison of twenty Kirghiz and a petty Chinese official, I was greatly amused by Raju, my caravan bashi, strongly protesting against my riding a nearly barebacked pony which I had caught when grazing, on the score that it would be most unseemly for me not to ride my own well-saddled pony when entering Bazar Dara. Owing to the exceedingly high mountains which hem in Bazar Dara at the mouth of the Dozok Dara Su, the task of measuring a base was very difficult, and reaching the sites selected for hill stations proved to be no light one, especially for the men with the yak carrying the instruments. On previous occasions I was struck by the wonderful agility and sure-footedness of the yak, but I was fairly astonished by the way this particular beast got along over ground where the two Kirghiz, who accompanied him, experienced great difficulty.

From Bazar Dara the route lay along the bottom of the exceedingly narrow valley called Dozok Dara, with vertical rock towering above it in many places to a considerable height. The approach to the Kukulung pass was very trying to mules and ponies, the former being undoubtedly by far the worst when marching up the very slippery and sloping ice, which for some distance completely filled the bottom of the narrow valley we had to ascend. The actual pass, though over 16,000 feet, is quite easy when there is no snow or ice on the north side, where the descent for some hundreds of feet is very steep. After a day's rest at Zad, the largest Kirghiz settlement in the Kulan Urgi valley, I managed to hire a few yaks, and started to recross the Kukulung pass, determined to carry the triangulation across it to Zad. On account of the great cold—the minimum thermometer fell to -12° Fahr. on the night of December 14—and the almost total absence of grass where it was necessary to halt on the south side of the pass, yaks were the only animals who could stand the double journey. These useful beasts can easily go for a few days with little or nothing to eat, and their thick coats protect them from the severity of the weather. On my return to camp 24, after a long and hard day's work on the high ground, where there was a fairly strong wind and the thermometer about zero, my beard and moustache were covered with icicles, which had to be melted in front of a small fire of dung and boortza. Feeling doubtful about being

able to identify from Zad the peaks observed at camps 19 and 21, I decided to spend a night close to the summit of the Kukalung pass and devote the next day, Christmas Eve, to measuring a base, etc., at the altitude of about 16,000 feet. Fortunately, we had brought a couple of sacks of dung and boortza to this barren and waterless spot, as the supply of fuel ordered from Zad was never sent.

It is exceedingly hard to state truly which was the worst day devoted to surveying on this journey, but it may be confidently stated that Christmas Eve, 1897, was quite one of if not the worst. The first item of that day's work was to climb up about 1000 feet to a site which commanded an extensive view, and spend a long time in the usual wind, with the thermometer below zero. As soon as the theodolite was packed up, the yak loaded, and a large pillar erected to mark the site, the descent to the other station was begun. Bad as the ascent was, the descent was far worse, the shale being more slippery and the gradient steeper. Owing to dearth of fuel, etc., it was imperative to complete the work at this camp in one day, the consequence being that I did not reach camp in the valley of the Kulan Urgi till about nine o'clock at night, and the men with the yaks much later.

At Zad more triangulation was done, and a last attempt was made two marches further on, but it was now too late in the season to permit of ascending to a suitable height whence the high barren mountains lying between me and the Yarkand river could be plainly seen, so recourse had to be made to observations of moon culminating stars for longitude. Bad weather put a stop to this, and the illness of the sub-surveyor, Dalbir Rai, to further topographical work, so a move was made to Yarkand. From Issok Bulok Agzee, or camp 26, onwards to the Yarkand river, the Kulan Urgi valley is exceedingly narrow, and bounded by precipitous mountains of considerable height. From Tir, a small village a few miles from where the Kulan Urgi river joins the Yarkand river, there is the choice of two routes of about equal length to Yarkand. That leading over the Sandal Dawan being reported less difficult than that over the Kuramut Dawan, I settled to travel by the former. The usual frozen river often proved very difficult for the baggage animals, but the main obstacle was encountered in a spot where the only possible way of getting the animals on was by hauling them up two steep drops of solid rock, where none but men, goats, and mountain sheep could ascend without assistance. A narrow ledge of rock halfway between the very steep parts enabled men and animals to rest before reaching the summit. Many of the animals were got up without much difficulty, but some proved very troublesome, and it was only with very great difficulty and hard work on the part of numerous men that the refractory ones were hauled up without turning somersaults. Needless to say, all the baggage had to be brought up by men, which added considerably to the delay.

About halfway between this obstruction and the summit there is another spot impracticable for laden mules and ponies. As to this fact we had not been enlightened by the Uz Bashi, or headman, of Tir, who returned to his village together with all the other men who assisted in getting the caravan up the rocks, thus leaving us in the lurch. This delayed the march considerably, as there were no extra men to assist, but the descent on the other side of the pass taxed the caravan-men and their charges severely. The gradient is very steep, and a recent slight fall of snow had so covered the rocks, stones, and shale that no track could be discerned, so we had to find our own way down. Men and animals continually fell down, especially at the foot of the very steep part where the narrow valley was for some distance a mass of sloping and slippery ice, on which they had to travel as best they could. We had hoped to reach some inhabited place before dark, but the difficulties of the march necessitated bivouacking on the mountain-side, where there was fortunately sufficient grass and a fair amount of partially dry yak-dung, the only available fuel. The old Pathan, Mohammed Amin, and his section of the caravan did not reach this inhospitable spot till after nine o'clock, having left all the baggage higher up. Wonderful to relate, the barometer, which was carried by one of the Pathans, survived this day's most trying march. The next day dysentery attacked Dalbir Rai, the sub-surveyor, and as little or no milk was obtainable, it was necessary to have him carried to Yarkand, where we arrived on January 20. Almost as soon as he recovered from this attack, rheumatism attacked him in a mild form, no doubt the result of exposure in the mountains. The latter also had its effect on me, and aided by a Chinese dinner which the Amban of Yarkand invited me to, and which was served in an open courtyard with a temperature considerably below freezing-point, proved too much for my constitution, which is not seasoned to a meal consisting of more than twenty-five dishes, washed down by the most evil-smelling hot and raw spirit that my nasal organ has ever been near.

(To be continued.)

THROUGH AFRICA FROM THE CAPE TO CAIRO.*

By EWART S. GROGAN.

THERE is a saying in South Africa that "every one who has once drunk dop (a brandy made in the Cape) and smoked Transvaal tobacco will, in spite of all inducements to the contrary, in spite of all the abominable discomforts inseparable from life in Africa, continually return to the old free untrammelled life of the veldt."

Anything more ridiculous than the possibility of my return to

* Read at the Royal Geographical Society, April 30, 1900. Map, p. 261.

The Geographical Journal.

No. 5.

NOVEMBER, 1900.

VOL. XVI.

JOURNEYS IN CENTRAL ASIA.*

By Captain H. H. P. DEASY.

HOPING that both Dalbir Rai and myself would improve in health from marching daily, we left Yarkand on February 8, and went back along the old route as far as Chumdi. Thence the course of the Yarkand river was followed for a short march as far as Taklay, the Chiung Sai valley being next ascended, and the Arpatalak pass crossed *en route* to Langar, which I ascertained to be about 10' further north than was supposed to be the case. The Yarkand river was frozen over close to this very small village, so we crossed to the opposite bank with ease, and continued the journey as far as the foot of the Khandar pass. The heavy snow which fell during the day and night in which we were camped close to it, effectually blocked the track, necessitating a return to Langar, where the ice had then almost disappeared from the river. Not being able to place much reliance on what the natives told me about routes, I decided to go back to Taklay and thence travel to Kosarab, with the intention of seeing if it was feasible to ascend the valley of the Yarkand river from that point. The absence of ice, the winding nature of the river, and the very precipitous barren mountains through which it flowed, proved to be insurmountable obstacles. Both Dalbir Rai and I were now much worse than when we left Yarkand; neither of us was able to do any surveying, which made it advisable to return direct to that town, which was reached on March 1. During the greater part of my stay in Yarkand this time, I was very fortunate in having the company

* Map, p. 596. Continued from p. 164.

of Mr. M. Backl nd, a Swedish missionary, and of Mr. Macartney, whom duty brought there. Thanks to the valuable help of the latter, who assured the ignorant Tektai, or commanding officer at Yarkand, that I had no intention of dropping shells into the Yang-i-Shahr, I was at length afforded permission to take observations on the site where Trotter observed, in order to ascertain the difference of longitude between his station and mine outside the town. Being unprovided with a flying-machine, it was now absolutely impossible to travel through the unexplored parts of the valley of the Yarkand river, so I determined to spend the summer in the northern part of Tibet, and once more endeavour to penetrate through the unknown part of Chinese Turkestan in winter.

Macartney having met with a man who professed to be intimately acquainted with many half-buried cities in the far-famed Takla Makan desert, I deemed it worth while engaging him as guide on the condition of "no cities no pay, many cities much pay," and on the chance that he would guide me to one or two places of interest. On April 12, when some iron tanks, in which honey had been brought from Russia, had been made as water-tight as was possible by local skill, and suitable frames constructed to support them when full of that much-prized, indispensable liquid, water, I set out from Yarkand for Guma, where I had to wait until the camels arrived from near Kharghalik. As soon as these all-important beasts of burden arrived, a start was made for the Takla Makan, our route passing through the oasis of Kara Targaz, where we filled up the water-tanks. Placing more reliance on an old man whom the so-called guide, Islam Akun, produced at Guma, and not wishing to take with me any more men than were absolutely necessary, I sent the guide back after the first march in the desert. The most striking features of this part of the Takla Makan are the large amount of brushwood known as jilgan, numerous half-dead trees, the well-defined ditches round the sand-dunes, many of which must be nearly 20 feet high and somewhat more in diameter, and the absence of any regular slopes in the sand. Judging from these noteworthy facts and the amount of vegetation, it is evident that at no very remote epoch the rainfall must have been considerably heavier than at present. Early in the morning of the third day after leaving the oasis of Kara Targaz it was very plain that neither of the so-called guides knew their way, and when, on being pressed for information as to the distance to the nearest deserted city, called Ak Tala Tuz, which I believe to exist only in the imaginative brain of Islam Akun, they pointed to a few trunks of trees as being the ruins of a house, I settled to return. Shortly after this was decided upon, the guides announced to Raju, my caravan bashi, that it was most fortunate the sahib had returned, as they had never before been so far into the desert, and if we had gone on any further they would not have been able to find their way back. During the return march I several times tried to guide myself, but the great sameness of the scene rendered it

impossible, so we followed our own tracks. The guides were now very much alarmed for their own safety, and acknowledged that they knew nothing about Ak Tala Tuz until Islam Akun made them promise to assert to me their intimate knowledge of the entire Takla Makan, and of these ruins in particular. At times the ways of natives are very strange, but it was left to Islam Akun to make me wonder for a long time as to what he hoped to gain by professing to be able to guide me to deserted cities, when he had not the slightest idea of the whereabouts of any; especially when his pay depended upon the fulfilment of his promise. The men who professed to be able to guide me to Ak Tala Tuz were punished by me, and Islam Akun was rewarded for his share in the transaction by the Amban of Khotan, who decorated him for one month with a large and heavy square board round his neck.

After checking the longitude of Khotan, I went to Polu *via* Chaka, intending to go direct to the Aksai Chin and Northern Tibet as soon as the sheep and supplies had arrived from Ladak, but I reckoned without my hosts, the Chinese. At Chaka a halt of some duration was made, in hopes of getting a good view of the Tekelik Tagh range, in which there are two peaks fixed by the Survey of India. Unfortunately the hazy season had set in, and this scheme had to be abandoned. After some delay at Polu, it was very plain that I should not get any help from the Polu people for a journey into the mountains, owing to the orders of the Chinese; and as the sheep and supplies had not arrived from Ladak, I went to Kiria to interview the chief obstructionist, as it was impossible to go without hired transport. Although this ignorant and unreasonable official had inspected my Tsung-li-Yamen passport, and knew full well that it was my intention to visit that part of his district lying beyond the Kwen Lun range, and that I intended to return to Polu, he proved obstinate, and obliged me to make a lengthy *détour* to Kara Sai. From this wretched spot, where a few shepherds and goatherds live in places hollowed out of the loess, the ascent to the Tibetan plateau is very gradual, being for the greater part up the valley in which the Tolan Khoja river has its source. From Kara Sai and its vicinity, the little transport that was required to supplement my own was procured after a short delay.

In the lower part of the Tolan Khoja valley there is plenty of excellent grass and water, but in the upper part, known as Sarok Tuz (yellow salt), there is no grass, but only a limited supply of burtza and not much water. At the head of this valley lies a pass of about 16,500 feet, a very easy and comparatively low one, which may be considered the natural boundary between Turkestan and the great Tibetan plateau. Looking forward from a hill near this pass, not a trace of vegetation is to be seen, and it was not till the western side of the small and irregularly shaped lake called Shor Kul was reached that any grass was obtained. Although it was now midsummer, and the glaciers and snow-covered

mountains of the Kwen Lun range, which form the northern boundary of the depression containing this salt lake, face the south, only one tiny rivulet was noticed coming from them. Between the lake and the Kwen Lun range the country is absolutely barren. At the first camp beyond Shor Kul there was little or no vegetation, so the remaining sacks of chopped straw were issued. Here it was again necessary to dig for water, which was by no means sufficient for all the animals. However, they quenched their thirst the next day, after a few hours' march, when the most easterly tributary of the Kiria river was reached. This tributary and the next are undoubtedly the smallest of the five principal affluents of the Kiria river, and flow through country devoid of all vegetation. The two Kara Sai guides having agreed to accompany us only as far as Yepal Ungur, on the Kiria river, where there is some excellent grass, it became our turn to lead the way. Finding fairly fresh tracks of men and donkeys around two recently killed yaks, I directed Raju to follow them up, and if possible to find his way to Polu and bring back the sheep and supplies which had arrived there after my departure. Although this man knew perfectly well the general direction of Polu, he at one time went in exactly the opposite direction until he came to the sources of the Khotan river, where he found two men hunting yak. Much to my surprise, I came across a fair-sized river west of Yepal Ungur, which was not shown on any map, so I decided to follow it down as far as possible and survey its course. This scheme had soon to be abandoned, owing to the exceedingly narrow rocky valley in which a waterfall soon proved too formidable an obstacle; we had already passed one after spending some time building up a narrow track.

Continuing our journey west over a high pass, the fifth and most westerly tributary of the Kiria river was met, and camp pitched at a place called Aksu, where I had to halt for some days on account of bad weather. My plan was to establish a trigonometric value for the longitude of Aksu by means of some peaks fixed by the great Trigonometrical Survey of India, but the very extensive sea of snow mountains lying south and west of the depression in which lie Ulugh Kul and Achak Kul interfered effectually. Efforts to economize time by sending out reconnoitring parties in an easterly direction from Yepal Ungur proved of no avail, as one party speedily returned with the excuse that nobody had ever been before them, another went north-east instead of south-east or south, while the third party assured me that a feasible route had been discovered in the desired direction, a statement which proved untrue. Ever since leaving Kara Sai the weather had been very severe, and heavy rain and numerous snowstorms so interfered with accurate surveying, that I decided to carry the triangulation from Aksu back to near Shor Kul, obtain good values for the co-ordinates of all the principal mountains, and finally establish trigonometrical and topographical connection with the survey executed in 1896. In this I was

successful, as also in ascertaining that there is no feasible route between Kara Sai and Polu leading in the direction of Central Tibet. I believe it has been often stated that in bygone times the Tibetans from the direction of Lhasa used to regularly visit Polu. I cannot find the slightest corroboration for this, unless perhaps the ruined post, or petty fort, at Baba Hatum may be considered proof that the Tibetans formerly inhabited that comparatively fertile part of the area known as the Aksai Chin. Repeated endeavours were made to ascertain the origin of this designation, but no information on this subject could be obtained either from the Chinese or the natives of Turkestan. In all probability the title Aksai Chin was given to this inhospitable area on account of the



VIEW OF KWEN LUN RANGE, FROM SHOR KUL.

innumerable snow mountains in it and the generally barren nature of the country. On arrival at "Fever camp," or camp 15 of 1896, there was no water where it had been previously obtained, but fortunately some was reached by digging in a small ravine close by. From the hills near this camp observations were taken of peaks fixed in 1896, after which camp was moved about 10 miles east to admit of sufficiently long bases being obtained. These bases varied in length from about $7\frac{1}{2}$ to 12 miles, and as the most distant peak, a singularly prominent one, 23,490 feet, was under 70 miles from the most distant hill station, the distance from it was accurately measured, as well as that from two other peaks. The inevitable strong wind was a great drawback, and necessitated the use of strong ropes to tie down the theodolite to large rocks. The absence

of more than two good points in the fine snow range on the left bank of the Kiria river near its source made me for a time rather anxious as to the connection between the 1896 and the current triangulation being good. This anxiety was soon, however, removed, as I was able to identify from Baba Hatum and the vicinity some peaks on the long and majestic snow range on the right bank of the Kiria river, which had been previously observed from near Yeshil Kul. The weather being exceedingly fine on my return to Aksu, another halt was made there for the purpose of observing some prominent peaks which had been previously too much obscured by clouds to admit of accurate observation.

Raju, having now returned from Polu with the sheep and supplies, guided me to the sources of the Khotan river—not the Kiria river, as some of my critics who have never been anywhere near the place thought fit to assume. There I was able to take good observations for latitude and longitude, and as it is only one short march from Aksu, the position of which was very carefully determined by triangulation, I venture to assert that the longitude of camp 113 on the right bank of the most northerly source of the Khotan river has been accurately determined by me. Colonel Trotter apparently considers that the Khotan river rises close to the pass shown on my map as being in lat. $35^{\circ} 11'$, long. $81^{\circ} 37'$, and that it flows west for some distance before turning north. One of the chief objections to this theory is the fact that the river which rises close to that pass on the south side of it was actually seen by the sub-surveyor, Leno, to flow into a large lake at about the intersection of the 35th parallel with the 81st meridian. Another objection, and I think a weighty one, to Colonel Trotter's theory, is the existence of an extensive snow range which lies between the real and the imaginary sources of the Khotan river. From the numerous glaciers and springs on the south side of this range, the northern branches of the Kiria river have their origin. With a view to making certain of carrying the triangulation across the Kwen Lun range, and thus getting an accurate value for the longitude of Polu, as the base of future work, it was considered advisable to spend a day close to the At To pass, whence the very steep descent into the Polu gorge begins. In this dismal locality there is not the slightest sign of any vegetation, the absence of which rendered it necessary to get from Polu chopped straw, barley, and firewood. As a proof of the great willingness of the people of this village to assist a British traveller, it may be mentioned that, although they had been repeatedly ordered not to assist me, when returning to their village they brought the all-important supplies to the At To pass, and subsequently gave me a large present of most delicious and welcome peaches, melons, and grapes. There being little or no baggage by this time, the descent through the very difficult Polu gorge was accomplished without mishap, and Polu re-visited on September 25. The harmony of the few days' rest at Polu was disturbed by Dalbir Rai,

the sub-surveyor, who suddenly rushed into a small room, drew his kookery, loaded his carbine, and threatened to shoot me or any one else who might venture to approach him; but thanks to my orderly, Abdul Karim, who displayed great tact and presence of mind on this occasion, Dalbir Rai was induced to lay down his carbine.

After nearly a fortnight's rest at Yarkand, I set out on November 3 with all the best-conditioned animals, determined to make a fourth attempt to explore the unknown parts of the Yarkand river.

For some time I was in great doubt as to the best route to take, but finally decided to go *viâ* Takla, the Arpatalak Dawan, Langar, and the Khandar Dawan, to the upper part of the valley known to most Sari-kolis as Uchi, but to some as Wacha. In the previous winter, a heavy fall of snow on the night I reached the foot of the Khandar Dawan prevented me crossing it. To my great surprise, there was no ice on the Yarkand river at Langar when I crossed it on November 9, the transit being effected on camels kindly supplied by the Beg of Sarikol, while the ponies and donkeys had to swim. The most alarming reports as to dangers attending the approach to the Khandar Dawan from the east side turned out to be greatly exaggerated, but the latter part of the ascent is undoubtedly very steep and stony, while for a short distance close to the summit the ponies with half-loads and the donkeys without any had to be assisted by men, as the so-called road had been rendered exceedingly slippery by a recent slight fall of snow.

Pending the arrival of the sub-surveyor (very kindly sent by the Survey of India to relieve the man who had been previously lent to me), camp was pitched at Gombaz, at a height of about 12,230 feet, at the foot of the Khandar Dawan, on the west side, as the valley is there much broader than at Khurak, and far more suitable for measuring long bases.

At Gombaz, a short base was carefully measured by means of a 10-foot subtense bar, and subsequently three other bases, forming an almost equilateral triangle whose sides were about 6 miles. By placing the most westerly hill station opposite to Gombaz, on the west side of the Uchi valley, I hoped to be able to again observe some of the peaks previously observed from the west end of Raskam, but an irregular range of considerable height intervened and compelled me to go so far from the station near Gombaz, whence the Raskam peaks had been observed, that it was impossible to distinguish the pillar, about 6 feet high, erected at the latter station, from the background of mountains of a similar colour.

Though a start was made from Gombaz about 8 a.m. for the west side of Uchi, it was not till about 3.30 p.m. that a site, probably well over 15,000 feet, commanding views of the peaks observed from the west end of Raskam and from near Gombaz, was reached, after considerable labour. This was, unfortunately, a day wasted, as the other end of the

base could not be observed; so there was nothing to do but pack up the theodolite, load the yak, and make tracks for camp, which was not reached by me till after 8 p.m., and by the men with yaks till much later. Having obtained fresh yaks, I returned the next day to the west side of Uchi, erected the theodolite at a much lower elevation than before, and observed Muz Tagh Ata—which has, according to the Pamir Commission Report, been carefully fixed by the survey officers of that Commission—and other peaks which I had previously observed from the Taghdumbash Pamir in 1897, thus getting a good trigonometric value for the longitude of Gombaz, the starting-point of my work on this journey. Just as the necessary observations had been almost finished, the new sub-surveyor arrived from Yarkand, and, after a day's rest, began topographical work on the scale of 8 miles to 1 inch.

During my stay in Uchi, I repeatedly but unsuccessfully endeavoured to obtain information about the unexplored parts of Sarikol and the valley of the Yarkand river. A certain amount of news of the route followed by Grombohefsky from Uchi to Sanglash was forthcoming, as also about Mariong; but beyond that the Tajiks professed absolute ignorance. The only thing to be done was to go to the valley erroneously called Mariom Pamir by one route, and leave it by some other.

The ascent to the Thung, or Thungal pass, about 14,000 feet, which intervenes between Uchi and the Mariong valley, up a narrow valley with water for most of the way and plenty of grass at its head, is quite easy, but the descent is for some hundreds of feet very steep, but good and quite feasible for laden animals. On November 29, this pass was almost quite free from snow. The Ming Bashi of Mariong being ill, he sent his son and a few other men to Mariong, a small village of about eight houses, a few miles from the Thung pass, to meet me and nominally to render assistance. Inquiries as to the Mariong valley and the routes leading to Raskam were speedily instituted, but it was soon very evident that no information of any value was to be obtained from the Ming Bashi's son, or from any one else. All denied the existence of any route to the south, and even as to the probable distance of Nosh Tung, which was stated to be at the junction of the Mariong and Yarkand rivers, it was impossible to discern truth from falsehoods. The Ming Bashi's son at first stated that Nosh Tung was two days' journey from Mariong, then three, then one, then two; but all agreed that it was situated at the mouth of the Mariong river.

According to most maps there is a Mariom Pamir, but such is not the case, as the valley, whose real name is Mariong, is very narrow, with exceedingly precipitous barren mountains rising to 2000 feet on either side. Cultivation is carried on wherever it is possible, but "Pamir" is a misnomer, as extensive grazing-grounds and a broad valley do not exist. The general direction of the Mariong valley is

about east and west, the latitude of Mariong being $37^{\circ} 23' N.$, and that of the mouth of the valley $37^{\circ} 19' N.$

Owing to the numerous lies told by the Ming Bashi's son and by others, I left Mariong in ignorance of where my next halting-place would be. On reaching a fairly large village with numerous fruit trees and a little cultivated land round it, I was told that it was Nosh Tung, but as it had been invariably stated that this was at the mouth of the Mariong valley, I pushed on until out of sight of the village, when I halted to await the arrival of the caravan. As it was nearly four o'clock before the caravan came in sight, and as nothing certain was known about the track onwards, it was decided to halt at Nosh Tung and try to obtain



GLACIERS NEAR SOURCES OF KIRIA RIVER.

some information about the feasibility of going up the valley of the Yarkand river, or by some other route, to the west end of Raskam. Evidently there was a great desire to get me out of the country as soon as possible, and to withhold even the scantiest information about routes leading in the desired direction; so I set out the next day to take observations at the mouth of the Mariong valley, while the sub-surveyor climbed to a peak above the Sargon pass, about 3500 feet above Nosh Tung, whence he was able to see the points fixed from near Gombaz, and a large expanse of country as well.

While my time was occupied in taking solar observations for latitude and longitude at the mouth of the Mariong valley, one of my men was sent to follow up the track along the left bank of the Yarkand river,

and see if it was possible to take laden animals along it for any distance. His report being very fairly satisfactory (the Nosh Tung people had denied the existence of any track), I determined to take a few ponies with me and go as far south as possible. The Ming Bashi sent a couple of camels with me, on the chance of their being required to ford the Yarkand river, but he took good care to send with them two worthless fellows, one a partial idiot, and the other a comparative stranger to Mariong.

About a couple of miles below Nosh Tung there are several hot springs, the temperature of the warmest being more than 130° Fahr. A little further down, the valley becomes exceedingly narrow and the track proportionately bad, while the necessity of repeatedly fording the Mariong river was by no means appreciated by the camels.

In order to avoid twice fording the Yarkand river, an exceedingly steep sand-slope had to be crossed, the descent from which was so steep that all the loads had to be taken down by the men. After a few miles one of the camel-men, who had hitherto professed complete ignorance of this part of the country, said that if we went beyond the first side valley, in which there was a semi-frozen stream and a little grass, nothing would be found for the animals further on; so a halt was made, and, after an hour's work, sufficient space was cleared for two small tents. This valley, only about 30 yards broad at its mouth, is so choked up with jungle, and the ice is so slippery, that the laden animals had great difficulty in penetrating up it a few score yards, and even when freed from their loads, progress to where there was tall dry kamish grass, at that season devoid of much nutriment, was by no means easy. Continuing along the left bank of the Yarkand river, it soon became necessary for the men to carry the baggage for 200 yards over sloping and slippery rocks, as the ice was not thick enough to bear even a man's weight. The valley, some miles ahead, was so narrow that I went forward to reconnoitre, but further progress soon became impossible. Utterly barren mountains rose sheer up on both sides to an estimated height of 3000 to 5000 feet, the river was too deep to ford, and the ice too thin to support a man. Plenty of good dry wood was obtained, but, unfortunately, nothing for the animals, which had to subsist on a couple of handfuls of grain.

While the caravan returned the following day to Nosh Tung, the sub-surveyor tried to climb to a peak from which he hoped to get extensive views, but, after reaching an altitude of about 5000 feet above the valley, the steepness of the mountain-side prevented his going up any higher. Owing to the very short time that the sun was visible from the mouth of the Mariong river, the observations for longitude were not as satisfactory as could be desired; and as that is the most westerly part of the Yarkand river, I checked them by observations of east and west stars, Polaris and a south star being observed for latitude.

The absence of sufficiently strong ice on the Yarkand river, and of sufficient camels for fording the river, compelled me to follow the route originally pointed out by the Nosh Tung people, viz. *via* Pichanyart to Pil. Accounts as to the number of passes and marches between Nosh Tung and Pil varied considerably. The passes being reported to be very bad, several yaks were hired, so as to lighten the ponies' loads—a precaution which proved to be very necessary. The Sargon pass, about 11,500 feet, was the first crossed, after many hours' hard work for men and animals. The track leading up to this pass from Mariong is exceedingly narrow, and in places the gradient is so severe that men and animals have to rest every score or so yards. The latter part of the descent is fully as bad, and a careful look-out for stones knocked over the mountain-side by the rear of the caravan had to be kept by those in front. The velocity attained by these small stones was often so great that it was necessary for those in front to halt under shelter of some friendly boulder or cliff, until the men and animals behind had passed the point directly above them on the winding track. Occasionally a yak would leave the very steep zigzag path and rush off to one side, sending countless stones down the mountain slope. The much-cursed brute would then stand there—how he managed to maintain his equilibrium was a wonder—until some extra large stone thrown by one of the many volunteers for the work induced him to move on. When the Yarkand river is frozen, this pass could be avoided; but I doubt if anything would be gained thereby, as additional stretches of the very narrow Mariong and Pichanyart valleys would have to be traversed.

At Pichanyart, where there are a couple of houses and a small patch of cultivated ground, Grombchevsky's route was entered on. Turning up the first side valley below Pichanyart, the route lay along the bottom, in which there is a fairly thick jungle and a small stream. This was so much frozen that crossing it repeatedly was difficult for the animals, which had to be preceded by an advanced guard to roughen the ice and spread earth over it. After crossing the Sharnoz pass, about 13,500 feet, a fairly easy one, the inevitable descent of several thousand feet had to be made into a valley of the same description as that on the other side, and a halt for the night made at Sharnoz, where there are a couple of deserted houses and a few square yards of land which had formerly been cultivated. To my intense disgust, it was necessary to camp the next day only a few miles distant from Sharnoz, as the men with the yaks stated that neither fuel nor water would be found further on, until two passes were crossed and the other side of the Yarkand river reached. After a careful search at this camp (Shamatagl), it appeared probable that in the summer-time perhaps a little good grass grew there, but at the time there were only tufts of very coarse grass, which the ponies, hungry as they were, would not touch.

Owing to the height of the very steep mountains above Shamatagl, it was necessary to ascend 200 feet, and then level a space just large enough to take observations without much risk of the theodolite being overturned. The ascent from Shamatagl to the pass, about 13,000 feet, which bears the same name, is very steep, but the track was almost free from snow, and the going comparatively good. From a peak but slightly higher than this pass, a most extensive view was obtained, thus enabling the sub-surveyor to get a good fixing and execute much useful work.

The descent from the Shamatagl pass, on both sides of which there is plenty of grass, being very easy, I hoped that the remainder of the march down to the Yarkand river would prove to be of a similar nature, but this was unfortunately not the case. Having descended about 2000 feet, it was necessary to make a very gradual ascent of about 150 feet, when the Tugadir pass was reached, and the valley of the Yarkand river was seen several thousand feet below. From the top of this pass only a few yards of the track was visible, the remainder being so precipitous that I paused for some time to wonder how even unladen ponies could, with any degree of safety, reach the valley below. Fortunately, the ponies were very lightly laden, yaks carrying the bulk of the baggage, and by ceaseless care and attention on the part of the caravan-men, who repeatedly had to hang on to the ponies' tails to prevent them from turning somersaults, no serious casualties happened.

Soon after reaching the Yarkand river, we received, with great joy, the news that the river was now well frozen over in a few places, and also along the bank, where the track is so bad that even unladen yaks cannot pass along without several men to assist them. No mention was, however, made of the short but exceedingly dangerous corner close to Sanglash which had to be passed. As it was not necessary to unload all the ponies, I suppose this spot is considered quite good by the usual frequenters of the Pil valley. Most of the ponies, having had so much experience of bad tracks which many goats would go along with caution, passed this vile spot without mishap, and the caravan reached about dusk the miserable village of Sanglash, at the mouth of the Pil valley, and about three-quarters of a mile from the Yarkand river. Sufficient chopped straw and barley being obtainable, a much-needed rest of one day was taken, and messengers were sent for fresh yaks to transport the little baggage there was to the west end of Raskam.

As I distrusted the information supplied by Tajiks, I sent on one of my own men to see if it was feasible to descend the Yarkand river, and he speedily returned, reporting the route to be still impracticable owing to absence of sufficient ice.

Fresh yaks having been procured, the Pil valley was ascended without much difficulty up to Chadder Tash, two short marches from Sanglash, where plenty of grass was reported to be. As usual the information

was false; a little burtza closely cropped by sheep, and of no use for ponies or donkeys, was the only vegetation to be found.

A little snow having fallen during the night at Chadder Tash, rendered the next day's march additionally troublesome, and one donkey, owing to snow and clay having balled in his feet, slipped and fell 200 feet on to the rocky bed of the narrow valley. The annoying circumstance attending this accident, the only serious one which happened during the whole journey, was the comparative excellence of the track where the donkey slipped, the breadth being about 8 inches. Curious to relate, although the donkey was killed almost instantaneously, no damage worth speaking of befel his load.



GENERAL VIEW OF SANDS OF KHOTAN RIVER.

Bad as is the descent to the Yarkand river from the Tugadir pass, there is a short descent—drop would be a more appropriate term—a few miles above Chadder pass, which is far worse. After pick-axes had been freely used for some time, and all the large loose stones put out of harm's way, the yaks, aided by several men, were sent on first. No doubt these hardy and exceptionally surefooted beasts had many times previously passed this spot; but even so, it was astonishing how they kept their footing. Most of the ponies, with several men assisting each one, managed to descend most of the way on their feet, but not so the donkeys, which slid and rolled down, often in a very alarming way.

Perhaps a somewhat better idea of the nature of the track between Chadder Tash and Pilipert, distant about 7 miles, may be conveyed by

mentioning that the caravan of eight yaks, twelve ponies, and nine donkeys, with plenty of men to assist, took seven hours to accomplish this march.

From Piliptert all the ponies and donkeys were sent to the Kulan Urgi valley to rest, while efforts to reach the country north of the west end of Raskam, the limit of surveying done in the previous winter, were continued. Yul Bash, the man who professed to be well acquainted with the route, occupying four days, in which as many passes have to be crossed, now asserted that another route, which some Kirghiz had followed on the previous day, was preferable, but that he did not know it. This guide had accompanied me in the previous winter from the Taghdumbash Pamir, through Raskam to Bazar Dara, and, in accordance with the secret orders issued by the Chinese, always asserted that he was quite ignorant of the country into which he was then guiding me. All the men accompanying the yaks, no doubt owing to the plan previously determined upon, professed similar ignorance of both routes, and stated that the best course to adopt would be to follow the fresh tracks of the Kirghiz.

From Piliptert, about 14,400 feet, onwards to the pass at the head of the Pil valley, which we had to cross, the country was covered with snow, so it was quite easy to follow the tracks of the cattle of the Kirghiz. By judiciously questioning the yak-men individually, it became evident that the route was, in fact, well known to at least some of them, but that for some mysterious reason they professed to be unacquainted with this part of their country. One man became quite indignant when he realized that he had been entrapped into displaying knowledge of the route, and vainly protested he only thought such and such to be the case; but the desired information was obtained, and further questioning became needless.

An occasional snowdrift somewhat delayed the ascent, but the most formidable obstacle was a large and very sloping glacier, up which the yaks had much difficulty in proceeding, owing to the comparative smoothness of the ice, which the wind had swept almost quite clear of snow. As soon as this glacier was reached progress became exceedingly slow. The shelter of a friendly side valley had to be abandoned, and, the full force of the biting cold head wind being experienced, the hardship of the march was greatly increased. With a temperature of -8° Fahr. at 2 p.m., and a strong head wind, riding became impossible, and even with three pairs of the thickest woollen socks, I was unable to keep my feet warm when crawling up the glacier. It was not till after 3 p.m. that the top of the Mamakul pass, about 17,000 feet, was reached.

A very brief halt was made for the purpose of boiling a thermometer, a trying operation to perform, as gloves had to be temporarily discarded, when my fingers became so rapidly benumbed from touching the

hypometer that I had to pause several times and endeavour to partially restore circulation. The temperature of the steam of boiling water on this pass was $180^{\circ} \cdot 2$ Fahr., air-temperature -5° Fahr. All thoughts of using the plane-table, even for a brief period, in this most inhospitable spot had to be abandoned; but this was not of much consequence, as the pass was fixed subsequently.

For a few hundred feet the descent from the Mamakul pass is so very steep that two men, who went on ahead to reconnoitre, had the greatest difficulty in descending safely, but those who followed the yaks had a somewhat easier task. As soon as the foot of this shale slope was reached, the heavily laden yaks, by that time fairly tired, were urged forwards as much as possible, in hopes of reaching before dark some fairly sheltered spot, sufficiently free from rocks and boulders to enable us to lie down for the night. In a very short distance, however, the valley became exceedingly narrow and steep, and so filled with boulders and large rocks that the pace of the yaks was little more than that of a snail, and by dusk we were still unpleasantly high and too near to the pass to think of halting.

Having again told the men to urge the yaks forwards as quickly as possible, I went on ahead, hoping to reach a place with ice and fuel before it became too dark to proceed. Much to my surprise, I came suddenly upon a herd of burrhel, which had come down to the stream for water or to lick the ice; but my rifle was behind, so I pushed on till I reached a place where there was a little brushwood and a fair chance of finding a somewhat level spot to sleep on. As it was now too dark to guess where the largest rocks were, and as stumbling over them in the dark is not exactly the height of enjoyment, I settled to halt there; but Yul Bash, the quondam guide, who hitherto professed entire ignorance of the route, now said that there was an ungur, or shelter, formed by overhanging rocks or mountain-side, only a very short distance further on, with more fuel close by, so we stumbled on for a few hundred yards, and reached the so-called shelter about 9 p.m. After a brief rest, the men collected sufficient brushwood to light a small fire, by the light of which we could see that the ungur was just large enough for one man, and that close by was an artificial one, without any more pretence to shelter than a tumble-down rubble wall, nowhere higher than about 18 inches, could afford. To pitch a tent was quite out of the question, owing to the numerous large rocks, so we slept wherever we could, and, thanks to the long and very fatiguing march, many of us were oblivious of the cold.

The minimum thermometer fell during the night to zero Fahr., and what the corresponding temperature in the precincts of the pass was may be guessed from the fact that it had been low enough the night before to freeze to death my hardy, thick-coated dog, whose love of the chase had led him to go in pursuit of a herd of ibex, or burrhel, from Pilipert.

Soon after leaving this bivouac, known as Miskan Jilga, numerous yaks were met, and in a few miles a tent occupied by two Kirghiz, who professed ignorance of the route to the Yarkand river. As far as Miskan, the Kirghiz encampment, the route is comparatively excellent, but further on the valley is so choked up with jungle that progress was considerably retarded, and much damage done to the baggage. Being quite ignorant as to the distance we were from our goal, the Yarkand river, no sights having been taken the previous night, I pushed on till dusk, when it was necessary to halt and patiently await the arrival of the yaks. A ruined house afforded shelter from the wind, and as plenty of good firewood was obtainable, we bivouacked in comparative luxury; but the tired yaks would have fared badly if their drivers had been allowed to keep them tied up all night and without any food, as was their intention. It was only after much threatening and abuse that the yak-men were made to go back a couple of hundred yards to collect chopped straw, which had been abandoned by the last people who had cultivated the comparatively open valley on the north side of the Topa Dawan, on which we now were.

The yak-men being, as usual, very dilatory in loading up the next morning, I went on ahead with a boy who had given a little information to one of my men, and in the course of the few miles which had to be accomplished before reaching the Yarkand river it was ascertained that Yul Bash, who professed ignorance of all routes hereabouts, not only knew the country perfectly well, but had, in the previous year, cultivated some of the fields close to last night's bivouac.

The most welcome news which the boy gave us was that of another route to Pilipert, which he had previously traversed with Yul Bash. It was a great relief to hear this, as, although it would take four days, during which as many passes had to be crossed, yet anything would be better than recrossing the Mamakul pass. Soon after noon the next day the long-wished-for goal was reached, and camp pitched on the right bank of the Yarkand river, with plenty of good dry firewood and some kamish grass for the yaks close by. To reach this camp, which is only about 10 miles distant from the most southerly part of the Yarkand river visited from Nosh Tung, it had been necessary to make ten marches and cross five passes, the tracks being in many places as bad and as dangerous as animals can proceed along.

Owing to the very tired state of the yaks, it was essential to halt for a day, thus affording time for topographical work, as well as for the execution of most needful repairs to the baggage. From this camp I again checked the longitude of the west end of Raskam by means of latitudes and an azimuth of nearly 180° , to one of my hill stations west of the Topa Dawan. Another man having arrived with a few fresh yaks, the lying Yul Bash was afforded an opportunity of pretending that he had just obtained information about the route which the boy

had previously told me was well known to him. Annoying as it was to be obliged to make such a lengthy *détour*, it proved to be most advantageous from a geographical point of view, as from peaks adjacent to four of the passes extensive views were obtained, and the topographer was invariably able to get good fixings at the sites he selected, while the positions of nearly all the camps and bivouacs were determined astronomically.

The return journey to Pilipert was accomplished without any more serious mishap than a yak falling into a deep and narrow crevasse hidden by tall grass. Owing to the valleys being very narrow and



THE MOST WESTERLY BEND OF YARKAND RIVER, TAKEN FROM THE MOUTH OF THE MARIONG VALLEY.

rocky, the labour of clearing a space for two small tents was considered to be far too great and out of all proportion to the extra comfort of sleeping in a tent, so this luxury was dispensed with.

Favoured by comparatively fine weather, we crossed the four passes—one about 17,000 feet—without having any snow to render the vile tracks, often excessively steep, more difficult than they usually are.

The only fuel obtainable at Pilipert being a little partially dried yak-dung, the sight of dry wood, which some Kirghiz had brought up from Kulan Urgi for me, was most pleasant, and in a short time after my return to this bleak spot I was seated in front of a good fire in the only unoccupied stone hut (through which, indeed, the biting

cold wind blew with as much ease as through a sieve), thawing the numerous icicles which hung from my moustache and beard.

Having obtained satisfactory observations for rating purposes at Pilipert, we gladly departed as quickly as possible from this land of liars and trouble for the hospitable valley of Kulan Urgi. After crossing two more passes in one day, Issok Su Aghzi ("mouth of the hot water") was reached about dark, and a day's halt was made there while the caravan was sent for.

Whatever motive or secret order had compelled the Tajiks to withhold information about routes, it must in fairness be said that they one and all faithfully adhered to the bond, as not an iota of news about the direct and easy route from Mariong to the part of the Yarkand river near the west end of Baskam was ever vouchsafed. The boy who gave me news about the return route to Pilipert was not a Tajik, but a native of Kulan Urgi. Large rewards were offered for information about the direct route from Mariong, and once the wily Mohammed Ju, my interpreter, had nearly succeeded in obtaining some particulars, when his informant was promptly ordered by some other Tajiks, who accidentally overheard the conversation, not to give any. It was not until I met some of my old friends among the Kirghiz of Kulan Urgi that I ascertained from one of them, who was well acquainted with the route from Nosh Tung southwards, that it was an easy one, requiring only two and a half days to traverse, and that it was constantly used by the inhabitants of Mariong when taking their herds to graze in the valleys on the right bank of the Yarkand river.

From Issok Su Aghzi I ascended the narrow Kulan Urgi valley, in which there are several Kirghiz encampments, to Zad, to check not only its longitude, but also that of Bazar Dara, with which it was connected by triangulation in the previous winter, and of other places dependent on that of Bazar Dara. On descending the valley from Zad, where I had spent two consecutive Christmas Days, we met the Kirghiz who had preceded me in crossing the Mamakul pass. Their yaks were so footsore that it was only with the greatest difficulty that they were brought back to Kulan Urgi, where they had to be left to rest at the first patch of grass. The Mamakul route was previously known only to one of the Kirghiz, and it is one which is but seldom used either by Tajiks or Kirghiz, the latter affirming that it is by far the worst known to them, and one which they would assuredly avoid for the future.

On reaching the small village of Tir, about 5 miles above the junction of the Kulan Urgi and Yarkand rivers, on December 29, it was stated that the ice on the latter river was not yet sufficiently strong to bear animals, so short excursions were made from Tir, up the Yarkand river to within sight of the limit of surveying done at Sanglash, then to the Kuramut Dawan, and lastly to the Sandal Dawan. Both of these

passes are exceedingly bad and stony. The approaches from both sides are up narrow and very steep valleys, then so full of slippery ice as to render the routes exceedingly difficult for ponies. The Kuramut Dawan, about 14,400 feet, is like the edge of a knife, and is equally bad on both sides; but the Sandal Dawan, about 16,000 feet, is less steep on the south side, this advantage over its neighbour being counterbalanced by the necessity of hauling ponies, yaks, and donkeys up two rocky places, divided by a small ledge on which only a few animals can rest at a time.

By the time these places had been visited and much topographical work executed under the most trying conditions of a very low temperature and biting cold winds, from which some protection was afforded by having a large numnah held up close to the plane-table, the Yarkand river, or Chiung Daria ("big river"), as it is called in this part of its course, was reported to be well frozen over in the necessary places, so the journey was continued northwards, the river being crossed and recrossed repeatedly, often on very clear and slippery ice. By making only short marches, the topographer was enabled to ascend some of the side valleys; cross the intervening ridges, offshoots from the Khandar range, from which good views were obtained; and rejoin the caravan, which kept to the main valley. From Langar northwards, this plan being quite impracticable, owing to the absence of all but the smallest of side valleys, and the precipitous nature of the high barren mountains on either side, pacing had to be resorted to, and was carried on to Kosarab.

This stretch of the Yarkand river is best known as the Zarafshan (literally "full of gold") river, but in practice only a little of that precious metal is found along its banks, chiefly between Kosarab and Ara Tash, but also in other places in very small quantities, and only when the river is in flood. The Danga Bash, or Tashkurghan river, as it is called during the latter part of its course, being still unfrozen on January 11, and far too deep to ford, it was necessary to follow its course for a short distance. In lat. $37^{\circ} 50' N.$, a few miles above the mouth of this river, the volume of which is, I should think, equal to fully one-third of the Zarafshan river, the track is too bad for laden animals. Hoping to avoid the necessity of off-loading, carrying the loads for 200 yards by men, and again loading up, the ice along the right bank was tried. It was, however, very rotten, and broke and cracked so ominously that it was necessary to retreat until the animals could ascend the bank. For some unexplained reason, the centre of the river, now unfrozen, contained a continually increasing number of miniature ice-floes, and in a couple of minutes after I had ordered the caravan to abandon the ice route and return to *terra firma*, a huge mass of thick ice came down the very rapid river, and became so firmly jammed between the ice extending from both banks, that the height of the river

speedily rose for a short time, until the rotten ice upon which the caravan had been a few minutes previously, broke up and allowed the floe to continue its course. Just as the caravan reached the bank a lot of villagers came to render assistance, which was much needed; but even with their help the caravan did not reach the tiny village of Oei Bekai, the last village in this valley, until after dark.

A couple of hundred feet above Oei Bekai the valley is so narrow and the right bank so precipitous, that it is necessary to cross to the other side. In spring and early winter the river is said to be fordable, but when we were there such a proceeding could not be thought of, owing to a dam of rotten ice having formed and raised the level of the river at the ford several feet. With the help of a few doors from the neighbouring houses and some baulks of timber, the two small gaps in this dam were bridged over, and the unladen animals crossed in safety; but so rotten was the ice that even men and unladen donkeys broke through the upper layer in many places.

Much as I wanted to continue up this valley and revisit Uchi, in order to have a fresh check on the longitudes, I was reluctantly compelled to abandon the project. The reported necessity of frequently crossing the Danga Bash river during four days was not pleasant; but my funds were now at such a low ebb that the combined pecuniary resources of the caravan were only just sufficient to cover expenses to Kosarab, where I expected a messenger to meet me with more money.

Leaving the valley of the Danga Bash river at Beldir, the route was up a narrow twisting and deep valley, which rendered it necessary to set up the plane-table very frequently. About halfway up this valley, close to a hut and shelter called Shoti, the valley is only a few yards wide, and in one place the track is supported by a rough scaffolding, so narrow that the ponies' loads had to be carried across by men, donkeys crossing in comparative safety with their loads. For some hundreds of yards the ice in this gorge, above the place where the track is supported by scaffolding, was so slippery, and the gradient so steep, that numerous steps had to be cut before the animals could proceed. Fine snow, which fell all day, rendered surveying on both sides of the Kesin pass (about 12,900 feet, the last pass to be crossed before reaching Kosarab) by no means pleasant; but the useful numnah, or felt rug, held up by a couple of men, kept the snow off the plane-table.

The march over the Kesin pass, on both sides of which there is plenty of grass, having taken much longer than was expected, owing to the troublesome gorge on the south side, we were forced to halt at the first inhabited house, the human occupiers of which kindly vacated it for me, but the other inmates—goats, sheep, some fowls, and a donkey—greatly resented being evicted, and seized the first opportunity to return. Whenever I went out some of the animals and fowls at once

rushed in, and as the process of re-erecting them raised so much dust that it was impossible to see across the solitary room, the thought of keeping them out for good was abandoned, and the dust washed down my throat with as dirty melted ice—the only available liquid—as I have swallowed for a very long time.

The next day we reached Kosarab, whence the Yarkand river was once more ascended for the last time, and a bivouac made at the most distant place that animals could proceed to, and the next day Ram Singh and I paced up to near the mouth of the Danga Bash river, thus completing the survey of the hitherto unknown part of the river known to the Chinese as the Jade river, and to others as the Raskam, Chiung Daria, Zarafshan, or Yarkand river.

The characteristic features of the country travelled through since leaving Uchi, are numerous very deep and narrow valleys, some cultivated, others so full of jungle that baggage-animals often proceed with great difficulty. The intervening ridges are very high and exceedingly precipitous, and are the homes of a few herds of ibex and burrhel, while chicore are numerous in the valleys. Between Nosh Tung and the Kulan Urgi valley eleven passes, averaging about 14,000 feet, were crossed in fourteen marches.

With the exception of a small patch of kamish grass in lat. $37^{\circ} 2' N.$, the valley of the Yarkand river from Surukwat northwards is destitute of grass, vegetation being represented by several clumps of trees, jilgan, and chekundo, which is largely used for adulterating the tobacco chewed by many natives.

Animal life is, with the exception of a few hardy lizards which can endure the great cold of winter and the fierce heat of summer, conspicuous by its absence; not even chicore or the common sparrow are found in this stony and barren valley bounded by bleak and bare mountains, generally of the steepest kind, rising to many thousands of feet above the river. In one place where the thickness of the ice on the river was measured, it was found to be 12 inches in mid-stream, and about 20 inches a few yards from the bank. The ice was in many places perfectly clear, sometimes smooth as glass, but occasionally its surface resembled the ripples on the sand after the tide has receded. It is only in the depth of winter, and then only for about six weeks from the beginning of the year, that it is possible to take animals along the valley of the Yarkand river, from near the west end of Raskam to the mouth of the Danga Bash river, and only in an exceptionally severe winter can they proceed direct to Kosarab.

Several circular, and as a rule vertical, cavities in the rocks, sometimes close to the water's edge, and occasionally above the highest flood-marks, attracted attention. The diameters of these cavities varied from about 15 to 24 inches, the height being sometimes nearly 6 feet. As a general rule they were neatly drilled, but that such a depth should be attained was certainly astonishing.

The minimum thermometer never registered any very low temperature, but still, after sleeping in the open for eleven nights, the average temperature being only a few degrees above zero Fahrenheit, good houses and cheery fires were decidedly much appreciated.

From Kosarab the Zarafshan river was once more followed down to where the Yarkand-Khotan road crosses it, a short excursion to the north side of the Sandal-Karamut Dawans being made from Chumdi, in order to execute topographical work which had to be abandoned during the previous winter on account of illness.

Much credit is due to Ram Singh, the sub-surveyor whom the Survey of India very kindly lent me, for carrying on mapping on the scale of 8 miles to 1 inch under very trying conditions, which seriously affected his health. The initial longitude was determined by triangulation from peaks previously fixed, and the closing error was ascertained by observation near Yarkand, at a place the longitude of which was arrived at in March, 1898, differentially from Trotter's observing-station in the Yangi-Shahr, and was checked by an occultation.

Good rates for the chronometer watches were obtained at eight places during the short journey, which, counting from the time I left Uchi until I reached Yarkand, lasted sixty-six days. The positions of thirty-two places were decided astronomically, and the longitudes of about twenty-six camps visited in the previous winter were carefully checked. As a general rule, latitude was determined by three sets to Polaris, and five sets to a south star, a 6-inch theodolite being used. The ordinary time observations consisted of two sets to an east star, and a similar number to a west star, but when observing for rating purposes, double the above number of sets were taken. Observations for magnetic deviation were also taken several times.

From Yarkand I now went to Kashgar, and while there measured a base of about 6 miles for the purpose of observing the mountain designated "Kungur" on the latest map of the Pamirs, better known as Curzon's map. This mountain is about 23,530 feet, or only 870 feet lower than Muz Tagh Ata, and, being almost exactly in line with the latter, effectually prevents it from being seen from Kashgar.

The absence of an escort for the British representative at Kashgar, Mr. G. Macartney, and his very strange official designation, which is far from being understood by the Chinese and others, impressed me very strongly as showing great neglect on the part of whoever is responsible for it. I feel very confident that, although Mr. Macartney at all times willingly did whatever he could for me in every way, it was solely owing to this most apparent want of official support from his superiors that his remonstrances about the treatment I experienced from the Chinese were ignored, and the promises made to him by the Taotai speedily broken. Owing to the opposition of the Chinese, chiefly of the Taotai, and their refusal to afford me due protection while

travelling in territory which, they repeatedly told me, is in their immediate jurisdiction, I was put to considerable extra expense. It was solely owing to the quite unnecessary hardship and exposure undergone during my second visit to the Polu gorge in June, 1899, that one of my men was killed, my journey considerably curtailed, and my own health so much affected that I was laid up in hospital in Simla for two months from rheumatism, etc., from which I have not yet recovered.

Soon after our passage through the Polu gorge with comparatively few casualties, a few men who were sent by the Amban of Kiria to destroy the track—a very easy task—by which we came, in order to prevent me from returning to Turkestan, overtook us while they were *en route* to recall a temporary post which had been established at Aksu—a positive proof that the latter place is undoubtedly in Chinese territory.

At the time camp 110 was reached there was not the slightest improvement in the health of Ram Singh, the sub-surveyor, who was quite unable to do any work; and as my own health was far from good, I most reluctantly decided to go to Ladak, now the only route by which we could leave Tibet. The direction taken was more or less the same as that by which we came from the Lanak La in 1896. Nevertheless, none of the Arguns who had accompanied me in 1896 were at all certain of the route, so I guided the caravan back to the Lanak La, and without having any necessity to refer to the map. Leh was reached on July 21, and as soon as the animals, which it had taken me a long time to collect, were disposed of, a move was made to Srinagar, and thence to Simla, where I remained for two months in the Ripon hospital.

Before concluding this, I fear, far too long paper, I should like to take the opportunity of expressing my heartfelt thanks to Colonel St. G. C. Gore, R.E., Surveyor-General of India, for the very great assistance so freely given to me at all times, not only by himself officially and privately, but by all the officers and officials of the Trigonometrical Branch of the Survey Department at Dehra Dun. Colonel Gore rendered invaluable aid by very kindly lending me the services of, in all, three sub-surveyors, to whom a very large share of credit is due for their skill, patience, and energy, often under most trying conditions. I shall always feel most grateful for this aid, and for the very great courtesy and assistance given to me by this department of the Indian Government, which, I believe, was as much as the regulations allowed. I should also like to tender my sincere thanks to the many other people who assisted me, especially to the Council of the Royal Geographical Society, Major G. Chenevix Trench, Mr. G. Macartney, C.I.E., Captain A. H. MacMahon, C.S.I., C.I.E., and Major W. R. Yeilding, C.I.E., D.S.O.

Before the reading of the paper, the PRESIDENT said: We have this evening to hear a paper on a previously unknown part of Central Asia from Captain Deasy,

and when I tell you that within the last few years he has correctly surveyed 40,000 square miles of new country, you will agree that he ought to receive a cordial greeting from a meeting of geographers.

After the reading of the paper, the following discussion took place:—

Sir THOMAS HOLDICH: It has given me very great pleasure to-night to welcome Captain Deasy back here again, and to hear what he has to say of his remarkable adventure. It is remarkable for more reasons than one, but chiefly for the careful attention he paid to scientific methods and to the scientific requirements of his expedition, so that he has made, as it were, almost a new departure in amateur, or, I might say, non-professional exploration. Other officers before Captain Deasy have taken the trouble to acquaint themselves with all that previous travellers have done in the fields of work to which they have gone, others also have taken care to secure the data necessary for their work, but few, and indeed I don't think any, have chosen such an exceedingly difficult ground for their experiments. Basing his work on the Pamir Surveys of 1895, Captain Deasy has shown us once again, if it were necessary, that it is possible to carry a triangulation across the most desperately difficult mountainous country, if only a man has energy enough for the incessant hard work of mountaineering, and ability enough, coupled with that intuition which enables him to recognize in a vast sea of mountains those particular points to which he has to make his observations. Difficulties like these are quite enough to stagger even a very experienced surveyor. However, Captain Deasy has willingly given up all the possible delights of shikar and the pleasures of unhampered travel to sacrifice himself conscientiously to the cause of scientific geography. Colonel Gore, the Surveyor-General of India, has told me that over all that extent of country which he has described, over 40,000 square miles, the scheme works out correctly, and more than this it is impossible for any man to effect. There is one point which is of peculiar interest to me, and that is the determination of the altitude of that great peak Muztagh-Ata, the great snow-mountain that Sven Hedin unsuccessfully endeavoured to ascend. He got very near the top, but failed to reach the summit. While we were in the Pamirs, it was never clear enough for us to be positively certain whether we had taken observations of the highest point of that mountain, but Captain Deasy's work sets the question at rest, and we know for certain that Muztagh-Ata is so far the highest point fixed north of the Himalayas, and it must remain at present king of the mountains of the trans-Himalayan country.

There is another aspect of the question, which one cannot go very much into in this place, and that is the political advantages which may arise from Captain Deasy's work. At the close of the Pamir Boundary Commission there was still a region in which international interests might be regarded as in a nebulous condition, to the east of the Pamirs, and as the time will certainly come when these questions will have to be settled, it must be of enormous advantage to the Government to be able to act on a basis of something like certain geography instead of making agreements based on geographical guesswork.

There is no doubt others, beside myself, will have something to say about his most interesting work. I will only say, from a surveyor's point of view, I consider the work done one of the most important contributions to scientific geography in Asia that we have had of late years.

Captain KENNION: The very modestly written paper to which we have just had the pleasure of listening, describes in a very compressed way Captain Deasy's wanderings during the space of two years in one of the most inhospitable regions of the world. It has been very interesting, but I think we must agree that, considering the distance covered and the time spent in almost continuous travelling, it has

been all too short. I hope he may later afford us an opportunity of reading an account of his travels in an amplified form.

The point about Captain Deasy's work which will, I think, specially appeal to the Fellows of this Society, is the thoroughness with which he explored the country he selected for his travels; unlike many travellers, who take a bee-line through a more or less unexplored country to the place they have set before themselves as a goal, and then simply hurry back to England to tell people what they have done, Captain Deasy not only explored but scientifically mapped the whole of the district he travelled over, linking it up with the triangulation system of British India, so that there now remains little or nothing to be learnt about this country from a geographical point of view.

There is one remark of Captain Deasy's about which I should like to say a few words. This is where he expresses a hope that the status of the British representative at Kashgar will be raised by furnishing him with an escort presumably of British-Indian troops. I gather that he would also be glad to see the establishment of what may be called a sphere of British influence in Chinese-Turkestan. I cannot myself agree that the large expenditure involved would be in any way justified or followed by corresponding advantages. Mr. Macartney's duties in Kashgar are, like my own in Leh, mainly connected with the trade between British India and Central Asia. Though at one time there were hopes that this trade would attain considerable proportions, it is now quite clear that these hopes will never be fulfilled; the trade is declining year by year, and the causes of the decline are such as seem to admit of no remedy. The reasons of the decline are Russian competition fostered by bounties and the near approach of Russian railways. It is also due to taxation imposed by the Government of India on the importation of the hemp drug known as charas, which has been the staple export from Chinese Turkestan to India. This drug is extremely injurious to those addicted to its use, and the action of the Government of India in this matter cannot be considered as other than wise and beneficial.

In spite of the hopelessness of the task, very strenuous efforts are, of course, being made by the Resident in Kashmir to promote this trade by every legitimate means, but, as I said before, no great measure of success can be hoped for.

From a political point of view, I must say I see no object in trying to create a British sphere of influence in Chinese Turkestan. Buffer states are all right in their place, but five years' residence in the Himalayas at Gilgit, at Chitral, and at Leh, has convinced me that none is needed here, and that nature's formidable barriers are themselves ample protection to India on the north. If doubt still lingers in any one's mind on this point, it should be dispelled by the lessons of the present war. As a matter of fact, so far from British prestige being on the wane in Chinese Turkestan, it was never higher than it is now. I lately received a letter from Mr. Phelps, who has gone to shoot big game in the Tian-shan mountains. After describing the enthusiasm with which he and his fellow-traveller were received in Yarkand, all the merchants of the place turning out to escort them into the city, he says, "We could not help feeling proud of being Englishmen."

I do not think this looks as if British prestige is on the wane. Nor is it. Although in my opinion a moribund trade cannot be built up, I believe there is a far more hopeful field for energetic commercial action open to us in Tibet. This country is as a market, to all intents and purposes, of virgin soil. It is as much outside the Russian sphere of influence as Chinese Turkestan is outside our sphere. Its commercial capabilities are, I believe, greater than has hitherto been suspected, though one traveller, Captain Bower, in his book, dwells at some length on the magnificent prospect which would be open to Indian tea-growers, if the prohibition against the import of the Indian leaf were to be removed.

The commercial invasion of Tibet is not by any means so outside the sphere of practical politics as is generally believed. Last autumn I visited the town of Rudok. I believe I was the first Englishman to do so, and whilst there had some long talks with the governor of the place, a by no means unintelligent Lhasan official. Though he had perforce, for his own safety, to maintain a hostile and irreconcilable attitude, he had no real antipathy to Europeans, while the common people, who are born traders, were delighted to see me, and considered the advent of an Indian official in their midst as the commencement of a new era of prosperity for them.

The generally hostile attitude of Tibetans to Europeans is entirely due to the efforts and orders of the Lhasan priesthood, who fear for their supremacy if British influence were once felt in Tibet. No one who has any knowledge of this extraordinary organization can doubt that this would be a result much to be desired, in the interests of those crushed beneath the tyranny of the monasteries.

Even the opposition of this priestly class is, I believe, by no means so insuperable as is generally imagined, and I feel sure that if steady pressure is brought to bear upon them in the numerous ways possible, the closed doors of Tibet will soon begin to turn on their hinges. I fear I have strayed somewhat from the realms of pure geography, and must conclude, but in doing so must express a hope that Captain Deasy will again find his way out East, and will then turn his attention to the exploration of some of the unknown regions of this country.

The PRESIDENT: Sir Thomas Holdich has given us a very clear idea of the value of Captain Deasy's scientific work during his explorations. It is now thirty years since we began to receive geographical accounts of these regions, then called the dominions of the Usbeg, or Ghazsie, from Mr. Hayward and Mr. Shaw, and since that time we have had the accounts of a great number of travellers in this region. It is therefore very high praise, but most deserved praise, to say that Captain Deasy's work, certainly as regards the resolution and determination he has shown, and the value of his scientific work, can be compared with and is equally as good as that of previous travellers—I say it is saying a great deal when among those previous travellers are such men as Younghusband and Littledale.

It was only by the aid of his photographs that we could form even a most distant idea of the difficulties of what he calls roads, that look much more like walls with flies crawling up them than roads suited for the passage of yaks and mules. But nothing seems to have stopped him in his determination to explore the upper valley of the Yarkand; and we must all congratulate him most sincerely on the success of his most difficult expedition. In moving a vote of thanks to Captain Deasy, I think we must include, not only his most interesting paper, but also his kindness in showing us these clear and excellent photographs, and also, I think, for the pains he has taken that his delivery should be so clear and distinct.

NOTE ON THE MAP.—This map is a reduction from sheets 1 and 2 of "Map of portion of Tibet explored by Captain H. H. P. Deasy, 16th Lancers, in 1896," and of sheets 1 to 5 inclusive of "Map of Portions of Western China and Tibet, explored by Captain H. H. P. Deasy in 1897-98-99," which were published under the direction of Colonel St. G. C. Gore, R.E., Surveyor-General of India. These sheets were compiled in the Trigonometrical Branch Office, Dehra Dun, by J. Eccles, Esq., M.A., Superintendent Survey of India, from the original records of Captain Deasy's exploration.

The longitudes on the eastern portions of this map are based on the following points of the Great Trigonometrical Survey of India, viz. Tartary No. 1 peak, Tartary No. 2 peak, Mangtza Lake No. 1 Peak, and Kiun (Kwen) Lun No. 2 peak.

and on the western portion they are based on Pamir 5 h and Taghdumbash h of the Pamir triangulation. The longitudes were extended as far as possible by triangulation, and when this was no longer feasible chronometric values were employed; they are referable to the Greenwich meridian, taking that of Madras Observatory $80^{\circ} 17' 21''$ E., and they require a correction of $-2' 34''$ to make them accord with the most recent value of that observatory, viz. $80^{\circ} 14' 47''$ E. The latitudes employed throughout were astronomically determined.

The heights in the eastern portion of this map are based on the fundamental height of Camp 3 of 1896, which was obtained from a series of observations with a mercurial barometer at various camps, the relative heights of which had been determined by triangulation. The observations were computed differentially from Leh by means of simultaneous observations recorded there. In the western portion they are based on the heights of the Pamir Triangulation. A six-inch transit theodolite was invariably employed.

AN OROGRAPHIC MAP OF AFGHANISTAN AND BALUCHISTAN.*

By Colonel Sir T. H. HOLDICH, K.C.I.E., C.B.

THE orographic map of Afghanistan and Baluchistan which is published in this number of the *Journal* is designed to illustrate, on a sufficiently small scale to be readily appreciable, the main structural characteristics of that part of Asia which lies to the west of the central Tibetan and Pamir plateaus, and the general analogy which exists in the construction of the two areas. To illustrate this structural relationship more fully, I will refer shortly to the views held by those modern geographers who have had the best opportunities of examining the mountain masses to the north of India, on the subject of the Himalayan conformation. These views are well epitomized in the articles on "Asia" and the "Himalaya," contributed by Sir R. Strachey to the 'Encyclopædia Britannica.' Although these articles were written many years ago, the researches of such recent observers as Godwin-Austen, Lydekker, Griesbach, Oldfield, and Tanner have adduced nothing which greatly modifies or affects the opinions therein expressed. Sir R. Strachey points out that "the Himalaya, with its prolongation west of the Indus, constitutes in reality the broad mountainous slope which descends from the southern border of the great Tibetan tableland to the lower levels of Hindustan and the plains of the Caspian; and that a somewhat similar mountain face, descending from the northern edge of the tableland, leads to another great plain on the north, extending far to the eastward, to the northern borders of China. Towards its north-west territory this great system is connected with other mountains—on the south with those of Afghanistan, of which the Hindu Kush is the crest, occupying a breadth of about 250 miles between Peshawar and Kunduz; . . . nor can any of the numerous mountain ranges which constitute this great elevated

* Map, p. 596.