

the Polar Basin. One could with certainty foresee that it might then be possible to go farther than in summer. There was a possibility that one might at that season be able to penetrate very far, perhaps to some land lying north of Spitzbergen, which might hereafter serve as base from whence to push still farther onward. These considerations constituted the ground for the plan of operations of the latter portion of the Swedish expedition, and it may now be considered as proved.

That one may, during autumn, reach by ship a latitude considerably higher than that which has been attained by most of the summer expeditions is possible ; if this year had not been unusually unfavourable with regard to the condition of the ice, we might in all probability have proceeded a considerable distance farther, perhaps beyond 83° N. lat. But we have at the same time convinced ourselves that, even in autumn, further progress is soon rendered impossible by impenetrable masses of broken ice. The voyage itself, moreover, at that season of the year, in consequence of the cold, the darkness, and the boisterous winds, accompanied by snow-storms that at that time of the year are prevalent in the Polar Basin, and the heavy sea amidst masses of drift-ice caused by these latter, is rendered so dangerous that the risk to which the traveller exposes himself is far from being compensated by the meagre prospect of success. The idea itself of an open Polar Sea is evidently a mere hypothesis, destitute of all foundation in the experience which has already by very considerable sacrifices been gained ; and the only way to approach the Pole, which can be attempted with any probability of succeeding, is that proposed by the most celebrated Arctic authorities of England, viz., that of—after having passed the winter at the Seven Islands, or at Smith Sound—continuing the journey towards the North on sledges in the spring.

IX.—*Report of the Trans-Himalayan Explorations during 1867.*

By Captain T. G. MONTGOMERIE, R.E., of the Great Trigonometrical Survey. From the Original Journals, &c., of the Trans-Himalayan Exploring Parties.

Read, April 12, 1869.

THE Trans-Himalayan explorations made during 1865-66 from the Mansarowar Lake to Lhasa, supplied various pieces of information as to routes and places in Tibet of which the names

were unknown in India. Tibetans had been heard to talk of their gold mines and salt mines, and the position of some of the latter was indicated roughly on European maps; but our knowledge of all such places was vague in the extreme, though the Tibetans certainly do bring both gold and salt. The first Pundit heard of these places whilst in Lhasa, and the second Pundit, when at the Gartok Fair, heard various particulars, from which he gathered that the route to those gold-fields east of Gartok was likely to be feasible.

It will be remembered that the second Pundit made his way to Gartok in 1865 by one route, and returned by another; thus connecting that place with points in British territory on the south that had been fixed by regular survey. There, however, still remained a large gap between Gartok and the Ladak territory, which latter had also been surveyed. It appeared to me very desirable that this gap should be filled up, the more especially as it embraced a portion of what was said to be the course of the great River Indus, a portion, moreover, that had never been traversed by any European.

The information I received, during the prosecution of the survey of Ladak, as to the Indus, led me to think that there was a large eastern branch of that river, and I was confirmed in that opinion by the reports of the surveyors who sketched the extreme south-east of Ladak.

Owing to the great jealousy of the Tibetans the surveyors could not make their way very far beyond the frontier; the fact of their being engaged on the survey of Ladak arousing the suspicions of the Tartars so much that a regular watch was established the moment a surveyor approached the frontier. Nevertheless the ground was sketched to some distance beyond, and peaks were fixed at a still farther distance by the theodolite.

The natives pointed out the position where the eastern branch came in, and a gap seen in the mountains in that direction made its existence highly probable. Having this information, it seemed to me very desirable that the question as to the existence or non-existence of this branch should be settled. I consequently determined that the second expedition of the Pundits should be in that direction: the first object being to settle various doubtful points as to the position of the Upper Basin of the Sutlej; the second object, the question of the eastern branch of the Indus; the third, the connection of Gartok with the regular survey in Ladak, and the fourth, to explore up to the gold and salt mines east of Gartok, and as far beyond as the Pundits could get in an easterly direction. The latter being with a view to gain some knowledge of the vast terra incognita lying

between the desert of Gobi and Lhasa. Preparations for the expedition were made during the spring of 1867. A third Pundit was entertained and trained to supplement the place of the second Pundit, who had proved to be somewhat wanting in nerve. Starting from Mussoorie on the 2nd of May, the party under the first Pundit reached Badrinath on the 24th of May, and Mana on the 3rd June. The Mana Pass to the north had not been declared open, and the party had consequently to wait at Mana. Whilst there several heavy falls of snow occurred on the neighbouring mountains.

The Pundit found that, before his party could cross into Tibet, it was necessary that the opening of the pass should be formally notified by the Tibetan officials; and, before this is done, the Jongpon (or Zungpong) of Chaprang makes inquiry every year as to the political and sanatory condition of Hindustan. The inquiry seems to be carried out with all that assumption of lofty superiority for which Chinese officials are famous. Looking down from their elevated plateaux, they decide as to whether Hindustan is a fit country to have intercourse with. The decision come to appears not to be at all a dead letter, for, as will be seen hereafter, it ultimately affected the Pundit's movements not a little. The especial inquiries made are as to whether there is war, epidemic, famine, &c., such as are in any way likely to affect Tibet.

During his stay at Mana the Pundit made complete arrangements for their journey, and he gave the third Pundit some farther practice in route-surveying. Whilst there he was also fortunate enough to secure the services of three men, viz., of a Bisáhiri trader, a resident of Badrinath, and a Ladaki trader from Zaskar. All these men knew the routes to the gold and salt mines east of Gartok. They proved, moreover, exceedingly useful in collecting provisions, servants, and asses; the latter for the carriage of the small parcels of merchandize which formed the ostensible object of their journey. On the whole the halt at Mana was a decided gain to the party.

At length, on the 9th of July, three men, sent by the Jongpon of Chuprang, arrived, and, having made all their inquiries, declared the Mana Pass open to traders from Gurhwal. The party accordingly was able to commence its march on the 26th July. It consisted of eleven men, twelve asses, and one pony, the men being all armed with weapons they had borrowed at Badrinath, as they were told that arms would be required to keep off robbers. On the 28th they crossed the Himalayas by the Mana Pass (18,570 feet), and on the 29th July reached Lumarti Camp. Here they were told to halt until more traders

joined them, so that the Tibetan officials might be saved trouble by examining and taxing a number at the same time. The second Pundit, however, was sent on ahead to intercede with the Chuprang Jongpon, and he succeeded in getting authority for the party to advance alone. Churkong is the place where traders are generally taxed, but in this instance the examination was made at Barku. The Abtuk of Chuprang searched the baggage, fortunately without discovering the instruments; and, being satisfied that the party was a trading one, he levied the taxes at the usual rates.

On the 6th August the party reached Totling, passing the small town of Chuprang on their left (north). At Totling they put up in the monastery, the monks (Gelonges or Dabas) allowing all travellers to do so. The monastery, with its numerous dykes of stones is about one mile in circumference; it has fifty to sixty monks attached to it, the head one bearing the title of Ling-Khambo. Between Mana and Totling there is no cultivation of any kind, but at Totling itself a grain called nai (barley) is sown in April, and reaped in September. From Totling the party advanced direct towards Gartok, crossing the Sutlej by a remarkable iron suspension bridge 76 feet span, 7 feet wide, and about 40 feet above the water. The chains are formed by links of iron, of the shape of the figure 8, each about one foot in length, the iron being over one inch square. The bridge is said to have been built by Gyalpo Kesar or Sekundar Badshah (Alexander the Great!) The iron is in capital preservation, owing to the very small rainfall, and to the care with which it is annually lubricated with butter (ghee.)

After crossing the Sutlej, the Pundit and his party all assumed the costume worn by Bisahiri traders.

On the 9th August they crossed the watershed between the Sutlej and the Indus by the Bogola Pass, 19,220 feet above the sea, and reached Gugti Camp, close to Gartok, on the 11th instant, avoiding the latter place, lest its officials should in any way interfere with their onward progress. Continuing their journey they ascended the mountains east of Gartok, and, after crossing the Gugti-la Pass, 19,500 feet above the sea, they found themselves on the 14th August on a vast desolate plateau, the lowest points of which they ascertained to be 15,280 feet above the sea.

This plateau is called Chojothol or Antelope Plain, from the great number of those animals seen on it. On the 16th they reached a small lake, covered with ducks and other wild fowl. On a-head no signs of a path, or of either houses or tents, were to be seen, and the party became anxious as to fresh water,

which was said to be very scarce. It was not till the evening of the second day that they came upon fresh water.

Several very brackish lakes were passed, so intensely salt that even the wild fowl avoided them. No potable water could be got till they found a glacier and melted its ice.

On the 10th they crossed the Pabha-la, 17,650 feet above the sea, and descended to the Giachuruff camp, on the banks of the Singh-gi-chu, or Indus River, 15,730 feet. After the desolate and arid table-land they had crossed, the sight of the river and its fresh water, and of the large camp beyond, was at first very pleasant to the Pundit's party; their pleasure was, however, soon damped, as they found the inhabitants of the camp very suspicious as to the object of their journey; their progress being for the first time impeded by the officials. Gopa Tajam, the head-man, questioned them as to the objects of their journey, and as to who and what they were, &c. When told that they were Bisáhiris, who had come there solely to sell coral and purchase shawl wool (pushm) in exchange, he told them flatly that he did not believe their story. With great correctness he then proceeded to point out the proper country of each individual, and said that if they had been really all Bisáhiris, and had been lately in Bisáhir, they would never have dared to enter Nari Khorsum that year, as an order had been promulgated at the time of opening the passes, forbidding Bisáhiris to enter the country on any account, as they had in the previous year introduced small-pox, which proved fatal to many of the inhabitants. The head-man, moreover, hinted that the party had introduced Europeans into the country.

These expressions being so strongly expressed, alarmed the Pundits, more especially as they never thought that the disguise of a Bisáhiri, which had served them so well on the route to Lhasa, would prove a hindrance on this occasion.

The Pundit thought these suspicions were due to the jealousy of an acquaintance of his, who lived near Badrinath. However, by repeated protestations, he managed to bring the head man round to a partial belief in their story, so that he at last consented to allow a portion of the party to proceed onwards, provided the remaining portion was left as a hostage for their good faith.

As the second Pundit's nerves were again considerably shaken by the dreary mountains they had crossed, and by the check they had received, the first Pundit decided to leave him at Giachuruff, whilst he and the third Pundit pushed on a-head, on the pretence of selling their coral. Whilst preparations for this purpose were being made, the head-man's suspicions began

to gather again, and it was only after farther entreaties, accompanied by presents, that they were allowed to advance. The Pundit left the Giachuruff camp on the 22nd August with the third Pundit; but the latter was, very soon after starting, detached with one servant to carry a route-survey up the river Indus as far as he could get. The Pundit himself made a very long march, so as to get well clear of the Giachuruff people, and by night was far away to the east, resting near the bed of a small dry stream. On the 23rd of August he hoped to be able to cross the Chomorang Range, but owing to a very heavy fall of snow, he was obliged to halt at a camping-place below it. Snow continued to fall on the 24th and 25th, and he was not able to continue his march till the 26th of August, when he crossed the Chomorang-la Pass, 18,760 feet above the sea, and after a long march, crossing a good deal of snow, he reached the large camp of Thok-Jalung,* the chief gold-field of that part of the country.

As the Pundit descended the Chomorang-la Pass, the Thok-Jalung camp came in sight, he found it pitched in a large desolate plain, of which the prevailing colour was reddish brown. As far as he could see, it at first appeared to be like other Tibetan standing camps, except that it was very much larger. As he got closer he made out the noise of a great number of voices singing together, and on his arrival found that this came from the gold-diggers and their families, whilst the men were at work.

The Pundit had armed himself with a letter from the Giachuruff chief, and this he presented the next day to the Thok-Jalung chief, with a small present of the best Indian tobacco, which he had somehow discovered to be a particular weakness of that individual. The chief received the Pundit in his large tent; he was much gratified by the present, but in spite of that and the letter, it was evident from his manner that he did not think that matters were quite right. He cross-questioned the Pundit, and then advised him to do what he had to do in Thok-Jalung quickly, and to return to Giachuruff by the same road as he came. The chief said that it was out of his power to allow the Pundit to stay long, and that properly he ought to have sent him back at once, as there was an order in force forbidding all Bisáhiris to enter the country that year.

Hearing that the Pundit had coral for sale he asked to see it. As soon as it was displayed the chief's wife, who was present, took such a liking to it, that she persuaded the chief to offer

* See the map in *Journal R. G. S.*, vol. 38, p. 129:

gold in exchange. The Pundit thought his only chance was to acquiesce, and he did so, making, as he afterwards found out, a very bad bargain. Having given up his coral, the Pundit was allowed to retire.

The chief was an inhabitant of Lhasa, called Yoodak Ming-már, about forty-five years of age. He had been master of the Thok-Jalung gold-fields * for some time. The Pundit saw him several times afterwards, and always found him very civil. His usual dress was a red robe of Lhasa or Shigatze manufacture, his head was covered with a brown felt hat, of Chinese fashion, with a broad rim turned up all round. He told the Pundit that he and every one else wore furs in the winter, and that they could not live at that season without them, which is no doubt correct, as the Pundit's observations made the gold-field to be at the great altitude of 16,330 feet above the sea. His tent was a large circular one, about 25 feet in diameter, with two poles; it was pitched in a wide pit some 7 or 8 feet below the surface of the ground, and the descent to it was by means of steps. Outside the Pundit noticed one of the gigantic black dogs of Lhasa. This beast was tied unpleasantly near the door, and was so savage that there was great difficulty in preventing him from flying on strangers. The Pundit had seen many of these dogs in Lhasa, and he at once recognised it by its great size, deep jowls, and the white mark on its chest. The Lhasa people call them Gya-ki, or royal dogs.

The tent was made of black yaks' hair; it contained bales of shawl-wool (pushm), leather packages of tea, strings of dried beef from the yak, and a few other Tibetan luxuries, such as dried apricots, currants, &c.; the poles were garnished with several match-locks and a sword. The chief's seat was beside a small box, in which there was a drawer containing paper, pen, ink, and a couple of cups or bowls, one for drinking tea, and the other for chung or whisky. The chief's tent seem to have also been the shrine of the camp, as behind his seat there were piled up the usual images, small brass bells, tiny vases, books, pictures, † lights, &c., that are carried about by wandering Buddhist Lamas. Whether the chief was also a Lama was not ascertained; but his red dress, and the ritualistic instruments point to that conclusion.

The chief was constantly smoking a silver-mounted Nepalese hookah. Tea was forthcoming at all hours. He had about

* From previous information it appears that gold was first discovered to be abundant at Thok-Jalung about eight or nine years ago.

† Quaintly painted on cloth, many of that kind can be seen in Ladak at the Hemis and other monasteries.

ten personal servants, who lived in small tents round about his own. The chief was a very intelligent man, and, all things considered, the Pundit thought him well informed. His shrewdness there was no mistaking, as instanced in the matter of the coral. He noticed the Pundit's box, examined it carefully, and then asked him how he came to have such a good box. The Pundit was fortunately ready with his answer, and said he bought it at one of the "Saheb logues" auctions, to carry his coral in. The fame of these auctions had reached even this Tibetan chief, and he expressed himself as quite satisfied, allowing the box to be removed, without discovering the large sextant, which was stowed away in a secret compartment. The chief took a great liking to the Pundit, and used to send for him every now and then, in order to discuss over tea and tobacco the great country down below.

The Pundit found the part of the gold-field that was being worked to be a great excavation from 10 to 200 paces in width and some 25 feet in depth, access to the bottom being by means of steps and slopes, the earth as dug out being thrown upon either side. The excavation at the time of the Pundit's visit was about a mile in length. The digging is carried on with a long-handled kind of spade, and occasionally with an iron hoe; the iron for these implements is brought from Bisáhir, Ladak, &c. The camp had a blacksmith who could repair these tools.

A very small stream runs through the gold-field, and the bottom of the excavation is consequently rather a quagmire during the day-time; but the stream is put to good use for washing the gold out of the soil. The diggers dam up the water and leave a sloping channel for it to escape by. A cloth is spread at the bottom of the channel and kept down by a number of stones so as to make the bottom uneven. One man brings earth from the excavation and sprinkles it over the channel, whilst another man drives water down the channel by means of a leather bag. The water carries the lighter soil right away, but the pieces of gold fall into the uneven places, and are easily collected in the cloth by lifting up the stones. The yield of gold seems to be large and the finds occasionally very heavy—the Pundit saw one nugget of about 2 lbs. weight (75 tolahs). The diggers say they can recognize the soil that contains gold at once; but, judging from the large number of gold-fields that have been used at one time around Thok-Jalung, and are now more or less abandoned, the Tibetan gold-diggers seem to be quite as capricious as those of Australia or California, and the probability is that whenever they are a long time without getting

good finds they strike their camp and move off to what they think a more tempting field.

From what the Pundit heard during this last expedition and the previous one to Lhasa, there is a whole string of gold-fields extending all the way from Lhasa to Rudok along the route which must run close to the northern watershed of the Brahmaputra, probably in the depression to the north of it. The gold-fields are carefully watched by the Lhasa authorities, a gold commissioner, called Sarpon,* superintends the whole of them, and each field has a separate master. Any individual is allowed to dig, provided he pays the annual tax of one sarshoo weight of gold, which is about $\frac{1}{2}$ a tolah or $\frac{2}{5}$ ths of an ounce. The greater part of the diggers come from the Chung province around Shigatze. The gold commissioner makes an annual tour through the gold district, visiting each field and collecting the taxes.

The Pundit says that in all his travels he never experienced such intense cold as he did at Thok-Jalung, owing, as he thought, to the high cold wind that was always blowing, more than to the great elevation, viz., 16,330 feet above the sea. The tents of the diggers are always pitched in pits some 7 or 8 feet below the surface of the ground, so as to keep out the wind. Spite of the cold, the diggers prefer working in the winter; and the number of their tents, which in summer amounts to 300, rises to nearly 6000 in winter. They prefer the winter, as the frozen soil then stands well and is not likely to trouble them much by falling in.

The water near Thok-Jalung is so brackish that the diggers cannot drink it till it has been frozen and then re-melted. Considering these difficulties about water, the great elevation, the total absence of wood, and the general severity of the climate, gold-digging at Thok-Jalung is carried on under very much greater difficulties than in any other part of the world. Nevertheless the diggers appeared to be cheerful, and were constantly singing, their families joining in a sort of chorus, which could be heard at a great distance.

Argols of dried dung from the yaks, ponies, and sheep, &c., form the only fuel. The Tibetans cook and eat three times a day, their food consisting chiefly of boiled meat, barley cakes, butter-milk, and tea stewed with butter. The Pundit said the Tibetans all preferred China tea, and did not approve of Himalayan, tea spite of its price; they vowed the latter was too heating for them, and that only very poor folks take it.

There was no attempt at masonry in the whole camp; the

* Sar is the Tibetan name for gold.

only apology for it being a square churtan of dry stone, plastered with white earth, and surmounted with a pole and flag.

At the foot of the mountains round about, the diggers had collected 7 or 8 piles of white stones (probably quartz), and on the bare slopes they had also picked out with white stones the letters of the sacred sentence "om mani padmi hom," on such a gigantic scale that it could be read at a great distance. The sentence was repeated in this way over and over again.

The diggers all eat yaks' flesh, and they are said to get over their Tibetan scruples by strangling their tame yaks; but they, nevertheless, do not object to wild animals, yaks, asses, &c., that have been shot.

The Tibetans say that eating roasted meat impedes their breathing, and that fresh milk has the same effect; they consequently forbid both and invariably eat boiled meat, throwing away the water in which it is boiled and drinking butter-milk. They extract their butter (ghee) from the milk of yaks, goats, and sheep. Their tea is invariably stewed with butter. The meal they use is generally barley meal.

The position in which Tibetans sleep is a most extraordinary one; they invariably draw their knees close up to their heads, and rest on their knees and elbows, huddling every scrap of clothing they can muster on to their backs. Those who are better off rest in this manner on a sort of mattress that rises towards the head; and the poorer people in standing camps generally manage to get a suitable slope on the mountain side, or to arrange stones and earth so as to rise in the same way; but rich and poor adopt the same position for sleeping. The Tibetans employed in Ladak by the Survey, though provided with tents (shouldaries) invariably slept in the way described above, arranging themselves in a circle round the tent. This position is most probably adopted in order to secure as much warmth as possible for the stomach, the thighs pressing against it and thoroughly excluding the external air. The gold-diggers smoke a great deal, using brass, zinc, or iron pipes, the latter being most common.

The Pundit mixed freely with the gold-diggers and observed all their ways and habits, but his time was limited. The chief, spite of his friendly conduct, insisting that he could not let him stay beyond the 31st of August. He ascertained that the price of the gold at Thok-Jalung was only Rs. 5½ to Rs. 6 in silver per saishoo (which weighs about a half tolah and 8 ruttees), or rather less than Rs. 30 per ounce. There were two tents belonging to goldsmiths in the camp; they came from the Chung or Shigatze province. Seeing no chance of extending his journey

to the east of Thok-Jalung, the Pundit retraced his route to Giachuruff; there he found the 3rd Pundit, who had made his way for a considerable distance up the River Indus to a place called Jiachan.

Though the 3rd Pundit had heard that a large band of mounted robbers were wandering about the Upper Indus, he was in no way hindered by them till he reached Jiachan. There, however, whilst he was down at the river, a couple of armed robbers fell upon his servant, an oldish man, and knocked him over, seizing a thermometer and the coco-nut containing the supply of quicksilver. Fortunately the Pundit was not far away, and hearing the cries he rushed to the rescue, seizing one of the robbers by his pig-tail, he swung him round and took back the stolen things. This 3rd Pundit, being a tall, powerful man, completely turned the tables, and the robbers pretended that they had only been joking with the old man, and did not really mean to take anything. The robbers made off as soon as they could, and the 3rd Pundit, thinking they might bring down more of their brethren on him, decided to retrace his steps. He was very reluctant to do this, as, from all he could hear, 3 or 4 marches more at the outside would have taken him to the source of the Indus, which at the farthest point he visited was still a good-sized stream. He was, however, certain from the peculiar head-dress of the robbers that they belonged to the armed band he had been warned against—the head-dress being one peculiar to the nomadic inhabitants of the Shellifuk and Majin districts, who are noted as professional robbers.

The whole of the Pundit's party having been re-collected at Giachuruff, he decided to trace the Indus down to its junction with the river upon which Gartok stands. Starting on the 4th September, they marched steadily down-stream, passing numerous camps, with their flocks and herds, but seeing no cultivation or villages till the 7th, when they came to a small village with the first patch of cultivation. All along the banks there was a low bushy jungle. The grass appears to have been abundant, and near one camp there was a herd of 500 or 600 horses or large ponies running almost wild, mostly of a white or a greyish colour. On the 12th September they reached the junction of the Indus and Gartok rivers, and, crossing the latter, encamped near the Lujan-Chumik spring.

From Lujan-Chumik the Pundit sent the 3rd Pundit to trace the river down into the Ladak territory, whilst he traced it up to Gartok. On the 14th September he reached Gar-Gunsa, the winter residence of the Gartok authorities. He found only three large and eight small houses in it, and was informed that the

rest of the inhabitants lived in tents. All along the banks of the river he found the grass tall and luxuriant. The valley all the way up was flat and wide.

On the 16th September the Pundit reached Gartok,* where he found a camp of about 200 tents, mostly belonging to traders. On his arrival he was alarmed to find that some one had been spreading reports as to his being in British employment, and he found it advisable to hasten his return. Choosing a new route, he got separated from his baggage and the greater part of his party, and had he not fallen in with traders from Shipki, he would have been put to very great hardships. He crossed by the Laochia Pass, and marching by Shiang and Dunkhar, reached Totling on the 26th of September. Here they waited for the 3rd Pundit, who joined them on the 29th of September, after having traced the Indus down to Demchok, in Ladak. From Demchok he crossed from the basin of the Indus to that of the Sutlej by a very high pass, and carried a route-survey down to Totling.† From Totling the 2nd and 3rd Pundits were sent down the Sutlej to Shipki, tracing the river as closely as they could. From Shipki they carried a route-survey in a southerly direction, crossing the Himalayas by a high pass and descending to Nilung on the upper course of the Ganges.

The Pundit himself returned from Totling to Badrinath by nearly the same route as he advanced by, only making one small variation. Ultimately the 2nd and 3rd Pundits rejoined the 1st, and they all made their way down into British territory by the beginning of November.

The geographical results of the exploration can be seen at a glance from the map (in Journal, vol. 38). They account for the geography of about 18,000 square miles, founded on 850 miles of route-survey with 80 heights. The routes are checked by 190 latitude observations, taken at 75 different points.

The course of the Sutlej River has been roughly traced from Totling down to Shipki, on the border of British territory. Hitherto there has been no survey of any kind of this portion, and the route, though only actually touching the river for a short distance, was carried near enough to it to enable the Pundits to lay down its probable course very closely. The position of Gartok, as determined by the two routes of the last expedition, has been confirmed by a third route carried up from Badrinath.

* Gártok is said to be a corruption of Gártod,—*toḍ* meaning "upper;" it is also called Gár Yár-Yársá,—Yársá meaning "summer abode," from *Yársa*, "summer," and *sá*, "abode." The winter-quarters are called Gár-Gunsá, from *Gunga*, "winter," and *sá*, "abode."

† The portion between Medokding and Totling was previously traversed by Captain Henry Strachey.

The mean of three gives a very good longitude of Gartok,* as has been proved by the farther route-survey carried from Gartok to Demchok, which latter had been previously fixed by the regular survey operations in Ladak; the longitude by the route-survey only differing from that of the regular survey by $2\frac{1}{2}$ minutes—a very satisfactory result from a route-survey † traversing 160 miles direct over such a very rough tract of mountains.

The routes have also defined the courses of both the upper branches of the River Indus from near their sources to their junction, and the conjoint stream from that point into Ladak. Neither of these branches had been previously surveyed in any way, except a small portion of the Gartok branch above Gartok, which had been roughly laid down by Moorcroft.

The existence of the eastern branch was doubted by many geographers,‡ as no Europeans had ever seen it. The Pundit's route has now proved that this eastern branch is the main stream known to the natives as Singh-gi-Chu or Singh-gi-Khamba (Lion's mouth), the River Indus itself, whilst the other branch, hitherto generally supposed to have been the main stream, is much smaller than the eastern one, and invariably called the Garjung-Chu.

The routes extended beyond the eastern watershed of the Indus as far as the great Thok-Jalung or Thok-Samba gold-field. Thok-Jalung was moreover roughly connected with various other gold-fields and salt-mines by means of information derived from travellers, and the general correctness of this information was roughly established by a route to Rudok, derived from similar information, which made out the position of that place tolerably close to that determined by the regular survey.

A number of lofty snowy peaks were determined from various stations of the route-survey, the most remarkable being the Aling-Gangri group north of the Indus, which, judging from the great mass of snow seen on the southern face during August and September, must be upwards of 23,000 feet above the sea, possibly

* Gartok, longitude, E. $80^{\circ} 23' 33''$; latitude, N. $31^{\circ} 44' 4''$, and height 14,250 feet above sea.—T. G. M.

† The values of the pace, as tested by the differences of latitude, were very accordant, thus :—

	Difference latitude.	Deduced length of pace in feet.	REMARKS.
From Badrinath to Gartok ..	0 59 36	2·495	By 1st Pundit.
„ Gartok to Thok-Jalung	0 40 23	2·512	„ 1st Pundit.
„ Gartok to Demchok ..	0 57 17	2·634	„ 1st and 3rd Pundits.
„ Demchok to Totling ..	1 13 24	2·495	„ 3rd Pundit.

T. G. M.

‡ It was indicated from native information by H. Strachey, on his Map of Ladak and Gnaïr-Khorsum.

as much as 24,000 feet. The line of perpetual snow on the southern slopes of the Ladak Mountains approximates to 20,000 feet in the same latitude, and it would require several thousand feet of snow above that line in order to be very imposing at 80 miles, at which distance the Pundit first saw it. The Aling-Gangri group had never, as far as I am aware, been heard of before. They appear to be a continuation of the range between the Indus and the Pangkong Lake. The Pundit could see no farther continuation of the range to the east of Thok-Jalung. Another high group was seen to the east of the Medok-la, on the watershed between the Sutlej and Indus.

Altogether the Pundit and his brethren have, as I predicted, improved very much in the art of fixing distant peaks; satisfactory proof of this has been forthcoming from their back bearings to well-known peaks, such as Leo-Porgyal, Kamet, &c., which gave very accurate positions to those peaks, and proving at the same time a valuable check on the route-surveys, and proving that there has been no large accumulation of error.

The numerous heights determined by the boiling-point give a good idea of the great elevation of the country traversed, and the consequently enormous difficulties under which the route-surveys were made. From them it will be seen that the Pundits were for more than three months at an elevation of over 13,000 feet. They crossed the great range between the Sutlej and the Indus three times—that between Gartok and Chajothol once, between Chajothal and Giachuruff once, the Chomorang Range twice, and the Himalaya Range three times, each of the crossings involving a pass of over 17,000 feet, two of them being over 19,000 feet.

The height of Gartok by the above is only 14,250 feet, instead of 15,000, as had previously been assigned to it. At the several points, Totling, &c., where Henry Strachey's heights were taken, the Pundit's heights are generally lower. A difference in the same direction was noted in the results of the previous expedition at a point near the Mansarowar lake; and, judging from the following comparisons, it appears to arise from a constant difference, probably due to the thermometer employed:—

	By the G. T. Survey.	By H. Strachey.
	Feet.	Feet.
Hanle	14,276	14,500
Pangkong	13,936	14,300
Tangse	12,791	13,000
Diskit	9,950	10,400

The above shows that Captain H. Strachey's were generally higher than the G. T. S. values, by about 300 feet on the

average; and the Pundit's values differing from Captain Strachey's by about the same amount, it may be concluded that they are tolerably near the mark, and at any rate not in excess.

The Pundit's heights agree with those of Badrinath, as determined by another observer.

During their journey from Mana to Thok-Jalung, a total distance of 207 miles, they only met with cultivation once, viz., near Totling on the Sutlej; everywhere else the mountains were too high to allow grain to grow. The mountains, however, produce plenty of coarse grass, sufficient to produce large flocks and herds, the Pundits coming across camps nearly every day.

The weather, until they reached the Chomorang Range, was good; there, however, the fall of snow, was very heavy, though it did not extend in any great quantity on the Thok-Jalung side. At Thok-Jalung itself only a little rain fell, though it was often cloudy.

During the whole of the time * the Pundit was on the Upper Indus there was a dense bank of clouds in the direction of the Kailas Peak, and, consequently, neither he nor the 3rd Pundit could ever get a bearing to that peak, though they were on the look-out to do so.

In spite of the desolate aspect of the mountains traversed, the number of wild animals was remarkable, quantities of Tibetan antelopes, wild asses (kiangs), yaks, grey wolves, hares and marmots. Wild fowl swarmed on some of the small lakes, and ravens used to visit the camp in pairs.

The actual source of the eastern branch or main stream of the Indus was not reached, but the people between Giachuruff and Jiacham said it rose at a place called Gangri-Goorgiap, which may perhaps refer to the Gangri or Kailas Peak; but the direction of the course of the Indus, as seen from near Jiachen, pointed rather to the east of that mountain. The whole district along the upper course of the Indus is called Bongthol, which is divided into the small districts (puttees) of the Singhtod and Singhmet. "Tod" signifying upper, and "Met" lower.

At the highest point visited the Indus was still a considerable stream. At Giachuruff the ford was always a difficult one, and for eight days after the fall of snow the Pundit experienced, the river was not fordable in any way. Whilst it was snowing on the Chomorang Range, heavy rain fell at Giachuruff, and the river, consequently, rose very much. The stream was

* The rains were in full progress at this time on the outer Himalayan ranges.

generally very clear and full of fish * of all sizes, up to about 18 inches in length.

The 3rd Pundit, though a very tall powerful man, had great difficulty in crossing when the river was falling; he crossed over to catch their baggage-animals which were out grazing, but being delayed till dark he was unable to venture back, and was consequently kept out all night with hardly a scrap of clothing, he and his companions huddling together in order to keep themselves warm.

From Jiachan to Giachuruff the Indus flows through a rather broad, flat valley, and from Giachuruff to its junction with the Garjung-Chu it flows through a similar valley, the banks being lined in many places with long patches of low jungle. The Indus above the junction was from 100 to 200 paces in breadth, with a depth of 4 to 6 feet; while the Garjung-Chu was in places as much as 250 paces in width, but with a depth of only 1 to 2 feet. The Garjung-Chu between Gartok and the junction flows through a particularly broad and flat valley. The Indus below the junction flows through a wide valley to a considerable distance below Demchok.

When at Thok-Jalung the Pundit made diligent inquiry as to the adjacent countries; he was informed that a large district, called Majin, extended for nine days' journey to the east, and that a smaller district, called Shellifuk, lay to the south-east. The Majin country was said to be a difficult one to travel in, as no rivers ran through it. The Shellifuk district boasted of some streams, but they all run into a large inland lake.

Immediately to the north of the gold-fields there is no regularly inhabited country, as far as the Thok-Jalung people are aware. They say there are some wandering thieves, Champas or Khampas, who live entirely on meat, and have had so little acquaintance with grain in any shape that they get sick when they take it from their more southerly brethren. The Pundit, however, seemed to have very little faith in this part of the story. He heard that at a considerable distance to the north-east there was a tract called the Whor country, inhabited by Shakpo people, the same style of people as those who come from Jilung.† Tartary is said to be to the north-east of Whor. To the north-west of Thok-Jalung lies Rudok, the route to which has been roughly indicated on the map. Ting-Chu and Rawung are the intermediate districts; the

* The Dokpa people eat these fish, but those Tibetans who have read Buddhist books do not do so.

† Jilung, about one month north of Lhasa.

first is a very cold place, and has very little sweet water, though plenty of brackish water. Rawung has much the same climate as Rudok, only slightly colder; it has, however, plenty of fresh water.

There is said to be a direct route from Thok-Jalung, south-east to Tudam monastery, on the great Gartok and Lhasa road. This route crosses some comparatively low ranges, but is said generally to run over great plains. Such inhabitants as there may be on the north, east and south are all nomadic, living in standing camps, shifting every now and then according to the state of the pasture, time of the year, &c. They are almost all addicted to highway robbery.

I have already pointed out how well the Pundits have succeeded in the difficult art of intersecting and fixing distant peaks. The way in which the chief Pundit quartered his ground and divided it, so as to account for the geography of the whole, with a few routes, is another great improvement, their work covering a much greater breadth, and leaving very little doubt as to the position of the intermediate ranges. As before, the Chief Pundit showed great tact in making his way among strangers, and his conduct of the whole expedition is highly creditable, and the way in which he has carried out my instructions is deserving of all praise.

The 2nd Pundit proved useful in various ways. The 3rd Pundit, in his route-survey from Lujan-Chumik to Demchok, and thence to Totling, proved that he was thoroughly up to his work, and likely to prove a very valuable addition to the party.

It is a matter of regret that the Pundits were not able to fix the heights of the peaks they intersected, more especially of Aling-Gangri; but as they have now succeeded so well in fixing the positions, it only remains for them to learn to take altitudes to them, in order to determine their heights.

They have already been trained to do this, and I have no doubt but that their next expedition will prove fruitful in this respect.

ROUTE-SURVEY—BADRINATH TO TOTLING.

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
Badrinath	9 45	3,400	Latitude observations taken at Badrinath near Temple.
2 ..	338 0	1,200	
3 ..	313 0	700	
4 ..	3 30	3,300	
5 ..	351 30	6,100	
6 ..	330 0	4,000	
7 ..	344 0	10,000	
8 ..	315 30	12,700	
9 ..	24 30	11,700	Cross Himalayas by Chirbittia-la.
10 ..	22 45	11,800	
11 ..	67 0	11,700	
12 ..	358 0	4,700	Observations for latitude taken at Lumarti, 2760 paces from station 12 on route to station 13.
13 ..	28 0	6,000	
14 ..	6 30	6,800	Observations for latitude taken at station 14 (Chirkong).
15 ..	25 0	12,400	
16 ..	27 0	12,000	
17 ..	37 0	5,500	Observations for latitude taken at station 17 (Barku).
18 ..	76 45	10,000	
Totling 19 ..	..	..	Observations for latitude taken at Totling.

ROUTE-SURVEY—TOTLING TO THOK-JALUNG.

Totling	52 0	38,200	Observation for latitude taken at Nairding-Sumdo, 12,300 paces from Totling on route to station 20.
20 ..	68 0	50,600	Observations for latitude taken at Khangiah camp, 32,300 paces from station 20.
			Observations for latitude taken at Gugti camp, 50,340 paces from station 20.
21 ..	47 0	13,700	
22 ..	85 0	5,300	Observations for latitude taken at Dumlung-Sumdo, station 22.
23 ..	62 0	4,500	
24 ..	44 30	11,300	
25 ..	88 15	4,100	Observations for latitude taken at Chogo-Gugti, 2000 paces, and with a bearing of 250° from station 25.
26 ..	98 30	8,000	
27 ..	68 0	9,300	
28 ..	20 45	13,300	
29 ..	48 0	56,000	Observations for latitude taken at Giamchicho, 15,300 paces from station 29 on route to station 30.

ROUTE-SURVEY—TOTLING TO THOK-JALUNG—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
30 ..	20 0	3,700	Observations for latitude taken at Kiangmachumik, 35,500 paces from Giamchicho on route to station 30.
31 ..	44 30	30,600	Observations for latitude taken at Giachuruff, 5000 paces from station 31 on station 32.
32 ..	70 0	19,900	
33 ..	94 0	6,000	Observations for latitude taken at Thok-Jalung, 4000 paces from station 33 on route to end of bazar.
End of Thok-Jalung Bazar.			

ROUTE-SURVEY—GIACHURUFF TO GARTOK BY LUJAN CHUMIK AND GAR-GUNSA.

Giachuruff	316 30	22,700	Latitude observations taken at Shildung camp, station 2.
2 ..	300 0	19,100	
3 ..	290 0	4,100	Latitude observations taken at Giamchung-phu, 2000 paces from station 4 on route to station 5.
4 ..	246 0	5,700	
5 ..	291 0	9,400	Latitude observations taken at Thankar village, 8000 paces from station 7 on route to station 8.
6 ..	323 0	4,400	
7 ..	289 0	17,100	Latitude observations taken at Pika village, station 10.
8 ..	272 0	9,800	
9 ..	225 0	3,500	Latitude observations taken at Pika village, station 10.
10 ..	276 0	6,300	
11 ..	308 0	2,300	Latitude observations taken at Burkung, 900 paces from station 15 on route to station 16.
2 ..	242 30	2,000	
13 ..	290 0	3,300	Latitude observations taken at Marku camp, station 17.
14 ..	258 0	3,000	
15 ..	265 30	16,500	Latitude observations taken at DakMaru, or station 20.
16 ..	258 0	11,100	
17 ..	287 0	10,000	Latitude observations taken at Ralajung, 19,900 paces from station 21 on route to station 22.
18 ..	209 0	6,700	
19 ..	255 0	7,800	Latitude observations taken at Ralajung, 19,900 paces from station 21 on route to station 22.
20 ..	226 15	5,900	
21 ..	260 30	29,000	

ROUTE-SURVEY—GIACHURUFF TO GARTOK BY LUJAN-CHUMIK
AND GARGUNSA—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
22 ..	227 45 ⁰	9,500	
23 ..	143 0	19,500	Latitude observations taken at Lujan-Chumik, or station 23.
24 ..	130 0	24,800	Latitude observations taken at Ju camp, or station 24.
25 ..	150 0	47,200	Latitude observations taken at Gargunsa, or station 25.
26 ..	129 0	26,700	Latitude observations taken at Lo-Gong camp, 30,400 paces from Gargunsa on route to station 26.
Gartok .. ..	..	..	Latitude observations taken at Gartok.

ROUTE-SURVEY—LUJAN-CHUMIK TO DEMCHOK.

Lujan-Chumik ..	319 15 ⁰	16,700	
2 ..	314 30	6,330	Latitude observations taken at Tashikang, or station 2.
3 ..	309 30	18,400	
4 ..	326 42	3,500	Latitude observations taken at Damakolok same as station 4.
5 ..	311 0	6,700	
6 ..	312 30	1,700	
Demchok .. ..	..	..	Latitude observations taken at Demchok.

ROUTE-SURVEY—DEMCHOK TO TOTLING.

Demchok	312 30 ⁰	1,000	
7 ..	224 30	3,900	
8 ..	194 30	8,800	Latitude observations taken at Demchok-Phu, 5390 paces from station 8 on route to station 9.
9 ..	186 30	6,900	
10 ..	169 30	2,100	
11 ..	178 0	5,500	
12 ..	158 30	21,900	Latitude observations taken at Deboche, 4000 paces from station 12 on route to station 13.
13 ..	150 30	12,300	
14 ..	197 30	5,300	Latitude observations taken at Medokding village, station 14.
15 ..	117 0	7,200	
16 ..	160 30	8,800	Latitude observations taken at Dilchachini-Sumdo, 3500 paces from station 15 on route to station 17.

ROUTE SURVEY—DEMCHOK TO TOTLING—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
17 ..	150 30'	20,500	
18 ..	153 0	7,500	Latitude observations taken at bank of Lamoche stream, 6200 paces from station 18 on route to station 19.
19 ..	167 30	2,500	
20 ..	134 0	2,600	Latitude observations taken at Jia-Sumdo, or station 20.
21 ..	206 0	12,300	
22 ..	223 0	4,100	Latitude observations taken at Chockche village, 800 paces from station 23 on route to station 24.
23 (same as station 1 below) ..	317 0	2,700	
24	308 0	5,600	Latitude observations taken at Rabgialing, 5600 paces from station 24.
1 (same as station 23 above) ..	143 0	1,800	
2 ..	139 0	1,500	
3 ..	141 30	16,200	Latitude observations taken at Shangche village, 7600 paces from station 3 on route to station 4.
4 ..	142 0	3,600	
5 ..	160 0	4,100	
6 ..	114 30	4,000	
7 ..	131 0	10,200	Latitude observations taken at Tibuphu, 4900 paces from station 7 on route to station 8.
8 ..	102 0	4,000	
9 ..	69 30	1,700	
10 ..	104 0	4,100	
11 ..	187 30	4,800	Latitude observations taken at Dungkhar village, 600 paces from station 11 on route to station 12.
		24,300	
Totling ..	..	..	Latitude observations taken at Totling.

ROUTE-SURVEY—BARKU TO SHIPKI.

Barku ..	229 0'	10,400	
2 ..	224 30	9,500	
3 ..	244 0	9,500	
4 ..	287 0	2,000	
5 ..	305 0	1,700	
6 ..	290 30	1,700	
7 ..	234 0	2,700	
8 ..	284 30	2,000	
9 ..	340 0	3,300	Latitude observations taken at Puling-Gongma, or station 9.

ROUTE-SURVEY—BARKU TO SHIPKI—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
10 ..	294 30	3,000	
11 ..	289 0	7,900	
12 ..	292 0	2,500	
13 ..	325 0	4,500	
14 ..	305 0	2,900	
15 ..	323 0	1,900	
16 ..	323 0	13,200	
17 ..	345 0	3,300	
18 ..	322 0	4,500	Latitude observations taken at Rildighang, or station 18.
19 ..	325 0	2,200	
20 ..	301 0	3,300	
21 ..	298 0	9,500	
22 ..	308 0	7,200	Latitude observations taken at Rivillage, or station 22.
23 ..	355 0	19,300	Latitude observations taken at Lanjan-Samba (bridge over Sutlej), 8500 paces from station 23 on route to station 24.
24 ..	324 30	4,600	
..	278 30	8,800	Latitude observations taken at Dongkhang, 3100 paces from station 25 on route to station 26.
26 ..	282 0	11,500	Latitude observations taken at Miangvillage, 2400 paces from station 26 on route to station 27.
27 ..	216 0	4,000	
28 ..	302 0	2,900	Latitude observations taken at Tiakvillage, 500 paces from station 28 on route to station 29.
29 ..	315 0	3,300	
30 ..	264 0	13,900	Latitude observations taken at Kuakvillage, 8550 paces from station 30 on route to Shipki.
Shipki .. ..	..	..	Latitude observations taken at Shipki.

ROUTE-SURVEY—SHIPKI TO NILUNG AND MUKPA.

Shipki	84 0	13,900	
2 ..	135 0	3,300	
3 ..	122 0	2,900	
4 ..	302 0	500	
5 ..	167 30	6,600	Latitude observations taken at Tiakvillage, or station 5.
6 ..	172 30	4,500	Latitude observations taken at Kuang, 2800 paces from station 6 on route to station 7.
7 ..	222 30	3,800	
8 ..	205 0	1,600	

ROUTE-SURVEY—SHIPKI TO NILUNG AND MUKPA—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
9 ..	170 30	12,300	Latitude observations taken at Sang, 4000 paces from station 9 on route to station 10.
10 ..	160 0	2,000	
11 ..	90 0	8,600	Latitude observations taken at Sumna, 5000 paces from station 11 on route to station 12.
12 ..	133 0	3,200	
13 ..	106 0	3,200	
14 ..	36 0	2,200	
15 ..	53 30	1,300	
16 ..	101 30	6,200	Latitude observations taken at Biar, 4700 paces from station 16 on route to station 17.
17 ..	157 30	2,700	
18 ..	126 30	4,500	
19 ..	129 0	2,800	Latitude observations taken at Sarang village, 800 paces from station 19 on route to station 20.
20 ..	152 45	3,700	
21 ..	139 0	1,700	
22 ..	127 30	2,000	
23 ..	130 0	2,300	
24 ..	141 0	1,300	
25 ..	205 0	2,300	
26 ..	156 0	10,000	
27 ..	177 0	6,900	
28 ..	167 0	10,700	
29 ..	202 30	1,900	
30 ..	193 30	3,000	
31 ..	235 0	1,900	
32 ..	188 0	1,900	Latitude observations taken at Chang-jum-Sumdo, 1280 paces from station 32 on route to station 33.
33 ..	231 0	1,100	
34 ..	176 0	1,000	
35 ..	203 0	2,200	
36 ..	196 0	1,200	
37 ..	153 0	4,300	
38 ..	212 30	1,800	
39 ..	160 0	1,200	
40 ..	192 0	4,400	Latitude observations taken at Nonam, 1600 paces from station 40 on route to station 41.
41 ..	196 30	3,800	
42 ..	158 0	1,400	
43 ..	211 0	2,800	
44 ..	251 30	2,700	
45 ..	263 30	4,300	
46 ..	217 0	1,100	
47 ..	255 30	5,600	Latitude observations taken at Nilung village, or station 47.
48 ..	182 0	2,500	

ROUTE-SURVEY—SHIPKI TO NILUNG AND MUKPA—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
49 ..	213 0	5,700	
50 ..	220 0	3,700	
51 ..	259 0	5,300	
52 ..	225 0	2,000	
53 ..	257 0	2,000	
54 ..	288 0	5,700	
55 ..	266 0	4,900	
56 ..	259 0	3,200	
Mukpa .. ..	..	..	Latitude observations taken at Mukpa.

ROUTE-SURVEY—GARTOK TO DUNKHAR.

Gartok.. ..	281 0	9,900	Latitude observations taken at Gartok.
2 ..	259 0	7,500	
3 ..	213 30	5,800	
4 ..	259 0	8,000	
5 ..	327 0	5,200	
6 ..	292 30	5,200	
7 ..	315 0	8,000	
8 ..	285 0	4,400	
9 ..	315 0	3,200	
10 ..	270 0	2,800	
11 ..	309 0	10,500	
12 ..	230 0	3,500	
13 ..	306 30	3,100	
14 ..	270 0	13,500	
15 ..	146 0	17,300	
16 ..	169 0	16,000	
17 ..	95 0	4,000	
Dunkhar .. ..	..	..	Latitude observations taken at Dunkhar.

ROUTE-SURVEY—DUNKHAR TO TOTLING.

Dunkhar	185 1	5,200	
Totling	179 0	23,700	
Totling .. ..	..	..	Latitude observations taken at Totling.

ROUTE-SURVEY—TOTLING TO CHIRKONG.

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
Totling	123 30	9,100	Latitude observations taken at Mang-nang village, or station 3.
2 ..	200 0	17,300	
3 ..	252 30	6,000	
4 ..	225 0	9,000	
5 ..	242 0	7,700	
6 ..	230 0	7,500	
Chirkong	Latitude observations taken at Chirkong.

ROUTE-SURVEY—GIACHURUFF TO JIACHAN UP THE RIVER INDUS.

Giachuruff	155 0	7,900	Latitude observations taken at Giachuruff.
2 ..	90 0	2,600	
3 ..	170 0	5,200	Latitude observations taken at Lapta-Rebo, station 7.
4 ..	208 0	2,400	
5 ..	198 0	5,600	
6 ..	135 0	9,600	
7 ..	124 0	10,200	
8 ..	193 0	10,000	
9 ..	245 0	8,900	
10 ..	216 0	11,600	Latitude observations taken at Nagpo-Shamdo, 7000 paces from station 8 on route to station 9.
11 ..	190 0	18,900	
Jiachan	Latitude observations taken at Jiachan.

ROUTE-SURVEY—MILAM TO GARTOK.

Milam	33 0	6,400
2 ..	5 0	9,000
3 ..	22 30	2,800
4 ..	333 10	8,200
5 ..	30 0	5,000
6 ..	26 20	6,100
7 ..	52 0	21,500
8 ..	48 40	3,600
9 ..	90 0	1,400
10 ..	71 40	2,900
11 ..	38 30	2,500
12 ..	52 30	12,500
13 ..	46 0	15,400
14 ..	26 0	15,400
15 ..	350 20	11,800
16 ..	358 10	7,600

ROUTE-SURVEY—MILAM TO GARTOK—*continued.*

Name and Number of Station.	Bearings of Forward Station.	Distances in Paces to Forward Station.	REMARKS.
17 ..	° 26 0'	6,700	
18 ..	28 20	2,100	
19 ..	72 20	6,000	
20 ..	32 20	6,800	
21 ..	318 20	22,600	
22 ..	322 10	10,500	
23 ..	315 40	10,800	
24 ..	335 0	22,900	
25 ..	319 0	20,200	
Gartok .. ..	..	..	Latitude observations taken at Gartok.

ROUTE-SURVEY—GARTOK TO MILAM.

Gartok	° 170 20'	10,300	Latitude observations taken at Gartok.
27 ..	141 20	8,800	
28 ..	155 30	4,200	Namochi, same as station 29.
29 ..	155 30	10,500	
30 ..	196 10	12,100	
31 ..	235 0	2,200	
32 ..	235 20	21,300	
33 ..	231 30	6,000	
34 ..	171 0	3,500	
35 ..	202 0	2,500	
36 ..	203 10	3,500	
37 ..	191 40	10,500	
38 ..	170 50	3,600	
39 ..	200 0	11,000	Dongpu village, same as station 40.
40 ..	196 0	3,000	Nagbo village, same as station 41.
41 ..	197 30	7,300	
42 ..	194 30	9,700	
43 ..	177 30	13,800	
44 ..	176 0	13,000	
45 ..	176 0	5,700	
46 ..	130 30	16,100	
47 ..	172 0	12,400	
48 ..	166 0	7,900	
5 ..	153 10	8,200	Nos. 5, 4, 3, 2, correspond with same numbers in route Milam to Gartok.
4 ..	202 30	2,800	
3 ..	185 0	9,000	
2 ..	213 0	6,400	
Milam .. ..	..	..

OBSERVATIONS FOR LATITUDE TAKEN IN GREAT TIBET

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.
	1867.	H. M.			
1	May 29..	6 30 P.M.	Badrinath Temple (near) ..	Polaris.	Lower
3	,, 31..	6 30 ,,	Ditto foot of steps	..	..
4	June 7..	11 30 ,,	Mana village, Ghonoli house ..	Antares.	Upper
5	,, 27..	10 0 ,,	Ditto	..	..
6	July 27..	3 30 ,,	Rában-Thok, camp Lumarti ..	Polaris.	..
7	,, 27..	4 30 ,,	Ditto Lumarti ..	..	..
8	,, 30..	3 15 ,,	Ditto ditto	(Fomalhaut)	..
11	Aug. 1..	4 15 ,,	Chirkong or Shibuk	Polaris.	..
13	,, 3..	4 15 ,,	East of Chaprang village at Thalthousa.	..	..
15	,, 5..	4 30 ,,	Totling village .. .. .	..	..
16	,, 7..	11 0 ,,	Nairding-Sumdo camp	Altair.	..
17	,, 10..	2 30 A.M.	Khangiah	(Fomalhaut)	..
18	,, 11..	5 40 ,,	Dukti camp	Polaris.	..
19	,, 11..	5 40 ,,	Ditto	..	..
20	,, 11..	5 40 ,,	Dukte camp .. .. .	..	..
21	,, 12..	..	Fort of Gugti-la .. .. .	..	..
22	,, 12..	..	Ditto	..	..
23	,, 13..	..	Gugti camp .. .. .	..	..
24	,, 13..	..	Ditto	(Fomalhaut)	..
26	,, 16..	..	Nabipa-cho	Polaris.	..
27	,, 19..	4 0 ,,	Kiangmachumik .. .. .	..	..
28	,, 20..	..	Giachuruff camp .. .. .	..	..
29	,, 26..	2 42 ,,	Thok-Jalung, near gold mine	..	..
30	,, 27..	9 30 P.M.	Ditto	Altair.	..
33	,, 30..	9 5 ,,	Ditto	..	..
34	,, 30..	12 15 A.M.	Ditto	(Fomalhaut)	..
35	,, 30..	2 30 ,,	Thok-Jalung	Polaris.	..

WITH ELLIOTT'S 6-INCH RADIUS SEXTANTS, NOS. 44 AND 45.

Double Altitude.	Single.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.	
58 40 0	..	+ 3'	30 44 29.4	0 .. "	Sextant No. 45.	
58 41 10	30 45 4.7	..	Ditto.—See observation No. 84.	
66 12 10	..	+ 3' 10"	30 45 20.6	} 30 45 17.8	Ditto.	
66 12 40	..	+ 2' 50"	30 45 15.0		..	Ditto.
65 10 50	..	+ 2' 30"	31 11 29.6	..	Ditto took observations for time 6h. 49m. 42s.	
65 18 20	..	— 7' 10"	31 10 24.6	} 31 12 9.7	Ditto No. 44.	
57 4 0	31 13 22.3		..	Ditto.
65 23 10	..	— 7' 10"	31 12 52.0	31 12 52.0	No. 44.	
65 43 0	..	+ 2' 30"	31 27 35.6	31 27 35.6	Ditto No. 45.	
65 43 30	31 27 48.9	31 27 48.9		
134 5 30	..	— 7' 10"	31 32 36.7	31 32 36.7	No. 44.	
56 5 0	..	— 7' 0"	31 42 52.7	31 42 52.7	Ditto near a ravine of the same name.	
66 25 10	..	— 7' 0"	31 44 0.3	} ..	Sextant No. 44.	
66 17 0	..	+ 3' 0"	31 44 55.3		31 44 47.0	Ditto No. 45.
66 16 0	..	+ 5' 0"	31 45 25.3	..	Pocket Sextant No. 12.	
66 23 30	..	+ 3' 0"	31 48 18.7	} ..	Junction of two streams, Dunlung-Sumdo.	
66 30 30	..	— 7' 0"	31 46 48.7		31 47 33.7	Sextant No. 44.
66 39 20	31 51 13.1	..	Chojothal district.	
55 25 30	..	+ 3' 0"	31 57 21.9	} 31 54 17.5	Watch stopped.	
67 0 40	..	— 7' 0"	32 1 54.1		..	Ditto.
67 9 30	..	+ 3' 0"	32 11 20.0	32 11 20.0		
67 16 0	32 14 34.5	32 14 34.5	District Singmiath, bank of Sing-Chu stream, also called Thok-Somba. Sextant No. 45.	
67 37 0	32 25 5.6	} 32 24 26.5		
132 13 0	32 13 46.5		..	
132 13 10	32 23 41.8		..	
54 33 30	32 23 36.9		..	
67 37 20	32 25 16.8	..	Sextant No. 45.	

OBSERVATIONS FOR LATITUDE TAKEN IN GREAT TIBET

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.
36	1867. Sept. 2..	H. M. 12 5 noon.	Singmiath-Puttee	Sun.	Upper
37	,, 2..	11 40 P.M.	Ditto	Jupiter.	..
38	,, 2..	..	Ditto	Ditto.	..
40	,, 3..	12 18 A.M.	Ditto	(Fomalhaut)	..
41	,, 3..	1 0 ,,	Ditto	Polaris.	..
43	,, 4..	8 40 P.M.	Shildung camp	Altair.	..
44	,, 4..	2 0 A.M.	Ditto	Polaris.	..
45	,, 5..	2 0 ,,	Giamchung-phu camp .. ..	..	..
46	,, 6..	8 40 P.M.	Thanker (one house only) ..	Altair.	..
47	,, 6..	2 0 A.M.	Ditto	Polaris.	..
49	,, 7..	8 30 P.M.	Pika village	Altair.	..
50	,, 7..	11 30 ,,	Ditto	(Fomalhaut)	..
51	,, 7..	1 30 A.M.	Ditto	Polaris.	..
52	,, 8..	8 20 P.M.	Burkung village (in ruins) ..	Altair.	..
53	,, 8..	1 36 A.M.	Ditto	Polaris.	..
54	,, 9..	8 15 P.M.	Marku camp	Altair.	..
55	,, 10..	8 18 ,,	Dak-Maru	Altair.	..
56	,, 10..	11 48 ,,	Ditto	Polaris.	..
57	,, 11..	8 15 ,,	Ralajung	Altair.	..
58	,, 11..	1 30 A.M.	Ditto	Polaris.	..
59	,, 12..	8 15 P.M.	Lujan-Chumik camp	Altair.	..
60	,, 12..	1 25 A.M.	Ditto	Polaris.	..
61	,, 13..	8 0 P.M.	Name unknown	Altair.	..
62	,, 13..	1 30 A.M.	Ditto	Polaris.	..
63	,, 14..	7 55 P.M.	Gargunsa village	Altair.	..
64	,, 14..	1 25 A.M.	Ditto	Polaris.	..
65	,, 15..	7 50 P.M.	Loa-Gong camp	Altair.	..
66	,, 15..	1 40 A.M.	Ditto	Polaris.	..
67	,, 16..	1 30 ,,	Garyarsa, large village .. ..	..	..
68	,, 16..	7 30 P.M.	Ditto	Altair.	..
69	,, 18..	..	Ditto	..	..
70	,, 19..	1 0 A.M.	Ditto	Polaris.	..
71	,, 24..	7 15 P.M.	Dunkhar village	Altair.	..
73	,, 24..	5 0 A.M.	Ditto	Orionis. (Rigel)	..
74	,, 25..	Noon.	Ditto	Sun.	..

WITH ELLIOTT'S 6-INCH RADIUS SEXTANTS, NOS. 44 AND 45—*continued.*

Double Altitude.	Single.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.
132 14 30	..	+ 3' 0"	32 12 38.4	Deduced thermometer 50°. Barometer 16.4 in.	One and a half mile south of Giachuruff Camp.
91 15 10	32 11 57.8		Ditto.
91 16 0	..	+ 5' 0"	32 10 32.8	32 9' 23".6	Pocket Sextant No. 12.
55 2 0	..	+ 3' 0"	32 9 16.7		..	Wind was high; not confident in the observation.
67 2 0	32 7 40.8	..	Ditto.
132 27 10	32 16 42.9	32 19 27.0	Near Mane, not taken on Meridian.
67 31 10	32 22 11.0		
67 40 40	32 26 57.5	32 26 57.5	
132 0 40	32 29 57.6	32 30 47.6	
67 50 0	32 31 37.6		
131 58 0	32 31 18.2	32 31 43.1	
54 18 50	32 30 59.0		
67 51 20	32 32 17.5		
131 55 10	32 32 43.3	32 32 53.1	
67 52 50	32 33 2.8		
131 58 30	32 31 3.6	32 31 3.6	Near Singi-Chu stream.
132 0 30	..	+ 2' 30"	32 30 18.8	32 30 3.0	(Near Gamuk village) on bank of Singi-Chu stream.
67 46 50	32 29 47.2		
132 5 0	32 28 4.4	32 27 52.6	On bank of Singi-Chu stream.
67 42 40	32 27 40.7		
132 11 40	32 24 44.5	32 24 35.1	
67 36 10	32 24 25.6		
132 30 50	..	- 7' 0"	32 17 54.6	32 18 22.8	
67 30 30	32 18 50.9		
132 50 0	32 10 19.0	32 8 45.6	
67 11 10	32 7 12.1		
133 10 30	32 0 3.6	31 57 45.9	
66 47 40	31 55 28.1		
66 22 30	31 42 50.6	31 43 54.0	
133 40 30	31 45 4.2		
133 40 40	31 44 59.3	31 42 41.6	
66 22 10	31 42 41.6		
133 47 30	31 41 34.1	31 41 26.9	
100 3 0	31 41 7.7		
115 54 30	31 41 38.9		

OBSERVATIONS FOR LATITUDE TAKEN IN GREAT TIBET

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.
	1867.	H. M.			
76	Sept. 28..	7 35 P.M.	Totling monastery	Altair.	Upper
77	„ 28..	10 45 „	Ditto	(<i>Fomalhaut</i>)	..
79	„ 29..	5 51 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
80	„ 30..	Noon.	Ditto	Sun.	..
81	Oct. 2..	5 40 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
82	„ 4..	7 0 P.M.	Mangnang village	Altair.	..
83	„ 4..	5 30 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
84	Nov. 14..	..	Badrinath Temple	Ditto.	..
1	Sept. 13..	..	Tashikang village	Altair.	..
2	„ 13..	..	Ditto	Polaris.	..
3	„ 14..	..	Domakolok camp	Altair.	..
4	„ 14..	..	Ditto	Polaris.	..
5	„ 15..	..	Demchok village	Altair.	..
6	„ 15..	..	Ditto	(<i>Fomalhaut</i>)	..
7	„ 15..	..	Ditto	Polaris.	..
8	„ 16	..	Demchok-phu camp	Altair.	..
9	„ 16..	..	Ditto	Polaris.	..
10	„ 17..	..	Deboche	(<i>Fomalhaut</i>)	..
11	„ 17..	..	Ditto	Polaris.	..
12	„ 18..	..	Madok Sing	Altair.	..
13	„ 18..	..	Ditto	Polaris.	..
14	„ 19..	..	Dilchachini-Sumdo	Altair.	..
15	„ 19..	..	Dilchachini-Sumdo	Polaris.	..
16	„ 20..	..	Right bank of Lamoche stream	Altair.	..
17	„ 20..	..	Ditto	(<i>Fomalhaut</i>)	..
18	„ 21..	..	Near Jia-Sumdo	Altair.	..
19	„ 22..	..	Rabgialing (near monastery) ..	..	..
20	„ 22..	..	Ditto	(<i>Fomalhaut</i>)	..
21	„ 22..	..	Ditto	Polaris.	..
22	„ 23..	..	Chokche village	Altair.	..
23	„ 23..	..	Ditto	(<i>Fomalhaut</i>)	..

WITH ELLIOTT'S 6-INCH RADIUS SEXTANTS, NOS. 44 AND 45—*continued.*

Double Altitude.	Single.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.
134 9 40	..	-- 7' 0"	31 30 30.3	} 31 30 47.7	Date mistaken.
56 31 0	31 29 56.2		
100 26 0	31 29 39.8		
112 23 10	31 30 22.5		
100 25 30	31 29 54.6		
134 27 0	31 21 50.1	} 31 21 47.2	
100 41 50	31 21 44.2		
101 56 50	30 44 9.9	..	Watch not going. See observations 1 and 3, preceding.
132 2 0	..	+ 3' 0"	32 29 19.4	} 32 30 13.1	Observations taken near monastery.
67 49 0	32 31 6.7		
131 46 0	32 37 18.6	} 32 38 9.7	Ditto.
68 4 40	32 39 0.8		
131 40 0	32 40 18.6	} 32 41 38.5	Thermometer 55°, barometer 18.2 inches.
53 58 0	32 41 22.9		
68 11 30	32 42 26.2	} 32 38 30.7	Deduced thermometer 55°, barometer 17.5 inches.
131 45 20	32 37 38.1		
68 5 20	32 39 23.3	} 32 29 8.7	Thermometer 51°, barometer 16.8 inches.
54 22 30	32 29 2.3		
67 45 0	32 29 15.1	} 32 20 14.0	Ditto.
132 22 0	32 19 17.5		
67 23 50	32 21 10.5	} 32 13 3.7	Junction of two streams (Sumdo), thermometer 52°, barometer 17.2 inches.
132 36 30	32 12 3.1		
67 14 40	32 14 4.3	32 13 3.7	Ditto.
132 58 30	32 1 2.9	} 32 0 47.8	Thermometer 53°, barometer 17.4 inches.
55 19 30	32 0 32.6		
133 1 10	31 59 43.0	31 59 43.0	Ditto.
133 10 20	31 55 8.0	} 31 53 37.0	Thermometer 53°, barometer 17.5 inches.
55 30 30	31 55 2.4		
66 30 50	31 52 8.8	} 31 52 58.2	Thermometer 54°, barometer 17.8 inches.
133 14 40	31 52 58.2		
55 34 40	31 52 58.1		

OBSERVATIONS FOR LATITUDE TAKEN IN GREAT TIBET

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.
	1867.	n. m.			
24	Sept. 24..	5 30 A.M.	Shangche village (near)	Altair.	Upper
25	„ 24..	..	Ditto	(<i>Fomalhaut</i>)	..
26	„ 25..	..	Tibu phu	Altair.	..
27	„ 25..	..	Ditto	(<i>Fomalhaut</i>)	..
28	„ 25..	..	Ditto	Polaris.	..
29	„ 26..	..	Dunkhar village	Altair.	..
30	„ 26..	..	Ditto	(<i>Fomalhaut</i>)	..
31	„ 26..	..	Ditto	Polaris.	..
1	„ 30..	7 25 P.M.	Barku village	Altair.	..
2	„ 30..	10 30 „	Ditto	(<i>Fomalhaut</i>)	..
3	„ 30..	5 0 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
4	Oct. 2..	7 30 P.M.	Puling-gongma	Altair.	..
5	„ 2..	10 16 „	Ditto	(<i>Fomalhaut</i>)	..
6	„ 2..	4 30 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
7	„ 4..	7 30 P.M.	Rildighang village	Altair.	..
8	„ 4..	10 10 „	Ditto	(<i>Fomalhaut</i>)	..
10	„ 4..	4 40 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
11	„ 4..	5 40 „	Ditto	(<i>Sirius</i>)	..
12	„ 5..	7 30 P.M.	Ri village	Altair.	..
13	„ 5..	10 55 „	Ditto	(<i>Fomalhaut</i>)	..
14	„ 5..	4 56 A.M.	Ditto	α Orionis.	..
15	„ 5..	5 42 „	Ditto	(<i>Sirius</i>)	..
17	„ 6..	12 15 „	Ditto	Polaris.	..
18	„ 7..	7 20 P.M.	Lanjan Samba	Altair.	..
19	„ 7..	5 33 A.M.	Ditto	(<i>Sirius</i>)	..
20	„ 8..	9 42 P.M.	Dongkhang	(<i>Fomalhaut</i>)	..
21	„ 8..	5 30 A.M.	Ditto	(<i>Sirius</i>)	..
22	„ 9..	12 o'clock.	Miang village	Polaris.	..
23	„ 9..	3 53 A.M.	Ditto	Orionis. (<i>Rigel</i>)	..
24	„ 9..	5 21 „	Ditto	(<i>Sirius</i>)	..
25	„ 10..	9 30 P.M.	Tiak village	(<i>Fomalhaut</i>)	..
26	„ 10..	5 15 A.M.	Ditto	(<i>Sirius</i>)	..

WITH ELLIOTT'S 6-INCH RADIUS SEXTANTS, NOS. 44 AND 45—continued.

Double Altitude.	Single.	Index Error.	Deducted Latitudes.	Mean Latitudes.	REMARKS.
133 21 40	..	+ 3' 0"	31 49 28.3	} 31 49 16.0	Thermometer 54°, barometer 18.0 inches.
55 42 30	31 49 3.6		
133 36 0	31 42 18.4	} 31 42 0.7	Thermometer 55°, barometer 18.2 inches.
55 58 0	31 41 18.7		
66 11 0	31 42 12.8	} ..	600 paces s.w. of village.
133 42 20	31 39 9.1		
56 0 10	31 40 16.8	} 31 39 34.1	
66 5 30	31 39 25.2		
134 10 0	..	+ 2' 0"	31 25 50.4	} 31 25 52.0	
56 30 0	31 25 55.9		
100 24 40	31 25 49.7	} 31 20 20.2	Camp.
134 20 50	31 20 24.7		
56 41 0	31 20 22.7	} 31 31 9.9	
100 35 50	31 20 13.3		
134 0 0	31 30 50.3	} 31 31 9.9	
56 17 0	31 32 25.0		
100 13 40	31 31 19.5	} 31 36 58.5	
83 55 0	31 30 4.7		
133 48 10	31 36 45.1	} 31 41 8.0	Near bridge over Sutlej River.
56 8 20	31 36 43.9		
131 30 0	31 37 0.7	} 31 45 49.7	
83 42 0	31 36 34.1		
66 2 0	31 37 11.0	} ..	(Midnight.)
133 39 30	31 41 7.0		
83 33 0	31 41 9.0	} 31 47 16.3	
55 51 0	31 45 24.6		
83 22 40	31 46 14.7	} 31 46 59.5	
66 23 0	31 47 38.0		
99 42 0	31 47 11.5	} 31 47 0.2	
83 22 0	31 46 37.7		
55 48 10	31 46 58.8	} 31 47 0.2	
83 21 20	31 47 0.2		

OBSERVATIONS FOR LATITUDE TAKEN IN GREAT TIBET

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.
	1867.	H. M.			
27	Oct. 11..	6 20 P.M.	Shipki village	Altair.	Upper
28	,, 11..	9 23 ,,	Ditto	(Fomalhaut)	..
29	,, 11..	3 40 A.M.	Ditto	Orionis. (Rigel)	..
30	,, 11..	5 10 ,,	Ditto	(Sirius)	..
31	,, 12..	6 12 P.M.	Kuak village	Altair.	..
32	,, 12..	11 48 ,,	Ditto	Polaris.	..
33	,, 14..	9 6 ,,	Kuang village	(Fomalhaut)	..
34	,, 14..	3 22 A.M.	Ditto	Orionis. (Rigel)	..
37	,, 16..	8 55 P.M.	Sumna village	(Fomalhaut)	..
38	,, 17..	8 50 P.M.	Beghar or Bikar village .. ..	..	..
39	,, 18..	8 45 ,,	Sarang village .. .. .	..	..
40	,, 18..	10 55 ,,	Ditto	Polaris.	..
41	,, 18..	3 4 A.M.	Ditto	Orionis. (Rigel)	..
42	,, 18..	3 32 ,,	Ditto	(Sirius)	..
43	,, 20..	11 30 ,,	Ditto	Sun.	..
44	,, 23..	8 20 P.M.	Changjum Sumdo	(Fomalhaut)	..
45	,, 24..	8 15 ,,	Nonam .. .. .	..	..
46	,, 25..	8 10 ,,	Chongsa or Nilung village ..	..	..
47	,, 26..	Noon.	Ditto	Sun.	..
48	,, 26..	8 5 P.M.	Ditto	(Fomalhaut)	..
49	,, 29..	7 50 ,,	Ditto	..	..
50	,, 29..	..	Ditto	Orionis. (Rigel)	..
51	,, 29..	..	Ditto	(Sirius)	..
52	,, 29..	..	Ditto	(Procyon)	..
53	,, 30..	Noon.	Ditto	Sun.	..
55	Nov. 6..	..	Makpa village .. .. .	..	..
56	,, 6..	7 55 P.M.	Ditto	(Fomalhaut)	..
57	,, 7..	Noon.	Ditto	Sun.	..
58	,, 8..	7 55 P.M.	Ditto	(Fomalhaut)	..
59	,, 8..	..	Ditto	(Sirius)	..
61	,, 9..	Noon.	Ditto	Sun.	..
1	Aug. 26..	..	Lapta Rebo camp	Polaris.	..
2	,, 29..	..	Jiachin camp	(Fomalhaut)	..
3	,, 30..	..	Nagpo Shando camp	Polaris.	..

WITH ELLIOTT'S 6-INCH RADIUS SEXTANTS, NOS. 44 AND 45—continued.

Double Altitude.	Single.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.
133 24 50	..	+ 2' 0"	31 48 27.5	} 31 48 25.6	
55 44 50	31 48 37.4		
99 39 40	31 48 22.8		
83 18 50	31 48 14.5	} 31 47 49.6	
133 27 20	31 47 12.3		
66 24 40	31 48 26.8		
55 53 50	31 44 0.5	} 31 43 52.6	
99 48 50	31 43 44.7		
56 8 20	31 36 43.2	31 36 43.2	
56 6 50	31 37 32.1	31 37 32.1	
56 13 40	31 34 5.3	} 31 34 11.3	
65 56 0	31 34 12.6		
100 8 30	31 33 54.6		
83 46 50	31 34 10.3	} ..	On meridian.
96 58 40	31 34 29.8		
56 47 10	31 17 18.6	31 17 18.6	
57 0 40	31 10 33.4	31 10 33.4	
57 7 30	31 7 10.3	} 31 6 17.9	Watch ceased going.
93 41 40	31 6 16.5		
57 9 50	31 6 0.2		
57 10 0	31 5 54.8	} 31 6 17.9	
101 4 30	31 5 54.0		
84 43 0	31 6 4.5	..	Ditto.
128 55 50	31 5 4.6	..	Ditto.
90 56 40	31 7 58.2	} 31 2 10.8	
86 42 20	31 2 25.6		
57 18 30	31 1 44.3		
86 5 40	31 2 47.2	} 31 2 10.8	
57 18 20	31 1 49.1		
84 51 20	31 1 56.4	} 31 2 10.8	
84 56 20	31 2 21.9		
66 58 10	..	- 7' 0"	32 0 23.0	32 0 23.0	A little after transit.
55 20 30	32 5 27.3	32 5 27.3	
66 44 0	31 53 19.2	31 53 19.2	

OBSERVATIONS OF THE BOILING

No. of Station.	Astronomical Date.	Watch Time.	STATION.
	1867.	H. M.	
1	June 28 ..	5 42 P.M.	Badrinath
2	July 4 ..	8 30 A.M.	Mana village, 1 $\frac{1}{4}$ mile N. of Badrinath .
3	„ 5 ..	4 30 P.M.	Ditto
4	„ 26 ..	7 0 A.M.	Ghastoli (halting-place)
5	„ „ ..	7 0 „	Ditto
6	„ 27 ..	3 0 P.M.	Tare (foot of hill)
7	„ 28 ..	9 0 A.M.	Hutoli (pile of stones)
8	„ 30 ..	Noon.	Lumarti-Sundo camp
9	„ „ ..	..	Ditto
10	Aug. 1 ..	5 47 A.M.	Ditto
11	„ 2 ..	7 40 „	Chirkong
12	„ 4 ..	6 8 „	Barku village
13	„ 5 ..	4 0 P.M.	Totling monastery
14	„ 7 ..	7 0 „	Be-Songbo-ka-Sumdo
15	„ 8 ..	6 8 „	(Larcha) Bogola foot of mountain ..
16	„ 9 ..	9 0 A.M.	Bogola
17	„ „ ..	6 30 P.M.	On the other side of Bogola
18	„ 10 ..	6 30 „	Khangiah camp
19	„ 11 ..	5 10 „	Gugti camp
20	„ 12 ..	4 25 „	Gugti-Sumdo
21	„ 13 ..	9 0 A.M.	Gugti-la
22	„ „ ..	5 45 P.M.	(Chojothol) Gugti camp
23	„ 14 ..	5 5 „	Lojan camp
24	„ 15 ..	6 0 „	Chojo-Gunsa
25	„ 16 ..	6 36 „	Name not known
26	„ 19 ..	4 23 „	Kiangma Chumik
27	„ 20 ..	9 0 A.M.	Paba-la
28	„ „ ..	5 30 P.M.	(In Puttie Singmiath) Giachuruff ..
29	„ 22 ..	3 53 „	Chomorang-la

POINT TAKEN IN GREAT TIBET.

THERMOMETER.		THERMOMETER.		Deduced height above Sea.	REMARKS.
No.	Boiling Point.	No.	In Air.		
22	195·40	30	60·00	10,284	On first step of temple.
„	195·10	„	64·00	} 10,510	
„	195·00	„	66·00		
„	190·40	38	51·00	} 13,251	On crest of pass, also called Chirbitiala and Doongri-la.
30	191·00	„	50·00		
„	185·50	„	50·00	16,587	
„	182·00	„	37·00	18,576	
„	185·50	„	57·50	16,660	
22	185·40	„	57·50	16,317	
30	185·50	„	30·00	16,396	
„	187·00	„	53·50	15,708	
„	191·50	„	55·50	13,005	
„	192·75	„	69·00	12,295		On house-top about 15 feet above ground, and 60 feet above river.
„	191·50	„	64·00	13,050	Junction of streams.
„	187·50	„	49·00	15,364	
„	181·00	„	40·00	19,220	On crest of pass.
„	186·50	„	45·50	15,935	Foot of mountain.
„	188·00	„	58·25	15,129	
„	188·00	„	67·50	15,205	On bank of Gugti stream.
„	184·50	„	62·50	17,324	Junction of streams.
„	180·50	„	37·00	19,490	On crest of pass.
„	185·00	„	58·25	16,968	On the other side of Gugti-la.
„	186·00	„	58·25	16,353	On bank of Lang-Chu stream.
„	187·00	„	53·00	15,700	Ditto.
„	187·75	„	58·25	15,289	
„	185·50	„	59·00	16,669	Halting-place where water is procurable
„	183·75	„	49·25	17,649	On crest of pass.
„	187·00	„	57·00	15,732	Camp on bank of Singi-Chu stream.
„	185·00	30	56·00	16,949	Foot of mountain.

OBSERVATIONS OF THE BOILING

No. of Station.	Astronomical Date.	Watch Time.	STATION.
	1867.	H. M.	
30	Aug 23 ..	6 0 P.M.	Chomorang camp
31	,, 27 ..	7 0 A.M.	Thok-Jalung (near gold-mine)
32	,, 29 ..	2 50 P.M.	Ditto
33	,, 31 ..	3 0 ,,	Chomorang-la
34	Sept. 4 ..	6 15 ,,	Shildung camp
35	,, 5 ..	4 23 ,,	Giamchung (Gopha)
36	,, 6 ..	5 30 ,,	Thanker village
37	,, 7 ..	5 52 ,,	Pika village
38	,, 8 ..	6 30 A.M.	Ditto
39	,, ,, ..	3 36 P.M.	Burkung village (in ruins)
40	,, 9 ..	4 15 P.M.	Marku camp
41	,, 10 ..	5 12 ,,	Dak Maru (red hill)
42	,, 11 ..	6 2 A.M.	Ditto
43	,, ,, ..	5 35 P.M.	Ralajung (on bank of Singi-chu) ..
44	,, 12 ..	5 55 ,,	Lujan-Chumik
45	,, 13 ..	5 0 ,,	On bank of Garjung-Chu stream ..
46	,, 14 ..	5 30 ,,	Gargunsa village, near stream
47	,, 15 ..	5 30 ,,	Loagong (Rebo) camp
48	,, 17 ..	5 30 A.M.	Garyarsa monastery
49	,, 25 ..	9 0 ,,	Dunkhar village
50	,, 30 ..	6 55 ,,	Totling (monastery)
51	Oct. 5 ..	8 0 ,,	Mangnang village
1	Aug. 25 ..	5 30 P.M.	Gobarteja-rebo
2	,, 28 ..	6 30 A.M.	Chakrang camp
3	,, 29 ..	7 0 ,,	Niarcher camp
4	,, ,, ..	5 30 P.M.	Giachan Günsa (house)
5	Sept. 23 ..	6 30 A.M.	Tashikong village
1	Oct. 1 ..	6 30 ,,	Barku village
2	,, 2 ..	6 12 ,,	Sharbarak-chu
3	,, 3 ..	6 6 ,,	Puling-Gongma camp
4	,, 5 ..	5 50 ,,	Rildighang camp
5	,, 6 ..	5 15 ,,	Ri village
6	,, 8 ..	5 59 ,,	Lanjam-Samba (near)
7	,, ,, ..	4 38 P.M.	Sirang-la

POINT TAKEN IN GREAT TIBET—continued.

THERMOMETER.		THERMOMETER.		Deducted height above Sea.	REMARKS.
No.	Boiling Point.	No.	In Air.		
30	184.50	30	45.00	17,151	
„	185.75	„	41.00	16,346	} 16,337
„	186.00	„	55.00	16,327	
„	182.00	„	53.00	18,765		On top of mountain.
„	188.75	38	55.00	14,652	Near stream.
„	188.50	„	62.50	14,861	
„	188.75	„	59.75	14,688	On bank of Singi-Chu, about 12 feet over the water.
„	188.80	„	56.75	14,637	
„	189.00	„	40.00	14,388	
„	189.40	„	64.00	14,324	On bank of Singi-Chu stream.
„	189.75	„	57.50	14,071	Ditto.
„	190.00	„	58.25	13,920	On top of hill.
„	190.50	„	23.00	13,393	
„	191.50	„	58.50	13,022	
„	191.50	„	54.50	12,999	On bank of Garjung-Chu stream.
„	191.00	„	53.00	13,287	
„	189.50	„	47.00	14,147	
38	188.75	„	49.00	14,381	
„	188.75	„	30.00	14,241	
„	190.00	„	51.50	13,652	
„	192.50	„	42.00	12,101	
22	190.80	„	supposed 30	12,867	
38	187.00	„	56.00	15,495	In puttee Singmiath.
„	186.50	„	40.00	15,659	
„	186.50	„	44.50	15,709	
„	186.25	„	47.25	15,878	
30	191.50	„	66.25	13,027	Near Monastery.
38	191.75	„	34.00	12,503	
„	190.00	„	36.25	13,545	
„	189.50	„	29.50	13,801	
„	189.50	„	17.00	13,709	
„	189.75	„	26.50	13,634	
„	196.00	„	39.75	10,039	On bank of Sutlej River.
„	185.00	„	32.00	16,491	On top of mountain.

OBSERVATIONS OF THE BOILING

No. of Station.	Astronomical Date.	Watch Time.	STATION.
	1867.	H. M.	
8	Oct. 9 ..	6 0 A.M.	Dongkhang (one house)
9	,, 10 ..	5 51 ,,	Miang village
10	,, 11 ..	6 37 P.M.	Tiak village
11	,, 12 ..	6 25 A.M.	Shipki village
12	,, 13 ..	5 28 ,,	Kuak village
13	,, 15 ..	7 32 ,,	Kuang village
14	,, ,, ..	12 24 P.M.	Pungrang-che-la
15	,, 16 ..	7 7 A.M.	Sang village
16	,, ,, ..	12 42 P.M.	Pimikche-la
17	,, 17 ..	7 35 A.M.	Sâmna (junction of streams)
18	,, 18 ..	7 6 ,,	Bikar village
19	,, 19 ..	8 55 ,,	Sarâng village
20	,, 22 ..	12 55 P.M.	Tago-la
21	,, 24 ..	7 32 A.M.	Sumdo Changjum camp
22	,, 25 ..	7 22 ,,	Nonam village
23	,, 27 ..	6 30 P.M.	Nilung or Chorsa village
24	,, 30 ..	1 8 ,,	Ditto
25	Nov. 7 ..	4 45 ,,	Mukpa village
26	,, 11 ..	6 42 A.M.	Ditto

POINT TAKEN IN GREAT TIBET—*continued.*

THERMOMETER.		THERMOMETER.		Deduced height above Sea.	REMARKS.
No.	Boiling Point.	No.	In Air.		
38	189·50	38	..	..	The Mercury sunk so low that the thermometer could not be read.
,,	193·50	,,	30·00	11,458	
,,	196·75	,,	36·50	9,592	
,,	196·00	,,	35·00	10,027	On top of a house.
,,	196·00	,,	37·50	10,030	
,,	191·50	,,	27·00	12,610	
,,	185·75	,,	34·00	16,057	On crest of pass.
,,	189·50	,,	18·00	13,715	
,,	183·50	,,	33·00	17,403	Ditto.
,,	190·50	,,	28·00	13,201	
,,	194·00	,,	38·00	11,201	
,,	193·00	,,	37·50	11,783	
,,	184·50	,,	34·00	16,810	On crest of pass
,,	190·75	,,	16·00	12,984	
,,	191·50	,,	22·00	12,583	
,,	194·00	,,	32·00	11,181	
,,	193·75	,,	51·00	11,407	
,,	199·25	,,	48·00	8,172	Alongside Dharamsala,
,,	199·50	,,	34·00	8,012	