



Photo engraving.

Survey of India Office, Calcutta, 1916.

PANDIT NAIN SINGH, C. I. E.  
SURVEY OF INDIA.  
THE FIRST OF THE PANDITS OF TIBETAN EXPLORATION.  
1865-75.

# RECORDS

OF THE

# SURVEY OF INDIA

Volume VIII (in two parts): Part I.

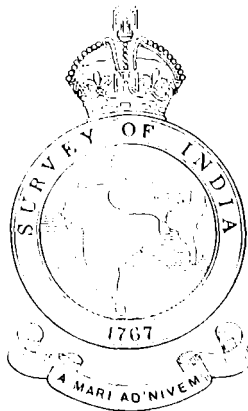
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## EXPLORATION IN TIBET AND NEIGHBOURING REGIONS

1865-1879.

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PREPARED UNDER THE DIRECTION OF  
Colonel Sir S. G. BURRARD, K. C. S. I., R.E., F. R. S.  
Surveyor General of India



DEHRA DUN  
PRINTED AT THE OFFICE OF THE TRIGONOMETRICAL SURVEY  
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## P R E F A C E .

The reports published in these volumes are not new: they are reprints of former publications. They have been republished in this new form partly because many of the old publications are now out of print and are not obtainable, and partly because the old publications are spread and scattered over numerous annual departmental and other reports and have never before been presented together in one collected whole.

•

G. P. LENOX CONYNGHAM,

Dehra Dun: }  
22nd February, 1916. } *Superintendent of the Trigonometrical Survey.*

COLONEL, R. E.,



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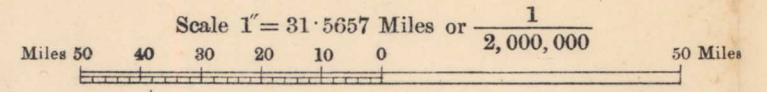
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- NO. XII. IRON CHAIN BRIDGE AT CHAK-SAMTUKA



ROUTE SURVEY  
 FROM  
**NEPĀL TO LHĀSA**  
 BY  
**PANDIT NAIN SINGH, C.I.E.**  
 (THE PANDIT)  
 1865-6

Compiled from the Original Materials  
 by  
**CAPTAIN T.G. MONTGOMERIE, R.E; F.R.G.S.**  
**G.T. SURVEY OF INDIA**



**NOTES**  
 Route of the Pandit.....  
 Camps.....▲  
 Monastery.....My.  
 Ta-sam.....Halting place  
 The longitudes are referrible to the old value of the Madras observatory viz 80° 17' 21"

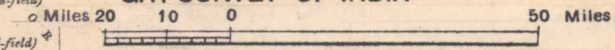
UPPER BASINS  
OF THE  
**INDUS & SUTLEJ RIVERS**  
WITH THE SOURCES OF THE  
**BRAHMAPUTRA & KARNALI RIVERS**  
FROM  
ROUTE SURVEYS MADE BY THE PANDIT EXPLORERS  
1867

Compiled from the Original Materials

by

CAPTAIN T.G. MONTGOMERIE, R.E., F.R.G.S.

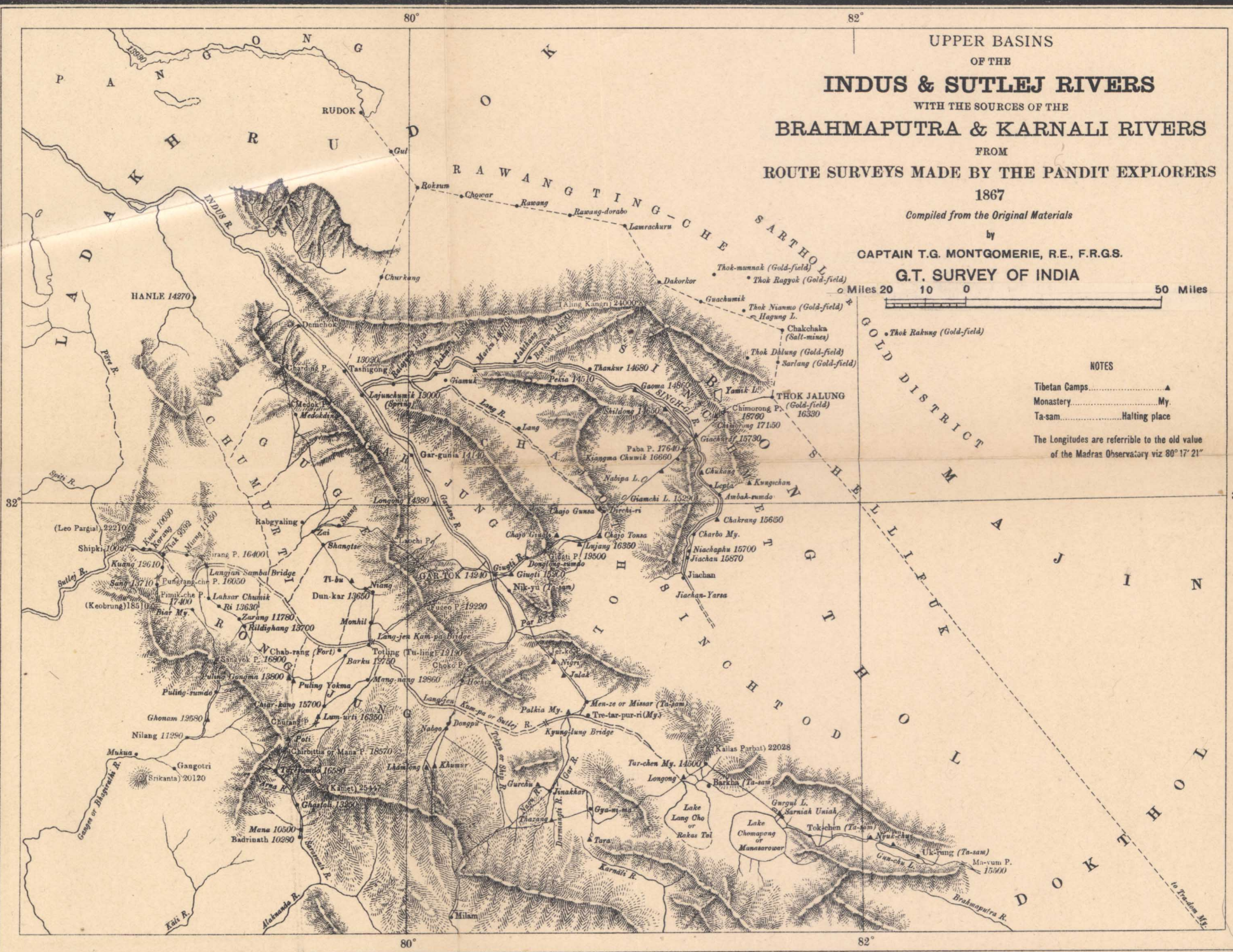
G.T. SURVEY OF INDIA



NOTES

- Tibetan Camps.....▲
- Monastery.....My.
- Ta-sam.....Halting place

The Longitudes are referrible to the old value of the Madras Observatory viz 80° 17' 21"





THE  
**TING-RI MAIDAN**  
 AND  
**UPPER ARUN RIVER**  
 WITH THE  
**EASTERN AND WESTERN SOURCES**  
 OF THE  
**KOSI OR KOSIKI RIVER**  
 THE GREAT EASTERN TRIBUTARY OF THE  
**GANGES**

ALSO  
**PART OF GREAT TIBET**  
 FROM A ROUTE SURVEY  
 MADE BY HARI RAM 1871-72  
 COMPILED FROM THE ORIGINAL MATERIALS  
 BY  
 MAJOR T. G. MONTGOMERIE, R.E., F.R.S., F.R.G.S.  
 Hon. Assoc. of the Indian Geographical Society, &c.  
 DEPUTY SUPERINTENDENT  
 G. T. SURVEY OF INDIA.

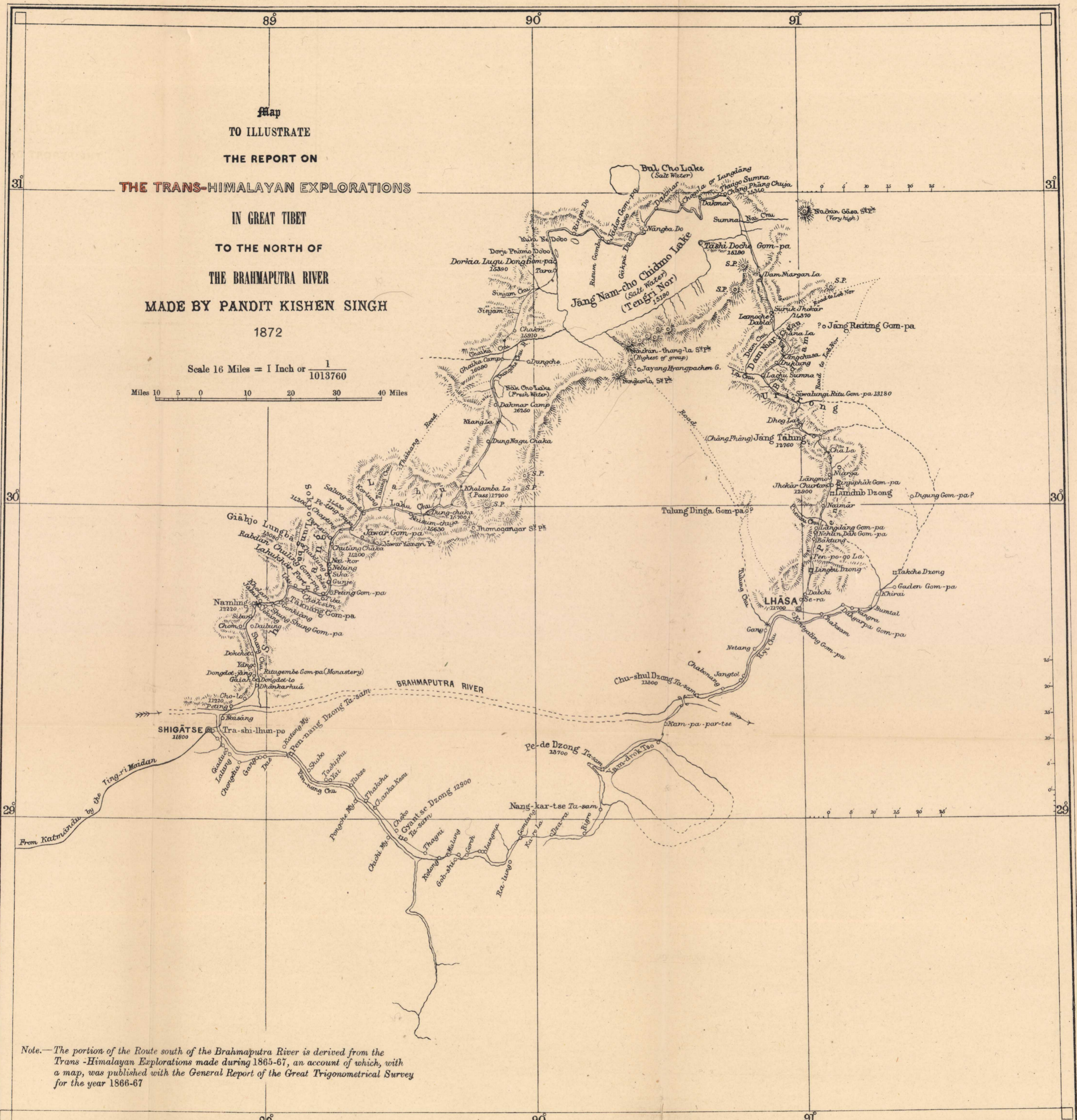
- References**
- Route Survey ..... denoted by —○—
  - Peaks fixed by the G. T. Survey ..... do. —△—
  - Do. by Route Survey ..... do. —○—
  - British Boundary ..... colored Red
  - Nepal do. .... do. Green
  - Sikkim do. .... do. Neutral tint
  - Chino-Tibetan do. .... do. Yellow
  - Glaciers ..... do. Emerald-Green
  - Dzong signifies Fort
  - Gom-pa " Buddhist Monastery
  - Chu " River.
  - La " Pass.
- Note: The country from Saka Tsan-po to Gyantse Dzong from Pandit's Map.

Scale 16 miles = 1 inch, or  $\frac{1}{1013760}$

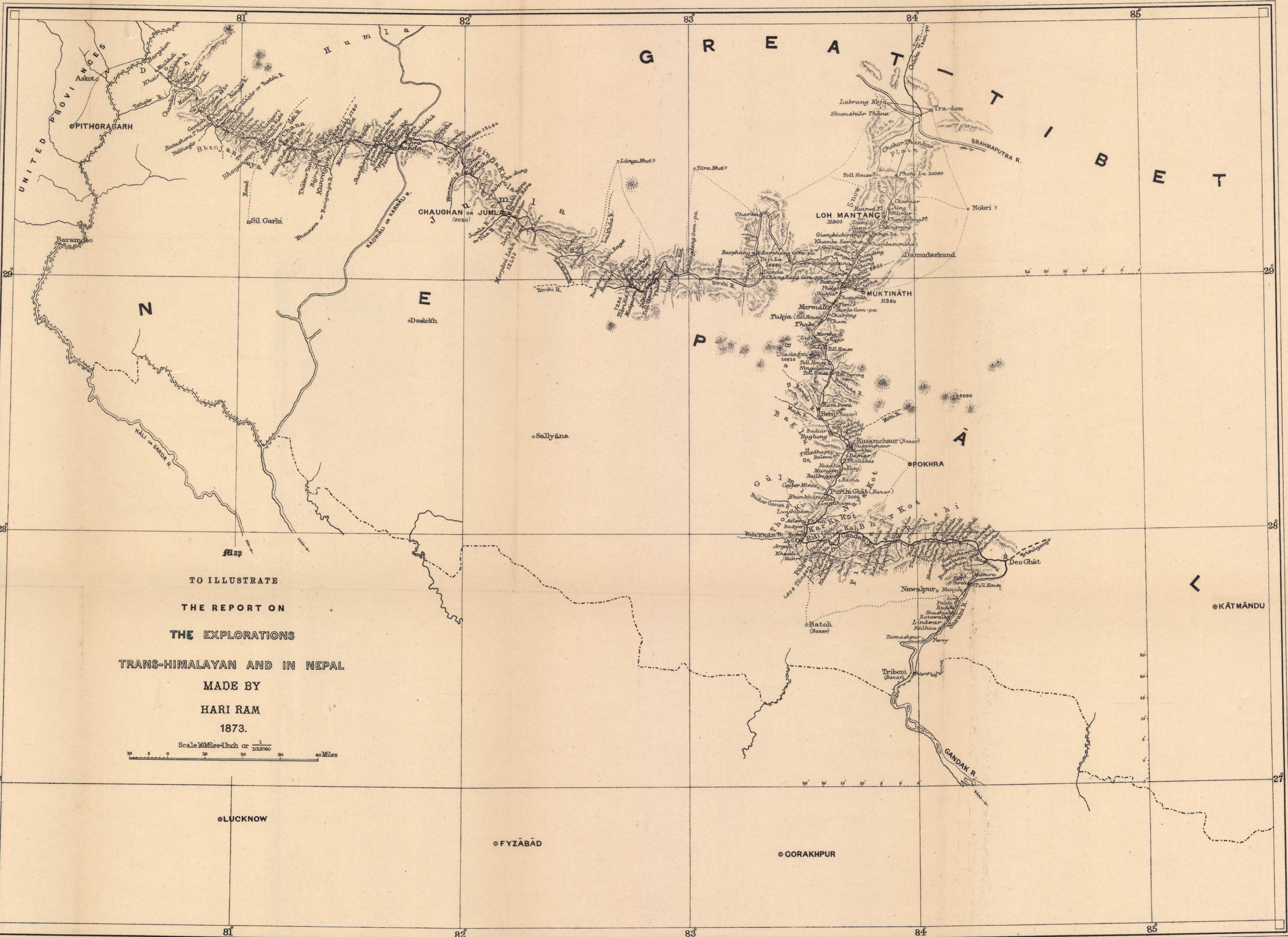
10 5 0 10 20 30 40 50 60 Miles

Map  
TO ILLUSTRATE  
THE REPORT ON  
**THE TRANS-HIMALAYAN EXPLORATIONS**  
IN GREAT TIBET  
TO THE NORTH OF  
THE BRAHMAPUTRA RIVER  
MADE BY PANDIT KISHEN SINGH  
1872

Scale 16 Miles = 1 Inch or  $\frac{1}{1013760}$   
Miles 10 5 0 10 20 30 40 Miles



Note.—The portion of the Route south of the Brahmaputra River is derived from the Trans-Himalayan Explorations made during 1865-67, an account of which, with a map, was published with the General Report of the Great Trigonometrical Survey for the year 1866-67



TO ILLUSTRATE  
 THE REPORT ON  
 THE EXPLORATIONS  
 TRANS-HIMALAYAN AND IN NEPAL  
 MADE BY  
 HARI RAM  
 1873.

Scale 16 Miles = 1 Inch or 1:1,276,000







Scale 24 Miles = 1 Inch or 1:576,000

REFERENCES

Chaka	= Salt lake	Kang Ri	= Snowy Mountain
Changma	= Northern	La	= Pass
Cho	= Freshwater lake	Shoma	= Southern
Chu	= River	Tsan-po	= Large River
Chumik	= Spring	Sundo	= Junction of streams
De	= District	Thok or	} = Gold Fields
Gom-pa	= Monastery	Sarka	

Sheet 1 of Map  
 ILLUSTRATING  
 THE REPORT ON  
**PANDIT NAIN SINGH'S ROUTE**  
 THROUGH GREAT TIBET  
 FROM LADAKH TO ASSAM  
 VIA THE TENGRI NOR (LAKE) AND LHASA  
 IN 1873-74-75

Sheet 11 of 11A  
 ILLUSTRATING  
**THE REPORT ON  
 PANDIT NAIN SINGH'S ROUTE**  
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 FROM LADĀKH TO ASSAM  
 VIA THE TENGRI NOR (LAKE) AND LHĀSA  
 IN 1873-74-75

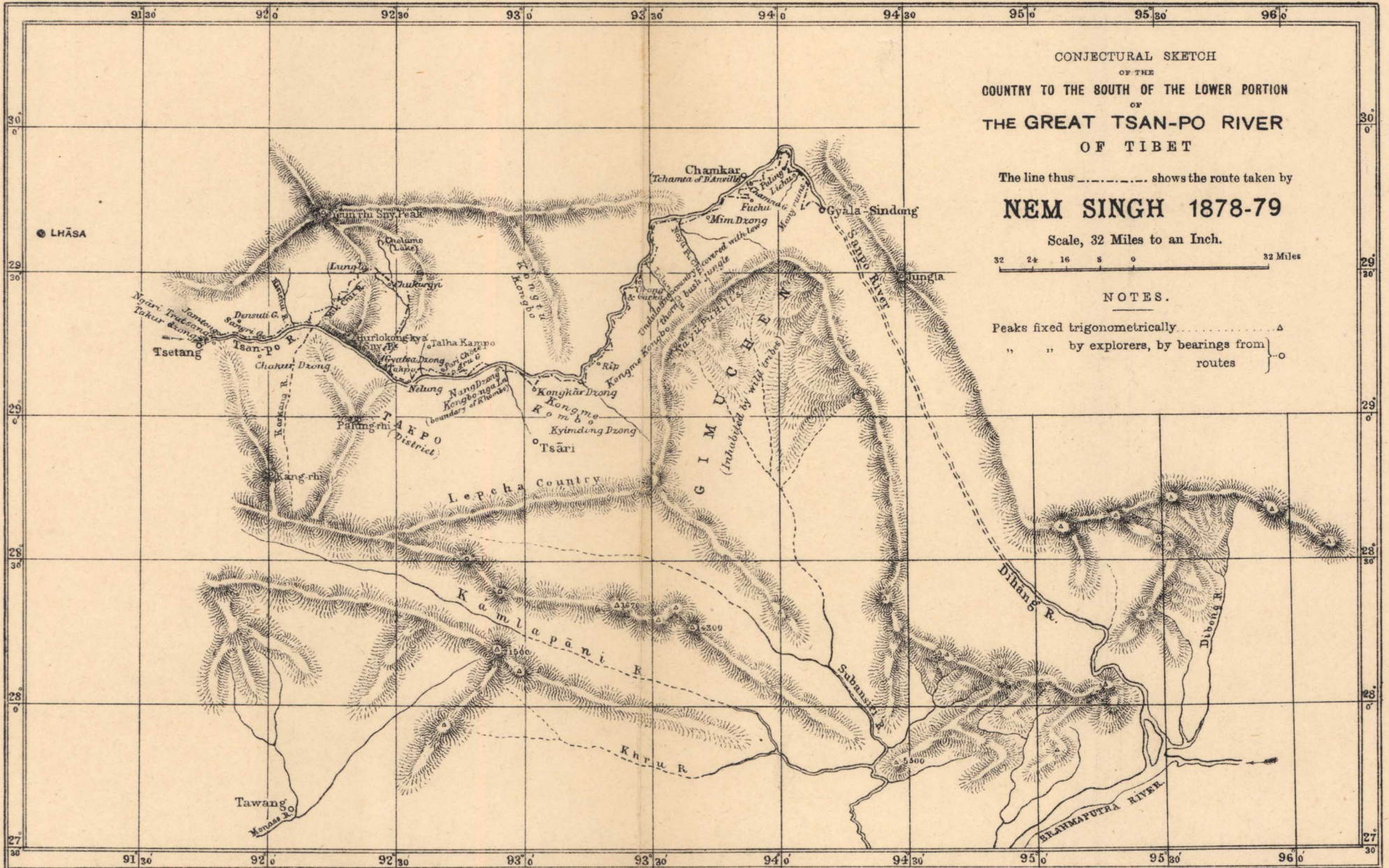
Scale 24 Miles = 1 Inch or  $\frac{1}{153600}$  Miles

REFERENCES

Chaka	= Salt lake	Kang Ri	= Snowy Mountain
Changma	= Northern	La	= Pass
Cho	= Freshwater lake	Shoma	= Southern
Chu	= River	Tsan-po	= Large River
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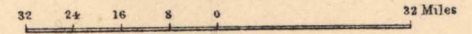


CONJECTURAL SKETCH  
OF THE  
COUNTRY TO THE SOUTH OF THE LOWER PORTION  
OF  
THE GREAT TSAN-PO RIVER  
OF TIBET

The line thus ----- shows the route taken by

**NEM SINGH 1878-79**

Scale, 32 Miles to an Inch.



NOTES.

- Peaks fixed trigonometrically..... Δ
- "    "    by explorers, by bearings from } routes

81° 0'  
31° 30'

81° 30'

82° 0'  
31° 30'

# MANASAROWAR and RAKAS TAL LAKES

by  
PANDIT KALIAN SINGH

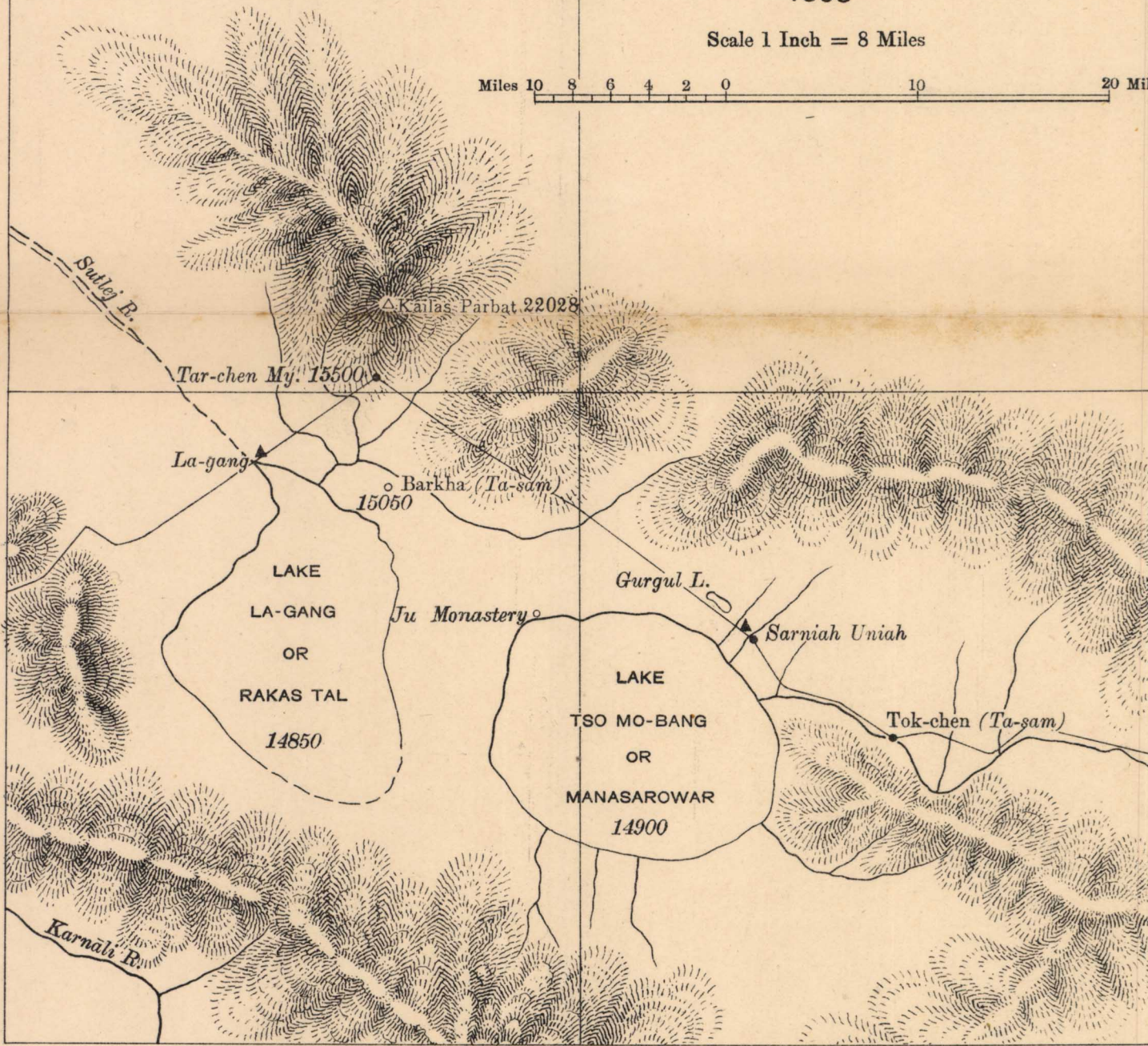
1868

Scale 1 Inch = 8 Miles

Miles 10 8 6 4 2 0 10 20 Miles

31° 0'

31° 0'

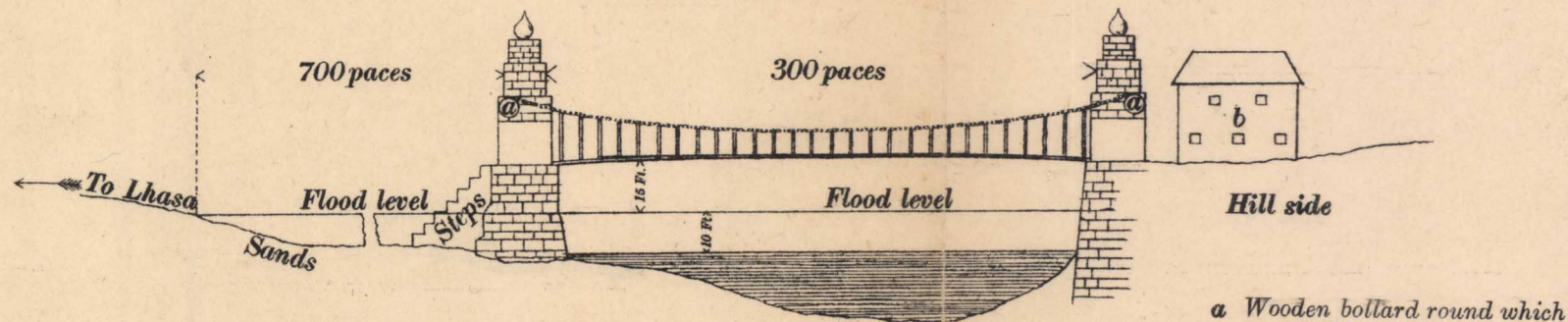


30° 30'  
81° 0'

81° 30'

30° 30'  
82° 0'

IRON CHAIN BRIDGE AT CHAK-SAMTUKA



a Wooden bollard round which the chains are wrapped

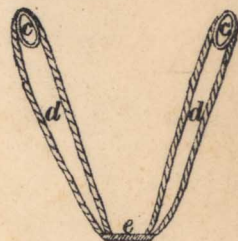
b Chak-sam Monastery

Links of Chains

<1 Foot>



Transverse Section of Bridge



c Iron Chains

d Rope Suspenders

e Footway



# CHARTS FOR PART II

[In Pocket]

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# REPORT OF A ROUTE-SURVEY

FROM

## NEPĀL TO LHĀSA.

BY

Captain T. G. Montgomerie R.E.

---

Exploration beyond the frontiers of British India has, for many years, made but little comparative progress, and (as far as Europeans have been concerned) has been confined to points not many marches beyond the border.

A European, even if disguised, attracts attention when travelling among Asiatics, and his presence, if detected, is now-a-days often apt to lead to outrage. The difficulty of redressing such outrages, and various other causes, has, for the present, all but put a stop to exploration by Europeans. On the other hand, Asiatics, the subjects of the British Government, are known to travel freely without molestation in countries far beyond the British frontier; they constantly pass to and fro between India and Central Asia, and also between India and Tibet, for trading and other purposes, without exciting any suspicion.

In 1861 it was consequently proposed to take advantage of this facility possessed by Asiatics, and to employ them on explorations beyond the frontier. The government of India approved of the project, and agreed to support it liberally.

With a view to carry out the above, Colonel Walker, the superintendent of the Great Trigonometrical Survey, engaged Pandit Nain Singh (known as "the Pandit") and his brother British subjects, from one of the upper valleys of the Himalaya. These men were recommended by Major Smyth, of the Educational Department, as likely to have great facility in travelling through various parts of Tibet, their countrymen having always been granted by the Chinese authorities the privilege of travelling and trading in Ngari Khorsum, the upper basin of the Sutlej. Such promising recruits having been secured, they were at once sent to the head-quarters of the Great Trigonometrical Survey, in order to be trained for Trans-Himalayan exploration.

On Colonel Walker's departure for England, these Pandits were put under Captain Montgomerie, who completed their training. They were found to be very intelligent, and rapidly learnt the use of the sextant, compass, &c., and before long recognized all the larger stars without any difficulty. Their work, from actual practice, having been found to be satisfactory, Captain Montgomerie directed them to make a route-survey from the Manasarowar lake to Lhāsa, along the great road that was known to exist between Gar-tok and Lhāsa. From Lhāsa they were directed to return by a more northerly route to Manasarowar. The route to Lhāsa was selected by Captain Montgomerie, because it was known, from native information, to be practicable as far as the road itself was concerned. If explored it was likely to define the whole course of the great river known to flow from near the Manasarowar lake to beyond Lhāsa. Hitherto the sole point on the upper course of this great river, the position of which was known with any certainty, was a point near Tra-shi-lhun-po or Shigātse, as determined by Captain Turner in 1783. The position of Lhāsa, the capital of Great Tibet, was, moreover, only a matter of guess, the most probable determination having been derived from native information as to the marches between Turner's Teshooloomboo (Tra-shi-lhun-po) and Lhāsa. In fact the route from the Manasarowar lake to Lhāsa, an estimated distance of 7 or 800 miles, was alone a capital field for exploration.

An attempt was made by the Pandits to advance direct from Kumaun, *via* Manasarowar to Lhāsa, but they did not find it practicable. Whilst in Kumaun they came across some British subjects, Bhotiās, who had been robbed whilst trading in the Chinese territories, near Gar-tok. These Bhotiās thought that, if the matter was properly represented, they might get redress from the Lhāsa Government, and hearing that the Pandits were going to Lhāsa, asked them to be their agents (*vakils*), in order to recover what they could. The Pandits consented, and one of them returned to Captain Montgomerie for fresh instructions. The attempt by the Manasarowar lake having failed, it appeared to Captain Montgomerie that the best chance of reaching Lhāsa would be through Nepāl, as the Nepālese Government has always maintained relations of some kind with the Government of Lhāsa. Traders from Nepāl, moreover, were known to visit Lhāsa, and Lhāsa traders to visit Nepāl.

Captain Montgomerie thought that the wish to recover money for the Bhotiās of Kumaun would afford a plausible excuse for the Pandit's journey to Lhāsa, an excuse the Nepālese would thoroughly understand, and he trusted the frequent intercourse with Lhāsa would eventually afford the Pandits a good opportunity of travelling to that place in company with traders or others.

The Pandits were consequently ordered to go to Katmandu, and from thence to try and make their way to the great road between the Manasarowar and Lhāsa. Their instrumental equipment consisted of two large sextants,\* two box sextants, prismatic and pocket compasses, thermometers for observing temperature of air and of boiling water, pocket chronometer, and common watch, with apparatus, the latter reduced as much as possible.

The Pandits started from Dehra Dūn, reached Morādābād on the 12th January, and Bareilly on the 23rd January, 1865. At Bareilly they took latitude observations, and commenced their route-survey. They crossed the Nepālese frontier at Nepālganj, Jang Bahādūr's new town, and from thence went by the Sisagarhi road to Katmandu, reaching the latter place on the 7th March, 1865.

In Katmandu they made inquiries on all sides as to the best route to Lhāsa; they found that the direct one by Kuti (or Nilam), across the Dingri plain (or Ting-ri Maidan, as it is called), was likely to be very difficult, if not impassable, owing to the snow at that early season (March, April). They consequently determined to try the route by Kerun Shahr, a small town in the Lhāsa territory, as that route was said to be passable earlier than the Kuti route. Having made their arrangements, the Pandits started full of hope on the 20th March, 1865, accompanied by four men, whom they had hired as servants.

On the 26th they reached Medongpodo village, and here they changed their mode of dress to one better known to the people of Lhāsa. They also gave out that they were Bashahris,† and were going to buy horses, at the same time to do homage at the Lhāsa shrine. The character of Bashahris was assumed, because they knew that those people had from time immemorial been privileged to travel in the Lhāsa territory without question. On the 28th March they reached the neighbourhood of Kerun Shahr, but, much to their disappointment, they were stopped by the Chinese officials, who questioned them as to the object of their journey, and searched their baggage. Fortunately the instruments (which had been ingeniously secreted in a false compartment of a box) escaped detection; but still, though nothing suspicious was seen, the plausible reasons given for the journey did not satisfy the jealousy of the Chinese authorities. In spite of everything urged, they were not allowed to pass until a reference had been made to the Kerun Shahr governor. The Kerun Shahr governor seems at once to have noted the weak points of their story, and having pointed them out with inexorable logic, declined to let them pass on any consideration; they were therefore reluctantly forced to retrace their steps to Shābru. At Shābru the wily Pandit managed to persuade a high official that they were no impostors, and induced him, moreover, to certify that in a letter to the Kerun Shahr governor. Armed with this letter they returned towards Kerun Shahr with hopes of better luck, and no doubt, under ordinary circumstances, would have succeeded; but on the road they fortunately discovered that the Kerun Shahr governor was an individual who had known the Pandit's brother personally when he was chief of Taklakhar or Purang near Manasarowar; his brother had in fact been frequently in close and friendly relations with him. This at once put a stop to all hopes of his advancing by the Kerun Shahr route, as the governor well knew he was no Bashahri. The other Pandit thought of proceeding by himself, but, being able to devise no feasible method, he gave up the idea, and the party consequently marched back, reaching Katmandu on the 10th April. Here they made fresh inquiries as to some more promising way of getting to Lhāsa. At last they heard of two opportunities, the first by accompanying the camp of a new agent (vakīl) that Jang Bahādūr was about to send to Lhāsa, and the second by accompanying a Bhot merchant. In order to increase their chances of success, they decided that one should go with the Nepāl agent, and the other with the merchant. The vakīl at first agreed to take one of them with him, but ultimately refused.

Failing with the vakīl, it was impossible for the Pandit, who was known to the Kerun Shahr governor, to go with the Bhot merchant, as he intended to take the Kerun Shahr route; he consequently decided to try a more circuitous route by Muktināth, but in this he failed, owing, according to his own account, to loss of health and the unsafe state of the roads, but, no doubt, in a great measure due to his own want of determination. After a long journey through the upper parts of the Nepāl territory, he returned to British territory. The account of his proceedings is referred to separately. The other Pandit, at first, was not much more successful with the merchant than his brother had been with the vakīl. The merchant, Dawa Nangal, promised to take the Pandit to Lhāsa, and on the strength of that proceeded to borrow money from him. The merchant, however, put off starting from day to day, and eventually the Pandit had to start with one of the merchant's servants, the merchant himself promising to follow in a few days. The Pandit assumed the dress of a Ladākhi, and, to complete his disguise, added a pig-tail to his head. This change was made, because he was afraid that the Kerun Shahr officials, who stopped him the first time, might recognize him again.

Starting on the 3rd June with one servant and Dawa Nangal's man, he reached Shābru on the 20th of June, having been delayed six days by a bad attack of fever. At Shābru he was

\* Only one large sextant was taken to Lhāsa.

† From the British valley of that name north-east of Simla.

kindly received by Dawa Nangal's family, but Dawa Nangal himself never made his appearance, and it became evident that he did not intend to keep his promise. In his perplexity the Pandit appealed to Dawa Nangal's uncle, and told him how he had been treated. The uncle, a man of some authority, said he sympathized with him, and gave him a pass to Kerun Shahr and a letter to Dawa Nangal's brother, who had just returned to Kerun Shahr from Lhāsa. In the letter he mentioned that the Pandit's claim against Dawa Nangal was just, and, in consequence, requested him to arrange for the Pandit's journey to Lhāsa, and, if necessary, to stand security for him.

Starting on the 6th July with one of the uncle's servants, the Pandit managed to make his way into Kerun Shahr. Here he found Dawa Nangal's brother, by name Chūng Chu. Chūng Chu, on hearing the state of the case, promised to assist the Pandit on to Lhāsa, but refused to pay his brother's debt. Chūng Chu proved himself a better man than his brother, for, though permission to travel by the direct route was refused, he ultimately succeeded in getting the Pandit permission to travel onwards; by this means he reached Tra-dom monastery, a well-known halting-place on the great road between Lhāsa and Gar-tok. Starting on the 13th August from Kerun Shahr, he reached Loha on the 23rd. From Katmandu up to this point vegetation and jungle had been abundant, but, beyond, the mountains were throughout bare, and all but barren.

On the 24th August the Pandit joined a large trading party, travelling *visā* Tra-dom to Manasarowar, and was allowed to accompany them. On the 30th he reached Tala Labrang, and there first caught sight of the great river\* that flows towards Lhāsa. His first acquaintance with this river was calculated to inspire him with respect for it, as three men were drowned in front of him by the swamping of a ferry boat. Alarmed by this occurrence the party marched a short distance farther up the river to a better ferry, by which they crossed in safety to the Tra-dom monastery on the 6th of September. At Tra-dom the Pandit feigned sickness, as a reason for not going on to Manasarowar, and he was accordingly left behind. Continuing to feign illness, he at last found an admirable opportunity of going to Lhāsa, viz., by accompanying a Ladākhi merchant in the employ of the Kashmir Mahārāja, who was that year going to Lhāsa, and was to pass through Tra-dom. On the 2nd of October the merchant's head man, Chiring Nirpal, arrived, and on hearing the Pandit's story at once consented to take him on to Lhāsa. Starting on the next morning with the Ladākhi camp, he marched eastwards along the great road, reaching the town of Sa-ka (Ta-sam) on the 8th October. So far everything had gone smoothly, but here the inquiries made by the authorities rather alarmed the Pandit, and as his funds, owing to the great delays, had begun to run short, the two combined made him very uneasy. However, he manfully resolved to continue his journey. He became a great favourite with Chiring Nirpal and the whole of the Ladākhi camp. On the 19th October they reached Ra-tung. From Tra-dom to this point no cultivation was seen, but here there was a little, and a few willow trees, and onwards to Lhāsa cultivation was met with nearly every day.

On the 22nd October the party reached the town of Janglāche, with a fort and fine monastery on the Nari-chu,\* the great river first met with near Tala Labrang. From this point people and goods are frequently transported by boats to Shigātse, 5 days march (85 miles) lower down the river. Most of the Pandit's companions went by boat, but he having to survey, count paces, &c., went by land. On the 29th October they reached Digarcha, or Shigātse, a large town on the Pen-nang-chu River near its junction with the great Nari-chu River. At Shigātse Chiring Nirpal had to wait for his master, the head merchant, called Lopchak. The Pandit consequently remained in that town till the 22nd of December. The Lopchak, who arrived on the 16th November, saw no objection to the Pandit continuing with the party, and, moreover, promised to assist him at Lhāsa. Whilst at Shigātse the Pandit and his companions remained in a large sort of caravanserai called Kunkhang. The only incident during their long stay there was a visit that he and the Ladākhis paid to the great Tra-shi-lhun-po monastery. This monastery lies about half-a-mile south-west of the city, and is the same as that visited and fully described by Turner. The Pandit would rather not have paid the Lama a visit, but he thought it imprudent to refuse, and therefore joined the Ladākhis, who were going to pay their respects to him. The Pandit confesses that, though personally a follower of Brahma, the proposed visit rather frightened him, as, according to the religion of his ancestors, who were Buddhists, the Lama ought to know the secrets of all hearts. However, putting a bold face on the matter, he went, and was much relieved to find that the Lama, a boy of 11, only asked him three simple questions, and was, according to the Pandit, nothing more than an ordinary child, and did not evince any extra intelligence. At Shigātse the Pandit took to teaching Nepālese shopkeepers the Hindi method of calculation, and thereby earned a few rupees.

The great road, which had hitherto been more or less close to the great Nari-chu River, from Shigātse goes considerably south of that river. On the 25th December they reached the large town of Gyāntse, on the Pen-nang-chu River, which was then frozen hard enough to bear men. Crossing the lofty Ka-ro pass they arrived on the 31st December at Naug-kar-tse, a village on the Yam-drok Tso or Lake Palti with the usual fort on a small hill. For two days the Pandit coasted along the Great Yam-drok Tso.† On the second day he nearly fell a prey to a band

\* The Brahmaputra.

† The margin of the lake was frozen.

of robbers, but, being on horseback,\* he managed to escape, and on the 2nd January reached Demālang, a village at the northern angle of the lake. From Tram-lung the lake was seen to stretch some 20 miles to the south-east. The Pandit estimated the circumference of the lake to be 45 miles, but, as far as he saw, it was only 2 to 3 miles in width. He was informed that the lake encircled a large island, which rises into low rounded hills 2000 or 3000 feet above the surface of the lake. These hills were covered with grass up to the top. Between the hills and the margin of the lake several villages and a white monastery were visible on the island. The villagers keep up their communication with the mainland by means of boats. The Pandit was told that the lake had no outlet, but as he says its water was perfectly fresh, that is probably a mistake; if so, the Pandit thinks the outlet may be on the eastern side, where the mountains appeared to be not quite so high as those on the other sides. The evidence as to the lake encircling a very large island is unanimous. Almost all former maps, whether derived from the Chinese maps made by the Lamas, or from native information collected in Hindustān, agree in giving the island a very large area, as compared with the lake in which it stands. This is, however, a very curious topographical feature, and as no similar case is known to exist elsewhere, it might perhaps be rash to take it for granted until some reliable person has actually made the circuit of the lake. Meantime the Pandit's survey goes a considerable way to confirm the received theory. The lake, from the Pandit's observations, appears to be about 13,500 feet above the sea; it contains quantities of fish. The water was very clear, and said to be very deep.

The island in the centre must rise to 16,000 feet above the sea, an altitude at which coarse grass is found in most parts of Tibet.

From the basin of the Yam-drok Tso the party crossed over the Kam-pa pass, reaching the great Nari-chu (the Brahmaputra) at Kam-pa-par-tse; from thence they descended the river in boats to Chu-shul village. Near Chu-shul they again left the great river, and ascending its tributary, the Kyi Chu or Lhāsa River, in a north-easterly direction reached Lhāsa on the 10th of January, 1866.

The Pandit took up his abode in a sort of caravanserai with a very long name, belonging to the Tra-shi-lhun-po monastery; he hired two rooms that he thought well suited for taking observations of stars, &c., without being noticed. Here he remained till the 21st of April, 1866. On one occasion he paid a visit to the Golden monastery, two marches up the great road to China, which runs from Lhāsa in a north-easterly direction. He also attempted to go down the Brahmaputra, but was told that it was impossible without a well-armed party of a dozen at least. His funds being low, he was obliged to give up the idea, and indeed, judging from all accounts, doubted if he could have done it with funds. The Pandit's account of the city of Lhāsa agrees, in the main, with what has been written in Messrs. Huc and Gabet's book as to that extraordinary capital, which the Pandit found to be about 11,400 feet above the sea. He particularly dwells upon the great number, size, and magnificence of the various monasteries, and the vast number of monks, &c., serving in them.

He had an interview with the Grand Lama, whom he describes as a fair and handsome boy of thirteen years of age. The Lama was seated on a throne 6 feet high and on a lower throne to his right was seated his chief minister, the Gyalbo† or Potolah Rāja, as he is called by the Newār people. The Gyalbo is evidently the actual ruler of Lhāsa, under the Chinese ambān or resident, the Grand Lama being a puppet in the hands of the Gyalbo.

It is curious that the few times these Great Lamas have been seen by reliable people they have been always found to be small boys, or fair, effeminate-looking young men. Moorcroft remarks on the emasculated appearance given to them in all the pictures of them that he saw during his journey to Gar-tok, and the same may be remarked on the pictures of Lamas in the monasteries of Ladākh. M. Huc says that the Dalai Lama at Lhāsa, during their visit in 1846, was nine years of age, and had been Grand Lama for only six years, so that he must have transmigrated once, at any rate, between that time and the Pandit's visit in 1866, possibly oftener, as M. Huc says that, during the time one Nomekhan or Gyalbo was in office, "three successive Dalai Lamas had died very soon after reaching the age of majority." Turner found the Grand Tra-shi-lhun-po Lama quite a child in 1783. From the above it would appear that the poor Lamas are made to go through their transmigrations very rapidly, the intervals being probably in inverse proportion to the amount of trouble they give to the Gyalbo. If the Pandit is right in saying that the Lamas are only allowed to transmigrate thirteen times, and the present Dalai Lama is in his thirteenth body, some changes may be expected before very long in the Lhāsa Government. The Pandit gives a very curious account of the festival observed at Lhāsa on and after their new year's day.

Having been so long away, the Pandit's funds had arrived at a very low ebb, and he was obliged to make his livelihood by teaching Nepālese merchants the Hindi method of accounts.

\* With reference to this, the Pandit on being questioned said that the paces of this portion, and of one or two other parts, were counted on his return journey.

† Or Gyalpo.

By this means he got a little more money, but the merchants, not being quite so liberal as those of Shigātse, chiefly remunerated him by small presents of butter and food, on which he managed to subsist. During his stay in Lhāsa the Pandit seems to have been unmolested, and his account of himself was only once called in question. On that occasion two Mahomedans of Kashmiri descent managed to penetrate his disguise, and made him confess his secret. However they kept it faithfully, and assisted the poor Pandit with a small loan, on the security of his watch. On another occasion the Pandit was surprised to see the Keruu Shahr governor in the streets of Lhāsa. This was the same official that had made so much difficulty about letting him pass Keruu Shahr and as the Pandit had (through Chūng Chu) agreed to forfeit his life if, after passing Keruu Shahr, he went to Lhāsa, his alarm may easily be imagined. Just about the same time the Pandit saw the summary way in which treachery was dealt with in Lhāsa: A Chinaman, who had raised a quarrel between two monasteries, was taken out and beheaded without the slightest compunction. All these things combined alarmed the Pandit so much that he changed his residence, and from that time seldom appeared in public.

Early in April the Pandit heard that his Ladākhi friends were about to return to Ladāk with the tea, &c., that they had purchased. He forthwith waited on the Lopchak, and was, much to his delight, not only allowed to return with him, but was told that he would be well cared for, and his expenses paid *en route*, and that they need not be repaid till he reached Manasarowar. The Pandit, in fact, was a favourite with all who came in contact with him.

On the 21st April he left Lhāsa with the Ladākhi party, and marching back by the great road as before, reached Tra-dom monastery on the 1st of June.

From Tra-dom he followed the great road to Manasarowar, passing over a very elevated tract of country from 14,000 to 16,000 feet above the sea, inhabited solely by nomadic people, who possess large flocks and herds of sheep, goats and yaks. On the road his servant fell ill, but his Ladākhi companions assisted him in his work, and he was able to carry it on. Crossing the Ma-yum pass, the watershed between the Brahmaputra and the Sutlej, he reached Tar-chen, between the Manasarowar and the Itakastal, on the 17th of June. Here he met a trader from British territory who knew him, and at once enabled him to pay all his debts, except the loan on his watch, which was in the hands of one of the Ladākhis. He asked his friends to leave the watch at Gar-tok till he redeemed it.

At Tar-chen the Pandit and his Ladākhi companions parted with mutual regret, the Ladākhis going north towards Gar-tok, and the Pandit marching towards the nearest pass to the British territory, accompanied by two sons of the man who had paid his debts.

The Pandit's servant, a faithful man from Zāskār in Ladāk, who had stuck to him throughout the journey, being ill, remained behind. He answered as a sort of security for the Pandit, who promised to send for him, and at the same time to pay all the money that had been advanced. Leaving Tar-chen on the 20th June, the Pandit reached Thazing on the 23rd, and here he was much astonished to find even the low hills covered with snow in a way he had never seen before. The fact being that he was approaching the outer Himalayan chain, and the ground he was on (though lower than much of the country he had crossed earlier in the season) was close enough to the outer range to get the full benefit of the moisture from the Hindustān side. The snow rendered the route he meant to take impracticable, and he had to make a great detour. After an adventure with the Bhotiās, from whom he escaped with difficulty, he finally crossed the Himalayan range on the 26th June, and thence descended into British territory after an absence of eighteen months. As soon after his arrival as possible, the Pandit sent back two men to Tar-chen with money to pay his debts, and directions to bring back his servant. This was done, and the servant arrived all safe, and in good health.

The Pandit met his brother, who failing to make his way to Lhāsa, had returned by a lower road through the Nepālese territory. This brother had been told to penetrate into Tibet, and, if possible, to assist the Pandit. The snow had however prevented him from starting. He was now at the Pandit's request, sent to Gar-tok to redeem the watch, and to carry on a route-survey to that place. The Pandit handed over his sextant, and told him to connect his route with the point where the Bhotiās had made the Pandit leave off. The brother succeeded in reaching Gar-tok, redeemed the watch, and after making a route-survey from the British territories to Gar-tok and back, he rejoined the Pandit, and they both reached the Head-Quarters of the Survey on the 27th of October, 1866.

During the regular survey of Ladāk, Captain Montgomerie had noticed that the Tibetans always made use of the rosary and prayer-wheel,\* he consequently recommended the Pandit to carry both with him, partly because the character of a Buddhist was the most appropriate to assume in Tibet, but, still more, because it was thought that these ritualistic instruments would (with a little adaptation) form very useful adjuncts in carrying on the route-survey.

It was necessary that the Pandit should be able to take his compass bearings unobserved, and also that, when counting his paces, he should not be interrupted by having to answer ques-

\* The mani-chuskor, or prayer-wheel.

tions. The Pandit found the best way of effecting those objects was to march separate with his servant either behind or in front of the rest of the camp. It was of course not always possible to effect this, nor could strangers be altogether avoided. Whenever people did come up to the Pandit, the sight of his prayer-wheel was generally sufficient to prevent them from addressing him. When he saw any one approaching, he at once began to whirl his prayer-wheel round, and as all good Buddhists whilst doing that are supposed to be absorbed in religious contemplation, he was very seldom interrupted.

The prayer-wheel consists of a hollow cylindrical copper box, which revolves round a spindle one end of which forms the handle. The cylinder is turned by means of a piece of copper attached by a string. A slight twist of the hand makes the cylinder revolve, and each revolution represents one repetition of the prayer, which is written on a scroll kept inside the cylinder.\* The prayer-wheels are of all sizes, from that of a large barrel downwards; but those carried in the hand are generally 4 or 6 inches in height by about 3 inches in diameter, with a handle projecting about 4 inches below the bottom of the cylinder. The one used by the Pandit was an ordinary hand one, but instead of carrying a paper scroll with the usual Buddhist prayer "Om mani padmi hom", the cylinder had inside it long slips of paper, for the purpose of recording the bearings and number of paces, &c. The top of the cylinder was made loose enough to allow the paper to be taken out when required.

The rosary, which ought to have 108 beads, was made of 100 beads, every tenth bead being much larger than the others. The small beads were made of a red composition to imitate coral, the large ones of the dark corrugated seed of the udrâs. The rosary was carried in the left sleeve; at every hundredth pace a bead was dropped, and each large bead dropped, consequently, represented 1000 paces. With his prayer-wheel† and rosary the Pandit always managed in one way or another to take his bearings and to count his paces.

The latitude observations were a greater difficulty than the route-survey. The Pandit required to observe unseen by any one except his servant; however, with his assistance, and by means of various pretences, the Pandit did manage to observe at thirty-one different places. His observations for latitude were all taken with a large sextant, by Elliot, of 6-inch radius, reading to ten seconds. The Pandit was supplied with a dark glass artificial horizon, but Captain Montgomerie finding that it was far from satisfactory, ordered the Pandit not to use it, unless he found it impossible to use quicksilver. A shallow wooden trough with a spout was made for the quicksilver, but as anything in the shape of a glass cover could not be carried, the Pandit was directed to protect his quicksilver from the wind as he best could, by sinking it in the ground, &c. The Pandit had invested in a wooden bowl,‡ such as is carried at the waist by all Bhotiâs. This bowl is used by the Bhotiâs for drinking purposes; in it they put their water, tea, broth, and spirits, and in it they make their stirabout with dry flour and water, when they see no chance of getting anything better. The Pandit, in addition, found this bowl answer capitally for his quicksilver, as its deep sides prevented the wind from acting readily on the surface. Quicksilver is a difficult thing to carry, but the Pandit managed to carry this safely nearly all the way to Lhâsa, by putting some into a cocoa-nut, and by carrying a reserve in cowrie shells closed with wax. At Pe-de however the whole of his quicksilver escaped by some accident; fortunately he was not far from Lhâsa, where he was able to purchase more. The whole of his altitudes were taken with the quicksilver.

Reading the sextant at night without exciting remark was by no means easy. At first a common bull's-eye lantern answered capitally, but it was seen and admired by some of the curious officials at the Tra-dom monastery, and the Pandit, who said he had brought it for sale, was forced to part with it, in order to avoid suspicion. From Tra-dom onwards a common oil wick was the only thing to be got. The wind often prevented the use of it, and, as it was difficult to hide, the Pandit was at some of the smaller places obliged to take his night observation, and then put his instrument carefully by, and not read it till the next morning; but at most places, including all the more important ones, he was able to read his instrument immediately after taking his observations.

The results of the expedition delivered at the Head-Quarters consist of—

1st.—A great number of meridian altitudes of the sun and stars, taken for latitude at thirty-one different points, including a number of observations at Lhâsa, Tra-shi-lhun-po and other important places.

2nd.—An elaborate route-survey, extending over 1200 miles, defining the road from Katmandu to Tra-dom, and the whole of the Great Tibetan road from Lhâsa to Gar-tok, fixing generally

\* This prayer is sometimes engraved on the exterior of the wheel.

† The Pandit found this prayer-wheel free of all examination by custom-house or other officials. In order to take full advantage of this immunity, several copper prayer-wheels have been made up in the G. T. S. workshop, fitted for compasses, &c.; these will be described hereafter.

‡ The Tibetans are very curious as to these drinking bowls or cups; they are made by hollowing out a piece of hard wood, those made from knots of trees being more especially valued. A good bowl is often bound with silver. The wood from which they are made does not grow in Tibet, and the cups consequently sell for large amounts.

the whole course of the great Brahmaputra River from its source near Manasarowar to the point where it is joined by the stream on which Lhāsa stands.

3rd.—Observations of the temperature of the air and boiling water, by which the height of thirty-three points have been determined, also a still greater number of observations of temperature, taken at Shigātso, Lhāsa, &c., giving some idea of the climate of those places.

4th.—Notes as to what was seen, and as to the information gathered during the expedition.

The latitude observations were taken with a large sextant of 6-inch radius, and have been reduced in the Great Trigonometrical Survey Computing Office. There is no doubt but that the Pandit is a most excellent and trustworthy observer. In order to see this, it is only necessary to look at the accompanying list, *vide* Appendix. At any one point the results deduced from a variety of stars differ *inter se* so very little, that it is not too much to say that the mean must be true within a limit of a minute.

The merits of the route-survey are more difficult to decide upon, but the means of testing the work are not wanting. The bearings from point to point were observed with a compass, and the number of paces between were counted. From the bearings and number of paces there was no difficulty in computing the latitude and departure in paces, or the number of paces that the route had advanced in latitude, and also in longitude. In order to determine the value of the pace, there was first the latitudes derived from the astronomical observations determined during the route-survey, and second the latitudes and longitudes of Katmandu, of the Manasarowar Lake, of places in Kumaun, and, lastly, the longitudes which Turner determined by his route-survey running nearly due north from the Chumalhari Peak. Turner's route forms a most important check upon the Pandit's work, and prevents any accumulation of error which might occur in a route-survey carried over such a great space as 9 degrees of longitude. As far as the longitudes are concerned, that of Katmandu, which has hitherto been accepted as approximately correct, was not found to be quite in accordance with the data forthcoming. It was consequently necessary to re-determine the longitude.

Colonel Crawford's Trigonometrical Survey and map undoubtedly still supply the most reliable data available as to the position of Katmandu, though his observations were made as far back as the year 1802.

No member of the Great Trigonometrical Survey of India has hitherto been allowed to use a surveying instrument in Nepāl, but, by means of stations in British territory, a number of peaks have been accurately determined to the north of the Nepāl valley. Several of these peaks have fortunately proved to be identical with those determined by Crawford.

Crawford's Mount Dayabhang, or L, corresponding with G. T. S. No. XXV.

"	D	"	"	"	XXI.
"	C	"	"	"	XX.
"	B	"	"	"	XVIII.

Now, on page 264 of London edition of vol. xii. of the 'Asiatic Researches,' Crawford's distance of Mount Dayabhang (or XXV. G. T. S.) from Katmandu is given as 35½ geographical miles					
Crawford's distance of D (or XXI. " )	"	"	48	"	
" of C (or XX. " )	"	"	59	"	
" of B (or XVIII. " )	"	"	68	"	

Taking the Great Trigonometrical Survey positions of the above points, we find that the distances given above intersect in points varying in longitude from 85° 16½' to 85° 19', and varying in latitude from 27° 42' to 27° 43'. According to Crawford's map\* the Dayabhang peak lies 25° E. of north from Katmandu; that bearing with the distance given above, viz., 35½ geographical miles, would put Katmandu in latitude 27° 43', longitude 85° 16½'. Crawford's latitude of Katmandu by astronomical observations† is 27° 42'. From the above it has been concluded that Katmandu is in N. lat. 27° 42½', and E. long. 85° 17' 45".

It is greatly to be regretted that the Messrs. Schlagintweit did not finally determine the longitude of Katmandu in 1857, when they received permission to use their instruments in the Nepāl valley. The longitude might have been determined with indisputable accuracy by the simple expedient of observing the azimuth of one or more of the Great Trigonometrical Survey peaks north of Katmandu. The Messrs. Schlagintweit state that they saw these peaks, and recognised them as those fixed by the Great Trigonometrical Survey; it is consequently all the more difficult to imagine why this great opportunity was lost. Their longitude of Katmandu was determined by a chronometer; but as the time depends upon a single day's set of altitudes taken too near to the meridian, it cannot be accepted as conclusive, but, as far as their observations can be relied on, they tend to confirm the longitude ‡ adopted above, viz., 85° 17' 45".

\* A MS. map in the G. T. Survey Office.

† See p. 255, vol. xii., 'Asiatic Researches,' London edition.

‡ The Schlagintweit's longitude of Katmandu, in terms of the G. T. Survey, is 85° 15' 34".



The longitudes of the points in Kumaun have been derived from the Strachey's map\*, and are known from the adjacent Great Trigonometrical Survey peaks to be correct within a very small limit. The longitude of Gyántse-dzong (or Jhansu-Dzong) has been taken from Turner's survey of the road from Bhután to Tibet, made in 1783. Turner's longitude of the Chumalhari peak is  $89^{\circ} 18'$ , the Great Trigonometrical Survey longitude being  $89^{\circ} 18' 43''$ . This coincidence no doubt is fortuitous, as there is an error of  $11'$  in the longitude of the origin of his survey; however it may have happened, Turner's longitudes up to Chumalhari seem to be correct, for Captain Godwin-Austen, whilst surveying in Bhután, ascertained that the village of Phári, close to the Chumalhari, is very nearly in the longitude ascribed to it by Turner. Turner moreover puts Tassisudon in longitude  $89^{\circ} 41'$ , and Captain Austen in  $89^{\circ} 40'$ .

It may consequently be assumed that the longitude of Turner's route near the Chumalhari peak is nearly correct. From the neighbourhood of the Chumalhari to Jhansu-Dzong, Turner's route runs nearly due north, and therefore any error in his estimate of distances would have a very small effect on the longitude. This is fortunate, as it is not known how Turner measured his distances, though he specially states that he took bearings with a compass. The distance between Chumalhari and Jhansu-Dzong is only about 80 miles, and as the bearing is so northerly (viz.,  $20^{\circ}$  E. of N.), it may be concluded that any error in the distance has had but small effect on the longitude. The longitude of Gyántse has therefore been assumed from Turner to be  $89^{\circ} 31'$ . Turner observed the latitude at Tra-shi-lhun-po, (Shigátse), and made it  $29^{\circ} 4' 20''$ , the Pandit makes it  $29^{\circ} 16' 32''$ . Turner's latitude of Chumalhari is  $28^{\circ} 5'$ , the Great Trigonometrical Survey latitude is  $27^{\circ} 50'$ . Turner very possibly was not accustomed to take latitudes, and as the Surveyor (Lieutenant S. Davis) sent with him was not allowed to go beyond Tassisudon, it is not to be wondered that there are differences in his latitudes. The comparison of several latitudes now well-known, tends to show that the semi-diameter of the sun may have been omitted by Turner, as his observations were to the sun only.

The Pandit's observations at Shigátse extend over many days, and include thirteen observations to the sun and a variety of southern stars, as well as to the pole star. The latitudes derived from these observations agree capitally *inter se*. The Pandit was thoroughly practised in the method of taking latitudes, and as his determinations of many well-known points, such as Bareilly, Morádábád, &c., have proved to be correct with only a pair of observations, there can be no doubt about accepting his latitude of Shigátse, where he took so many. The Pandit followed the same river as Turner for 50 miles between Gyántse and Shigátse. They agree in making the bearing between those places  $62^{\circ}$  west of north. The bends of the river as given by them agree in a general way, but the distance by Turner is 39 miles, and by the Pandit 46 miles. As the former appears to have only estimated his distances by guess, while the latter paced them carefully, the result by the Pandit has been adopted as the most correct.

In a route-survey, where bearings, distances, and latitudes only are available, it is obvious that a route running meridionally is the most easily checked. Unfortunately in this route-survey the only part that runs very favourably is that from Katmandu to Tra-dom, where there is a difference of longitude of  $118'$  to a difference of latitude of only  $75'$ . The length of the pace derived from the difference of latitude is 26074 feet, or 31 inches. The remainder of the route from the Manasarowar to Gyántse runs so nearly east and west that the differences of latitudes between the various points are too small to give a reliable value for the pace, but, as far as they go, these differences indicate a longer pace than that derived from Katmandu to Tra-dom. The direction of the route not being favourable for determining the pace from the latitudes, recourse has been had to the known differences of longitude between Kumaun, Katmandu, and Gyántse, derived as above. The difference of longitude between Katmandu and Kumaun makes the length of the Pandit's 253 feet, or 30 inches. The difference between Katmandu and Gyántse makes the length of the Pandit's pace to be 275 feet, or 33 inches.

The route between Katmandu and Kumaun taken by the Pandit is the worst part of the whole of his route. It crosses the Himalaya twice, and also several high passes, and the road on the Cis-Himalayan side is particularly rough and rocky, with great ascents and descents. It was consequently to be expected that his pace would be somewhat shorter than on the route between Tra-dom and Gyántse, which runs the whole distance by the easiest slopes possible, without crossing a single steep pass. The Pandit's pace, as derived from his own difference of latitude between Katmandu and Tra-dom, is 261 feet, or 31 inches. If this pace were adopted between Katmandu and Kumaun, the difference of longitude between the two would be only  $13'$  larger than the assumed difference, or in  $320'$  ( $5^{\circ} 20'$ ) only a discrepancy at the rate of  $\frac{1}{4}$  per cent. If this same pace were used between Tra-dom and Gyántse the difference of longitude would be  $17'$  less than the assumed difference, viz.,  $328'$  ( $5^{\circ} 24'$ ), or a discrepancy at the rate of only  $\frac{1}{5}$  per cent.

The two lengths of the paces, derived from the difference of longitude, agreeing so closely with that derived from the Pandit's difference of latitude between Nepál and Tra-dom, the one being slightly shorter in the roughest ground, and the other slightly longer in the easiest ground,

\* Compiled in the Surveyor General's Office, Calcutta, April, 1850.

it seems reasonable to conclude that the lengths of pace derived from the longitudes are quite in accordance with all that is known of the route. The Pandit was practised to walk 2,000 paces in a mile, or say a pace of  $31\frac{1}{2}$  inches, and he has certainly adhered very closely to it. From Gyāntse to Lhāsa the road is very similar to that between Tra-dom and Gyāntse, and the same value of pace, viz.,  $2\cdot7\frac{1}{2}$ \* has been used. This gives a difference of longitude of  $1^{\circ} 28' 7''$ . The Pandit's latitude of Lhāsa is derived from twenty separate observations to the sun and stars. It is probably within half a minute of the correct value. From the above it is concluded that Lhāsa is in north latitude  $29^{\circ} 39' 17''$ , and east longitude  $90^{\circ} 59' 43''$ .

Between the Manasarowar lake and Lhāsa the Pandit travelled by the great road called the Jong-lam† (or Whor-lam), by means of which the Chinese officials keep up their communications for 800 miles along the top of the Himalayan range from Lhāsa, north of Assam, to Gar-tok, north-east of Simla. A separate memorandum is given hereafter as to the stages, &c., on this extraordinary road. Starting from Gar-tok on the Indus, at 15,500 feet above the sea, the road crosses the Kailas range by a very high pass, descends to about 15,000 feet in Ngari Khorsum, the upper basin of the Sutlej, and then coasting along the Rakastal, the Manasarowar, and another long lake, rises gradually to the Ma-yum Pass, the watershed between the Sutlej and the Brahmaputra, 15,500 feet above the sea. From the Ma-yum Pass the road descends gradually, following close to the north of the main source of the Brahmaputra, and within sight of the gigantic glaciers, which give rise to that great river. At about 50 miles from its source the road is for the first time actually on the river, but from that point to Tra-dom it adheres very closely to the left bank. Just before reaching Tra-dom the road crosses a great tributary, little inferior to the main river itself. The Tra-dom monastery is about 14,200 feet above the sea.

From Tra-dom, the road follows down the Brahmaputra, sometimes close to it, sometimes several miles from it, but at 80 miles east of Tra-dom the road leaves the river, and crossing some higher ground, descends into the valley of the Ra-ga River, which is a great tributary of the Brahmaputra; leaving the Rakas valley, the road crosses over the mountains, and again reaches the Brahmaputra at about 180 miles below Tra-dom. About 10 miles lower the road changes from the left bank to the right bank, travellers having to cross the great river by ferry-boats near the town of Janglāche. Below Janglāche, the road follows the river closely to a little below its junction with the Ra-ga River. From that point the road runs some 10 miles south of the river, crossing the mountains to the large town of Shigātse, 11,800 feet above the sea. From Shigātse the road runs considerably south of the river, it ascends the Pen-nang-chu river, and crossing the Kharola pass, 17,000 feet above the sea, descends into the basin of the Yam-drok Tso. For two long stages the road runs along this great lake, which is 13,700 feet above the sea, then rising sharply, crosses the lofty Kam-pa pass, and descends to the Brahmaputra again, now only 11,400 feet above the sea. Following the great river for one stage more, the road (which has hitherto been running from west to east) here leaves the Brahmaputra, and ascends its tributary, the Kyi Chu, in a north-easterly direction for three stages more to Lhāsa, which is 11,700 feet above the sea. The total distance is about 800 miles from Gar-tok to Lhāsa.

This long line of road is generally well-defined, though it is not a made road, in the European sense of the word. The natural slopes over which the road is carried are however wonderfully easy. The Tibetans have, as a rule, simply had to clear away the loose stones, and only in three or four places, for a few miles, has anything in the way of making a road been necessary.

In many parts there appears to have been considerable danger of losing the road in the open stretches of the table-land, the whole surface looking very much like a road; but this danger is guarded against by the frequent erection of piles of stones, surmounted with flags on sticks, &c. These piles, called *lapcha* by the Tibetans, were found exceedingly handy for the survey; the quick eye of the Pandit generally caught the forward pile, and even if he did not, he was sure to see the one behind, and in this way generally secured a capital object on which to take his compass bearings. The Tibetans look upon these piles partly as guide posts, and partly as objects of veneration; travellers generally contribute a stone to them as they pass, or if very devout and generous, add a piece of rag; consequently, on a well-used road, these piles grow to a great size, and form conspicuous objects in the landscape. Over the table-land the road is broad and wide enough to allow several travellers to go abreast; in the rougher portions the road generally consists of two or three narrow paths, the width worn by horses, yaks, men, &c., following one another. In two or three places these dwindle down to a single track, but are always passable by a horseman, and, indeed, only in one place, near Pin-dzo-ling, is there any difficulty about laden animals. A man on horseback need never dismount between Lhāsa and Gar-tok, except to cross the rivers.

The road is, in fact, a wonderfully well-maintained one, considering the very elevated and desolate mountains over which it is carried. Between Lhāsa and Gar-tok there are 23 staging

\* The direction of the road between Pe-do and Lhāsa is rather more favourable for making use of the Pandit's latitudes. If used they would give a pace of 236 feet, a proof that the pace was longer than between Tra-dom and Katmandu. This pace would put Lhāsa in longitude  $91^{\circ} 3' 36''$ .

† *Lam* means road in the Tibetan language.

places, called Ta-sams, where the baggage animals are changed. These Ta-sams are from 20 to 70 miles apart; at each, shelter is to be had, and efficient arrangements are organised for forwarding officials and messengers. The Ta-sams generally consist of a house, or houses, made with sun-dried bricks. The larger Ta-sams are capable of holding 150 to 200 men at a time, but some of the smaller can only hold a dozen people; in the latter case, further accommodation is provided by tents. At six Ta-sams tents only are forthcoming. Each Ta-sam is in charge of an official, called Ta-sampa, who is obliged to have horses, yaks, and coolies in attendance whenever notice is received of the approach of a Lhāsa official. From ten to fifteen horses, and as many men, are always in attendance night and day. Horses and beasts of burden (yaks in the higher ground, donkeys in the lower) are forthcoming in great numbers when required; they are supplied by the nomadic tribes, whose camps are pitched near the halting houses.

Though the iron rule of the Lhāsa authorities keeps this high road in order, the difficulties and hardships of the Pandit's march along it cannot be fully realized, without bearing in mind the great elevation at which the road is carried. Between the Manasarowar lake and the Tra-dom monastery the average height of the road above the sea must be over 15,000 feet or about the height of Mont Blanc. Between Tra-dom and Lhāsa its average height is 13,500 feet; and only for one stage does the road descend so low as 11,000 feet, whilst on several passes it rises to more than 16,000 feet above the sea. Ordinary travellers with laden animals make two to five marches between the staging-houses, and only special messengers go from one staging-house to another without halting. Between the staging-houses the Pandit had to sleep in a rude tent that freely admitted the biting Tibetan wind, and on some occasions he had to sleep in the open air.

Bearing in mind that the greater part of this march was made in mid-winter, it will be allowed that the Pandit has performed a feat of which a native of Hindustan, or of any other country, may well be proud. Notwithstanding the desolate track they crossed, the camp was not altogether without creature comforts. The yaks and donkeys carried a good supply of ordinary necessaries, such as grain, barley-meal, tea, butter, &c., and sheep and goats were generally procurable at the halting places. A never failing supply of fuel, though not of the pleasantest kind, was generally forthcoming from the argols or dried dung of the baggage animals, each camp being supposed to leave behind at least as many argols as it burns. At most of the halting places there is generally a very large accumulation.

Between the Manasarowar and Sa-ka (Ta-sam) nothing in the shape of spirits was to be had, but to the eastward of the latter place a liquor made from barley could generally be got in every village. This liquor, called *chang*, varies in strength, according to the season of the year, being in summer something like sour beer, and in the winter approximating closely in taste and strength to the strongest of smoked whiskey. The good-natured Tibetans are constantly brewing *chang*, and they never begrudge anyone a drink. Thirsty travellers, on reaching a village, soon find out where a fresh brew has been made; their drinking cups are always handy in their belts, and they seldom fail to get them filled at least once. The Pandit stoutly denied that this custom tended to drunkenness among his Tibetan friends; and it must be allowed that in Ladākh, where the same custom prevails, the people never appeared to be much the worse for it; guides had however to be rather closely watched, if the march took them through many villages, as they seldom failed to pull out their cup at each one.

A good deal of fruit is said to be produced on the banks of the Brahmaputra, between Shigātse and Chu-shul. The Pandit only saw it in a dried state.

When marching along the great road, the Pandit and his companions rose very early; before starting they sometimes made a brew\* of tea, and another brew was always made about the middle of the march, or a mess of stirabout (*suttoo*)† was made in their cups, with barley-meal and water. On arriving at the end of a march they generally had some more tea at once, to stave off the cravings of hunger, until something more substantial was got ready, in the shape of cakes and meat, if the latter was available. Their marches generally occupied them from dawn till 2 or 3 p.m., but sometimes they did not reach their camping ground till quite late in the evening. On the march they were often passed and met by special messengers, riding along as hard as they could go. The Pandit said these men always looked haggard and worn. They have to ride the whole distance continuously, without stopping either by night or day, except to eat food and change horses. In order to make sure that they never take off their clothes, the breast fastening of their over-coat is sealed, and no one is allowed to break the seal, except the official to whom the messenger is sent. The Pandit says he saw several of the messengers arrive at the end of their 800 miles ride. Their faces were cracked, their eyes blood-shot and sunken, and their bodies eaten by lice into large raws, the latter they attributed to not being allowed to take off their clothes.

It is difficult to imagine why the Lhāsa authorities are so very particular as to the rapid transmission of official messages, but it seems to be a principle that is acted upon throughout the

\* The Tibetans stew their tea with water, meal, and butter; the tea-leaves are always eaten.

† A Tibetan always carries meal with him, and makes *suttoo* whenever he feels hungry.

Chinese empire, as one of the means of government. Ordinary letters have a feather attached to them, and this simple addition is sufficient to carry a letter from Lhāsa to Gar-tok, 800 miles, in little over thirty days. A messenger arriving at a village with such a letter is at once relieved by another, who takes it on to the next village. This system was frequently made use of by the surveyors in Ladākh and Little Tibet, and it generally answered well.

If any very special message is in preparation, and if time permits, an ordinary messenger is sent ahead to give notice. Food is then kept ready, and the special messenger only remains at each staging-house long enough to eat his food, and then starts again on a fresh horse. He rides on day and night, as fast as the horses can carry him. The road throughout can be ridden over at night; if there is no moon the bright starlight\* of Tibet gives sufficient light. Tibet is rarely troubled by dark nights; but, in case it should be cloudy, or that a horse should break down, two mounted men always accompany the messenger. These men are changed at every stage, and are thoroughly acquainted with their own piece of road. Each of these two men has, at least, two spare horses attached behind the horse he is mounted. If any horse gets tired it is changed at once, and left on the road, to be picked up on the return of the men to their own homes. By this means the messenger makes great progress where the road is good, and is never stopped altogether, even in the rougher portion. A special messenger does the 800 miles in twenty-two days on the average, occasionally in two or three days less, but only on very urgent occasions. The Pandit made fifty-one marches between Lhāsa and the Manasarowar Lake, and his brother makes out the remaining distance to Gar-tok seven marches more, or, in all, fifty-eight marches. The Pandit found very few of the marches short, while a great many were very long and tedious.

Little idea of the general aspect of the country, which the road traversed, could be given by the Pandit.

From the Manasarowar Lake to Tra-dom (140 miles) glaciers seem always to have been visible to the south, but nothing very high was seen to the north; for the next 70 miles the mountains north and south seem to have been lower, but further eastward a very high snowy range was visible to the north, † running for 120 miles parallel to the Ra-ga River. From Janglāche to Gyāntse the Pandit seems to have seen nothing high, but he notices a very large glacier between the Pen-nang valley and the Yam-drok Tso.

From the lofty Kam-pa Pass the Pandit got a capital view. Looking south he could see over the island in the Yam-drok Tso, and made out a very high range to the south of the lake; the mountains to the east of the lake did not appear to be quite so high. Looking north the Pandit had a clear view over the Brahmaputra, but all the mountains in that direction were, comparatively speaking, low, and in no way remarkable.

About Lhāsa no very high mountains were seen, and those visible appeared to be all about the same altitude. Hardly any snow was visible from the city, even in winter. From the Manasarowar to Ra-lung, 400 miles, there were no villages, and no cultivation of any kind. The mountains had a very desolate appearance, but still numerous large camps of black tents, and thousands of sheep, goats, and yaks were seen. The fact being that the mountain sides, though looking so arid and brown, do produce a very nourishing coarse grass.

To the eastward of Ra-lung, cultivation and trees were seen every day near the villages. Near the Yam-drok Tso the lower mountains seem to have had a better covering of grass. The Pandit mentions the island in the Yam-drok Tso as being very well grassed up to the summit, which must be 16,000 or 17,000 feet above the sea. This extra amount of grass may be due to a larger fall of rain, as the Pandit was informed that the rains were heavy during July and August.

As a rule, the Pandit's view from the road does not seem to have been very extensive, for although the mountains on either side were comparatively low, they generally hid the distant ranges.

The only geological fact elicited is that the low range to the east of the Lhāsa River was composed of sandstone. According to the Pandit, this sandstone was very like that of the Siwālik range at the southern foot of the Himalaya.

The probability of this is perhaps increased by the fact that fossil bones are plentiful in the Lhāsa district. They are supposed to possess great healing properties when applied to wounds, &c., in a powdered state. The Pandit saw quantities of fossils exposed for sale in the Lhāsa bāzār. The people there call them *Dug-rupa*, or lightning bones. One fossil particularly struck the Pandit; it consisted of a skull which was about 2½ feet long, and 2½ feet broad. The jaws were elongated, but the points had been broken off. The mountains crossed were generally rounded with easy slopes. The roundness of those on the Yam-drok Tso Island seems to have been very remarkable; this general soundness and casiness of slope probably points to former glacier or ice action.

\* The starlight in Tibet, as in all very elevated regions, is particularly bright.

† With a very high peak at its western extremity, called Harkingang. A very high peak was also noticed to the south between the Ra-ga and Brahmaputra valleys.

Besides the Yam-drok Tso, a good many smaller lakes were seen, and two much larger ones were heard of. Those seen by the Pandit were all at about 14,000 feet above the sea. There are hardly any lakes in the lower Himalaya; the few that exist being all at, or below, 6,000 feet but from about 14,000 to 15,000 feet lakes and tarns are particularly numerous.\* This may be another evidence of former ice action.

Whilst the Pandit was at Shigätse and Lhāsa, he took a series of thermometer observations to determine the temperature of the air. During November, at Shigätse, the thermometer always fell during the night below the freezing point, even inside a house. The lowest temperature recorded was 25°, and during the day the temperature hardly ever rose to 50°. At Lhāsa, in February, the thermometer generally fell below 32° during the night, and the lowest observed temperature was 26° †; during the day it seldom rose to 45°. During the whole time the Pandit was in the Lhāsa territory, from September to the end of June, it never rained, and snow only fell once whilst he was on the march, and twice whilst in Lhāsa.

The snow-fall at Shigätse was said to be never more than 12 inches; but the cold in the open air must have been intense, as the water of running streams freezes if the current is not very strong. A good deal of rain falls during July and August about Shigätse, and there is said to be a little lightning and thunder, but the Pandit does not recollect seeing the one or hearing the other whilst he was in the Lhāsa territory. The wind throughout Tibet is generally very strong on the table-lands, but at Shigätse and Lhāsa it does not seem to have been in any way remarkable. The sky during the winter seems to have been generally clear.

The Pandit's heights were all determined thermometrically, that is, by observing the temperature of boiling water. The height of Katmandu, thus determined, agrees very closely with that deduced from other sources; the thermometer used there, and at Muktināth, returned in safety, and was afterwards boiled at a trigonometrical station. It was found to agree with the observations taken before the Pandit went to Katmandu. This thermometer was handed over to the Pandit's brother.

The Pandit took another thermometer with him to Lhāsa, and, with it, all his higher points were determined. This latter was unfortunately broken near the end of the Pandit's march. There has, consequently, been no means of finding out whether it had altered in any way during the journey, nor any opportunity of testing it at known altitudes. If it had come back safely, there would have been no difficulty in having it boiled at trigonometrical stations of all heights, up to the highest visited by the Pandit. This thermometer was boiled at Almora before the Pandit started, and with that observation as a zero, the heights of Lhāsa, &c., have been computed out.

The height of Tar-chen, a little above the Manasarowar Lake, computed out in this way, is found to be 14,489 feet above the sea. The Manasarowar Lake, as derived from Captain H. Strachey's thermometrical observations, is 14,877½ feet, or taking a mean between his height of the Manasarowar and Rakastal lakes it is about 15,000 feet. A result 400 or 500 feet higher than the Pandit's height. It may consequently be concluded that the Pandit's heights are not in excess.

With reference to the spelling of the name of the capital of Tibet, Lhāsa has been adopted, as that agrees best with the Pandit's pronunciation of the word. He says the word means God's abode, from *Lha*, a God, and *Sa*, a place.

It may be remarked that more bearings to distant peaks would have been a great addition to the Pandit's route-survey, but the recognising of distant peaks from different points of view is a difficult matter, and only to be accomplished after much practice. The Pandit's next survey will, no doubt, be much improved in this respect. On the whole, the work now reported on has been well done, and the results are highly creditable to the Pandit.

\* There are no lakes known in the Himalayas higher than 16,000 feet, but possibly one of those heard of by the Pandit may turn out to be a little higher.

† Inside a house.

‡ Manasarowar, 175 feet above lake, air 46° boiling point 186.0  
 Rakastal, " " 54° " " 186.0  
 Pithoragarh, 5,590 above sea, " 64° " " 202.5

*Extracts from a Diary kept by Pandit Nain Singh, during his Journey from Nepāl to Lhāsa, and from Lhāsa through the Upper Valley of the Brahmaputra to the Source of that River near the Manasarowar Lake.*

Having made our preliminary arrangements, I started from Nepāl on the 20th March, 1865, accompanied by my brother and four private servants. We arrived at night fall at Azitpur village, on the Lhāsa road.

*March 21st.*—Crossed over the Nilkānt hills, and arrived at Sūndriphedi.

*22nd.*—After travelling all day, I arrived in the evening on the bank of the Bitrāwāti stream.

*23rd.*—I arrived at Raucha village, and took observations for latitude, and thermometrical observations.

*24th.*—Arrived at Nāklang halting-place.

*25th.*—Arrived at Shābrū village, situated near the junction of the streams Gandak and Lendichu, and took observations for latitude. This is a customs' post, where all goods are taxed, and travellers have to pay a toll of 4 annas each; we paid Rs. 1-8 for our party.

*26th.*—Arrived at Medongpodo village, where we altered our mode of dress, adopting a mode familiar to the inhabitants of Lhāsa, in order to preclude any suspicion as to the object of our visit.

*27th.*—Arrived about noon at Temure (a Nepalese thāna and customs' post), where the officials forced us to undergo a strict examination. Our boxes and baggage were closely searched, but they failed to discover our instruments, which were hid in a secret compartment of a box; they, however, compelled us to pay a toll of Rs. 4, after examining our *parwānas*. We then proceeded on our way, and by night-fall arrived at Rasuagarhi, a fort built by Jang Bahādūr in 1855, during a war between him and the Lhāsa rāja. This fort is situated near the junction of the Gandak and Lendichu streams, the latter forming the boundary between the Nepāl and Lhāsa territories. A stone bears a Chinese inscription mentioning this fact. I here took observations for latitude, and thermometrical observations.

*28th.*—I arrived at noon on the left bank of the Gandak at Paimanesa Chauki halting-place, near a thāna of the Kerun Shahr district. We were here stopped, and interrogated as to who we were, and as to the object of our visit. Our answer was that we were Bashahris,\* and the object of our visit was to purchase horses, and also to pay our homage at the shrine of the Lhāsa divinity. On hearing this, they told us that we must be detained till the Kerun Shahr governor gave us his sanction to pass; and, acting up to their decision, they sent word to Kerun Shahr, meanwhile searching our boxes, &c.; but the same good fortune attending us, they failed to discover the secret recesses where our instruments were hidden; they however, made us pay a toll of Rs. 5 for myself and party. After detaining us the whole of the next day, the 29th, and a portion of the 30th, the expected answer from the Kerun Shahr governor arrived, and was read to us. It stated that we were forbidden to continue our route by Kerun Shahr, because this was not the ordinary route from Katmandu to Lhāsa, the proper route being *viâ Nilam* or Kuti, and, had we been Bashahris, the route we should have taken was *viâ Manasarowar*, and not this. Seeing such a decided prohibition set against our continuing our onward march by Kerun Shahr, I demanded back the toll which had been imposed on us, but a portion only of the Rs. 5 was returned. With heavy hearts and gloomy forebodings as to the ultimate success of our enterprise, we made a detour to Rasuagarhi.

*31st.*—We left Kasuagarhi fort early this morning, and arrived at night fall at Shābrū. Here I was again questioned why I had returned, when I had told them on leaving the place on the first occasion that I was going on to Lhāsa. I told them how it was that, after travelling up to Paimanesa Chauki unmolested, our further march was prohibited by the police at that thāna. They suggested to me that if I laid my complaint before another official, who lived some miles away, and who was in favour with the Po-ta-la rāja (the Lhāsa Lāma's *divān*), I might perhaps get a passport to Lhāsa through his intercession.

Acting up to this suggestion, I proceeded early the following morning to visit this official, and told him all that I had mentioned to the police at Paimanesa Chauki, and also exhibited to him the passports that I had in my possession. He listened to me with great attention, and evidently believed my statements. After a long pause he wrote a letter to the Kerun Shahr governor (Jongpon), stating that I was no impostor, but that my real object in wishing to visit Lhāsa was for the purpose of purchasing horses, to visit the shrine of the Lhāsa divinity, and to recover certain sums of money due to me by some of the Lhāsa residents. I succeeded completely in imposing upon this official, and elicited from him a promise that no one should now impede me. After making him a present of a few trifles, such as a pair of spectacles, a box of matches, &c., I withdrew to Shābrū village, intending to start the following morning towards Kerun Shahr, armed with the letter.

\* Inhabitants of the country north-east of Simla, who possess the privilege of travelling through the Lhāsa territory without question.

*April 2nd.*—Starting early from Shābru, we arrived at noon at a *sarai* called Dongkhang; here we were accidentally informed by some travellers that the Kerun Shahr governor (Jongpon) was the individual who had in previous years been the governor of Puraug or Taklakhar, and the chief official at one time of Gar-tok. This deprived us of all hope of being able to proceed onwards, for this chief of Kerun Shahr was personally well acquainted with my brother, and had we proceeded, even with such influential support as the letter mentioned above was likely to give, yet the recognition of my brother by the Kerun Shahr governor (which was certain to happen) would have prevented him from having any confidence in us, and would thus have thwarted our enterprise at the outset. My brother had very frequently (only a few years previous) been brought in close and friendly contact with the governor, and he well knew that we were no Bashahris. I then planned that my brother and three servants should return and stay at Nepāl, till such time as the melting of the snow would render the road to Lhāsa, *viā* Nilam or Kuti, practicable for travellers, while I, with one servant, should proceed by Kerun Shahr; but, after mature consideration, we abandoned this plan, because, with but one servant, I might have fallen an easy prey to thieves. Accordingly, we retraced our steps, and on the 7th April arrived at Khinchat Bāzār, situated on the bank of Trisuli Gandak river. Here, thinking that our number (six) might create suspicion, I discharged two of our servants, who knew but little of the Tibetan language. I made over to them the papers and work already finished, with instructions to deposit them in a safe place till my return. We ourselves marching back, arrived at the Batar Bāzār by nightfall. Resuming our march the next morning, we arrived at Katmandu on April 10th, 1865.

I was already acquainted with a resident of Katmandu, and with his aid I took up my residence there, waiting till such time as the melting of the snow might render the road to Lhāsa, *viā* Nilam or Kuti, practicable to travellers. Meanwhile, I made the acquaintance of all who I thought might enable me to compass my object, collecting as much information, as to the road to Lhāsa, the state of the country, &c., as I could, without creating suspicion. My friend promised to accompany me to Lhāsa as my servant, on a pay of 25 rupees per month. I thought he would be useful, as he had travelled the road, and was well known all along it, but when the time came he failed me.

Another resident of Katmandu told me that it was fruitless to imagine that I could ever reach Lhāsa, for although I had tried only one of the two roads, *i.e.*, the one by Kerun Shahr, and had to return, yet there was less chance of success in reaching my destination by the other, *viz.*, by Nilam or Kuti, for the authorities on this road were much stricter than those I had met with on the Kerun Shahr road. He informed me that if I was not personally known to the chief official (Jongpon) at Nilam, he would on no account give me permission to travel to Lhāsa, as he was forced to give security for the good conduct of those he passes. With the best intentions, he advised me to give up all thought of seeing Lhāsa, telling me that even if I should be fortunate enough to pass through Nilam, yet a higher and stricter official, residing at Dhingri Ghanga\* (Ting-ri Maidan), would require better and stronger reasons before allowing me to go to Lhāsa. Suffering from anxiety, and losing nearly all hope of ever accomplishing my design, I determined to overcome my despondence, and make one effort more. With this view I daily went about the city questioning all who were going to Lhāsa, but none would allow me to accompany him. At last I met with an apparently rich man on the eve of travelling to Lhāsa, and did all I could in my power to gain his confidence. When I thought I had partially succeeded, I asked him if he would allow me to accompany him, and he said he would have no objection. I then made him take an oath not to desert me on the road. I advised him not to travel by Kerun Shahr. He, however, told me that he was well known by the authorities on the Kerun Shahr road, and that his house was not far from Kerun Shahr, so that there was no cause of fear. Thinking that this man, Dawa Nangal, was really as honest and honourable as he appeared to be I lent him Rs. 100, a sum which he promised faithfully to return on our arrival at Lhāsa. At that time I heard that Jung Bahādur intended to send another *vakil* to Lhāsa, in place of the one already there, and I was told that this would be the best opportunity afforded of getting to Lhāsa. We then decided that my brother, who was likely to be recognised by the Kerun Shahr official, had better accompany this *vakil*, who was about to proceed by the Nilam road, while I was to travel by the Kerun Shahr road with the Bhotiā, Dawa Nangal, thinking that, if I was unfortunate enough not to reach Lhāsa, my brother might be more successful, and *vice versa*.

We consequently divided the money in my possession, and I made over a few of the instruments to him, retaining the better servant of the two for myself. I then removed to the dwelling of Dawa Nangal, and, preparatory to starting, altered my dress to one adopted by the Ladākhis, and added a tail of hair to the back of my head. All my arrangements being completed, I requested Dawa Nangal to delay no longer. Whereupon he advised me to start, in the company of one of his men, and promised to join me, either on the road, or at Shābru village, as work was likely to detain him for four or five days at Katmandu. We started from Katmandu on the

\* The Gurkhas suffered their first defeat at the hands of the Tibetans on the Ting-ri Maidan in 1792. Kuti and several other frontier posts of Nepāl were taken from the Gurkhas in consequence, and the Lhāsa boundary was carried considerably to the south.

night of the 3rd June, 1865, and arrived, after travelling for 4 miles, at a village named Dharmatali.

Resuming our march the following morning, we arrived at Basuata Pāwa. On the 5th we arrived at Sundriphedi. On the 6th we halted at Trisuli Gandak bridge. On the 7th arrived on the bank of the Bitrāwāti stream. On the 8th at Dayabhang on the 9th we continued our stay at Dayabhang in consequence of rain. On the 10th we arrived at Bekuti village. On the 11th we halted. From this village, all the way to Rasuagarhi, the inhabitants of the country are Bhotiās. On the 12th we arrived at Gurang village. 13th, at Dungalang, where I fell ill with fever, and continued there in that state for 6 days. On the 20th, after my recovery, we marched to Shābru village. Here the servant of Dawa Nangal, who accompanied me this far, mentioned to Dawa Nangal's family that I was a friend of Dawa's, and that it was the request of the latter that they should show me kindness. I was hospitably received and lodged, but after some days I began to feel uneasy at Dawa Nangal's long delay. I mentioned my anxiety to his family, and, in compliance with my request, they sent a messenger, asking the cause of the delay. Dawa's answer was that press of work would keep him still longer at Katmandu, but that he might be expected at Shābru within 10 or 12 days. I now concluded that Dawa intended to play me some trick, and this suspicion gave me great anxiety, and induced me to visit Dawa's uncle; he was the chief person of Shābru village, and possessed great influence. I asked his advice as to what was to be done in my perplexity, for to return to Katmandu was not my intention, and to proceed onward to Lhāsa was not in my power, in consequence of the prohibition of the road officials. He said he felt for me, and would give me a passport to Kerun Shahr, as also a letter to Dawa Nangal's brother, who had just returned from Lhāsa to Kerun Shahr, and who being a just and good man, would return me the money lent to his brother, and also arrange for my safe journey to Lhāsa. Acting up to his promise, he gave me a passport to Kerun Shahr, and the letter to Dawa's brother. He stated in his letter that I was an honest man, going to Lhāsa on commission for the purchase of horses, and that my claim of Rs. 100 against his brother was just, also mentioning that he would stand security for my good conduct to Lhāsa, and requesting him to arrange for my journey to that place, and if the Kerun Shahr officials required it, even to stand security for me.

Starting on the 6th July, accompanied by a relative of the Shābru official, I reached Temure. On the 7th I arrived at Paimanesa Chauki, where, as on the first occasion, the officials attempted to stop me, but the person who accompanied me from Shābru opened the way, and in the evening of this same day we arrived at Kerun Shahr.

Kerun Shahr is a small town, possessing from 15 to 20 shops (some kept by Nepālese and some by Bhotiās, who sell a variety of articles). Kerun Shahr has a fort and a good-sized temple. Its population is estimated at from 3000 to 4000 souls. Rice is imported, and salt exported. Three crops are raised annually. Wheat and barley are sown in October, and ripen in June. Another description of barley, called *Ne*, is sown in July, and ripens in October, and two other grains (called in these parts *Phūpar* and *Serso*) are sown in May, and ripen in September. A number of edible herbs are cultivated. On arriving at Kerun Shahr I lost no time in seeing Dawa Nangal's brother, by name Chūng Chu, and after offering a few trifling presents, explained my business with him. He promised me that all in his power would be done to enable me to travel onwards to Lhāsa, but, as regarded the money, he could not refund it, as his brother was a bad man, and it was not his intention to pay his debts. For four days after this interview, the chief official (Jongpong) was busy, and could not attend to my affairs; but on the fifth day I obtained a hearing from him, and urged my request to be permitted to travel on. He told me, with all my strong recommendations, he would not wait a moment longer to grant me leave to travel, had there not been a higher official than him at Ting-ri Maidan who might object, but that he would send word to the chief official at that place (eight days' journey distant), and if he granted my request, no further obstacle would present itself to my travelling to Lhāsa. He also mentioned that the only thing he found not right was, that no Bashahri travelled by this road at this time of the year, and this might be one of the reasons which might induce the chief official at Ting-ri Maidan to negative my request. A messenger was sent bearing a letter from the Kerun Shahr to the Ting-ri Maidan official; and after 15 or 16 days, on the 26th July, the answer was received. The Kerun Shahr official was ordered to send me back to Nepāl, and on no account to allow me to travel on towards Lhāsa, for had I been going to Lhāsa for horses I would not have taken this route, and, had I been a Bashahri, the route to Lhāsa I should have adopted was by Manasarowar, and not this. On hearing the decision of the Ting-ri Maidan chief, I implored the Kerun Shahr chief to permit me to travel to Pati Nubri, to see my countrymen, *viâ* Juktumba pass and Kadāng Chum, but he hesitated, and said that should he permit me to go there, and should I thence proceed on to Lhāsa, and the news of my arrival at the latter place reach the ears of the Ting-ri Maidan chief, then he would forfeit his all, and perhaps be murdered, for disobeying orders; he, however, sent a man with a letter, urging this fresh request of mine, to the Ting-ri Maidan chief. The messenger was despatched on the 29th of July, and returned on August 10th, bearing the order from the Ting-ri Maidan chief to make me give security for my good conduct, before I was permitted to travel to Pati Nubri. On learning this, I returned to Shābru village, and with a great deal of persuasion and many entreaties induced the chief of the village, Chūng Chu, to enter into security for me.



The wording and sense of the security was, that should I, on being permitted to travel to Pati Nubri, break through my promise not to visit Lhāsa within this year, then he, Chūng Chu, would submit to the heaviest penalty which the Po-ta-la rāja might think fit to impose on him. Chūng Chu, after doing this much for me, made me give him a declaration to the effect that, should I be found in Lhāsa within this year, then it would be at the penalty of the loss of my life. This declaration was written out by the Kerun Shahr official, and I subscribed my name and seal to the document. This did not appear entirely to allay the suspicion of the Kerun Shahr official, and to guard against any wrong-doing on my part, he directed that I should be accompanied by his men from stage to stage, and they were ordered to bring back a letter from me on my arrival at Pati Nubri.

August 13th.—I left Kerun Shahr, and arrived at Rakma village. 14th.—Arrived at Todang village, and halted there the following day. 16th.—Arrived at Mun village. 17th.—Crossed Juktumba pass, and arrived at Kolūng Chuksa. 18th.—Arrived at Jong-hil village. 19th.—Arrived at Chartau phuk village. 20th.—Arrived half-way up Lachumu Phurphur mountain. 21st.—Arrived at a halting-place; the road to this place from the last was very bad. Tradition has it that a priest rose to heaven on wings from the top of this mountain; hence its name. 22nd.—Arrived at Namdūl village, where I met Chūmik Dūrji, the brother of the man who I said lived at Pati Nubri, and to whom I told the Kerun Shahr chief I intended going. 23rd.—At Loha village.

24th.—At Bābuk village, where I saw Thele, from whom the messengers carried back the letter, as ordered by the Kerun Shahr official. At this place a plant called *Nirbisi*\*, or *Jadwar*, grows wild very abundantly; its root is held in very great esteem throughout India, as possessing great healing power when applied to cuts, scars, bites of venomous serpents and insects. Bābuk is a large mart for the exchange of goods; Bhotiās from all parts frequent it. Salt, wool, felt, and borax are brought here from Tibet, prior to being carried into Nepāl and adjacent territories, while tobacco, rice, grain, cloth, copper-plates, &c., are brought from Nepāl, prior to being carried into Tibet, to Tra-dom, Nik-yu (Ta-sam), Hāpchān, Tala Labrang, and all other large places. From Katmandu to Loha village jungle and forest was generally abundant, but at this place there was none visible, and hence to Lhāsa the mountain sides were very bare and rocky. I learnt that on the 25th August, Bāro Thele Durcha, with a large party, and a great number of yaks (about 200) laden with goods, intended to start from this place towards Tra-dom. Having told these people that I was a Bashahri (a countryman of theirs), I was held in great favour with all, and consequently received no opposition to my wish to accompany them: we accordingly started, and arrived in the evening at Galā Sātang camp.

26th.—We crossed the Galā mountain, which forms the boundary between the Lhāsa and Gurkha territories, where I took thermometrical observations, and after passing Sang jomba village, we arrived by evening at Somnāth camp.

27th.—Crossed No pass, and arrived at Baruduksum camp. 28th.—Halted at Baruduksum. 29th.—Arrived at Zāngra Dung or Rebo grazing-ground, at that time covered with herds tended by men. 30th.—Arrived at Tala Labrang. 31st.—Halted at Tala Labrang.

September 1st.—Arrived at Yakkui or Mala Labrang. 2nd.—Arrived on right bank of the Brahmaputra River, at Kela monastery. 3rd.—Arrived at Muna Ghāt on bank of river, where boats formed of a frame-work of wood, covered with leather, convey people and goods across; on this occasion the boat was lost, with three people, in my presence, and so I returned to Kāu. 4th.—Arrived at Jangthakdong grazing-ground. 5th.—Arrived on right bank of the Brahmaputra at Lik-tse monastery, situated on a low hill. 6th.—Crossed the river by ferry at Lik-tse, and arrived at Tra-dom monastery.

I was frequently asked who I was by the inhabitants, and I always said that I was a Bashahri merchant, called *Khūmu* in these parts, and had purchased a quantity of *Nirbisi* root at Pati Nubri and Muktiñāth, which I had sent on to Manasarowar by another route, and had come here merely to worship. The inhabitants told me that the road from hence to Lhāsa was infested by thieves and dacoits, and that a journey by a small party was attended with great danger.

The Mahārāja of Kashmir sends a merchant with a great quantity of goods to Lhāsa once in two years. Hearing that he was to be sent this year, it occurred to me that I had better try to accompany his party. The merchant sent is called Lopchak, and, by the orders of the Lhāsu rāja, is shown great attention, and treated with great distinction, as he passes along the road. The rāja of Lhāsa sends a merchant, called Jang Chongpon, into Ladākḥ once a year.

On the 8th of September, a traveller came into Tra-dom from Gar-tol, and on questioning him I was delighted to hear that the merchant (Lopchak) would be here within thirty days. I accordingly rented a house, and made up my mind to wait, and to avoid suspicion pretended that illness prevented me from joining the party on their way to Manasarowar. Grain and food generally, being imported, are very dear. Grain is not raised at all at this place. Tra-dom possesses a large monastery, surrounded by 8 or 9 post-houses (Ta-sams). At this place there are very extensive plains, stretching to the east 7 miles, and in width about 4, to the west 15 miles, by about 15 in breadth.

\* *Zedoary*, a spicy plant, somewhat like ginger in its leaves, but of a sweet scent.

**October 2nd.**—The merchant's head man, named Chiring Nirpal, accompanied by about 12 men and 70 laden yaks, came into Tra-dom this day. On his arrival I sent for him, and made friends with him. I told him what I had already told all at this place, and asked him to let me accompany him to Lhāsa, as the season had advanced, and to return to Manasarowar was nearly impossible. He, without hesitation, acceded to my request, and so we started the following day.

**3rd.**—Arrived at Thuku camp.

**4th.**—Arrived at Shricarpo camp. **5th.**—Arrived at Nyuk-ku Ta-sam, where Chiring Nirpal dismissed the coolies from Tra-dom, and engaged fresh men. **6th.**—Arrived at Jalgung camp. **7th.**—After crossing a large river called Charta Sāngpo, we arrived at Jhalung camp.

**8th.**—Marching along the bank of the Chaka River, we arrived at Sa-ka (Ta-sam) town. This place is presided over by two officials (Jongpons), residing at Sar Dzong and Nub Dzong, who questioned Chiring Nirpal as to who I and my servants were. He told them that we were his countrymen and servants. Nothing more was said by them on hearing this, but I was very much troubled in mind, thinking that, should I be discovered at Lhāsa, I would to a certainty forfeit my life; and another subject was a source of great uneasiness to me, *viz.*, that I was fast exhausting my funds. I, however, determined to accomplish my design of seeing Lhāsa. I continued my route-survey, and took observations for latitude at favourable moments, wherever I could. Grain is not raised at Sa-ka (Ta-sam) but is brought here all the way from Kerun Shahr and Jongkha (Fort). Chiring Nirpal was very kind to me, and I, in return, told him that when we got back to Manasarowar, he need only ask me for whatever he wished to have it granted. Coolies were changed at Sa-ka (Ta-sam). **9th.**—Arrived at Naguling camp. **10th.**—Arrived at Se-mo-ku Ta-sam coolies and yaks were changed. Halted on **11th.** **12th.**—Arrived at Tarchung camp. **13th.**—Arrived at Gangbiako camp. **14th.**—Arrived at Ruan camp. **15th.**—Arrived at Sang-Sang Ta-sam, a mud house, where coolies and yaks were changed. **16th.**—Arrived at Ge camp. **17th.**—Arrived at Sang-Sang-Kau Ta-sam, a mud house; there is, besides the above, one other house of mud, belonging to a *jemadar*; coolies and yaks were changed. **18th.**—Arrived at Kūkap camp. **19th.**—Arrived at Ra-tung camp. Cultivation is seen from this place onwards, and willow trees make their appearance here also. From Tra-dom to this place there are no signs of cultivation, and the population is very scanty.

**20th.**—Arrived at Ngap-ring Ta-sam, to the north-west of which place lies a lake 8 miles long and 3 miles in breadth. On the bank of the lake, and north-east of this village, is situated Ngap-ring village, ruled by a Jongpon (an official). The yaks between Ngap-ring and Lhāsa are very small, and the goods (which from Tra-dom had been carried on large yaks) were at Ngap-ring transferred to asses.

**21st.**—After passing a small lake called Lang cho gonak, we arrived at Bharka village. The water of this lake is very salt, and is reported to be 162 feet in depth. The length of this lake is 4 miles, and breadth 2 miles.

**22nd.**—After crossing the Brahmaputra by ferry, we arrived at Janglāche town, which has a very fine monastery, and a strongly built fort, situated on the top of a small hill. They call a fort in these parts *khar*.

A number of shops are kept by Nepālese. I was informed that the Kerun Shahr and Ting-ri Maidan road passes through this place. We halted here on the 23rd, when we were joined by a second portion of the Ladākh merchant's men and yaks (105) conveying goods.

**24th.**—Continued our stay at Janglāche town. From this town to Shigātse city goods and men are frequently transported by boats covered with leather, the river being wide and navigable; but we preferred going overland, and so continued our journey.

**25th.**—Arrived at Tashiling village. **26th.**—Arrived at Pin-dzo-ling village, which is ruled by a Jongpon. There is a very well-built monastery in this village. At this village the river is spanned by a bridge, formed of iron chain and rope, called *chakoam*.

**27th.**—Arrived at Si-lung village. **28th.**—Arrived at Chia-ri village.

**29th.**—Arrived at Digarcha, or Shigātse, city. We took up our quarters at a *sarai* (called *Kunkhang* in these parts), built by the government. At north-west end of the city, on a low hill, stands a strong fort, called Gang Mār Dzong, which, as tradition has it, was built by a Deo. To the south-west of the city stands a very well-built monastery, called Tra-shi-lhun-po, surrounded by a wall about one mile in circumference. Numerous houses and temples rise within this enclosure; four of the larger temples among these are superior to the rest, and have gilded spires.

The idols in these temples are studded with precious stones, gold, and silver. There are 3,300 priests in this monastery, the chief being the Great Lama, called Panjan Ring-bo-che, considered throughout Tibet as an incarnation of the Deity, who can read the thoughts of men, and who is supposed never to die.

We formed a small party and on the 1st of November went to do homage to Panjan Ring-bo-che, and were conducted into the presence of a boy eleven years old, seated on a high throne covered with rich silks. He was surrounded by a number of priests, standing in reverential attitudes, and bearing the insignia of their calling. We uncovered our heads and made a low

obeisance, and then presented an offering of pieces of silk. Panjan King-bo-cho then placed his hands on each of our heads and beckoned to his priest to have us seated. Up to this time he had preserved a profound silence, but, on seeing that we were seated, put us only three questions (as he is wont to do to every worshipper), *viz.*, "Is your king well?" "Is your country prospering?" and "Are you in good health?" The priest then placed a small strip of silk round each of our necks, and from a silver kettle poured a little tea into our cups, and then dismissed us.

The city of Shigätse is three-quarters of a mile in length and half a mile in breadth. North-east of the city, distant three-quarters of a mile, situated on the left bank of the Pen-nang-chu stream stands a monastery, called Konkialing, in the centre of a garden. A market (*büzär*) is daily held on the space called Thom, between the city and the Tra-shi-lhun-po monastery, where every saleable article is exposed throughout the day, the vendors retiring to their homes in the evening.

The population of the city is estimated at 9,000 souls, exclusive of the 3,300 priests. The earth here is rich and yields fine crops of grain. The city is ruled by two Depons, one residing at Khärak village, and the other at Rimu village; but two Jongpons (inferior officers) are obliged to take up quarters in the city.

A force, consisting of 100 Chinese and 400 Bhotia soldiers, is quartered here. To the south of the city, and distant about 15 miles, is situated a hill called Ma-u-ri, where gold is said to be found; but a strict order prohibits the people from working it.

*November 16th.*—The Kashmir Mahārāja's merchant,\* for whom we were waiting, came in on this day, and I waited on him with a few presents, requesting to be permitted to accompany his men, as I had done from Tra-dom. I told him the story of my illness, and how it was that I came with his servants. He saw no objection to my continuing with his men, and promised to assist me at Lhāsa. I took strict observations for latitude at this place as often as I could.

*28th.*—The Nepālese agent (*vakil*) at Lhāsa, who was recalled by Jang Bahādūr, arrived at Shigätse city on this day, and I was sorry not to discover my brother among his followers.

*December 22nd.*—Left Shigätse city and marched to Gang village. *23rd.*—Arrived at Pen-nang town, governed by a Jongpon, who resides in the fort. *24th.*—Arrived at Takse village. *25th.*—We arrived at Gyāntse city, which is about the size of Shigätse, and has a fort on a low hill in the heart of the city, and also a large gilded temple. The city is ruled by a Depon, assisted by two Jongpons.

A force, consisting of 50 Chinese and 200 Bhotia soldiers, is quartered here. The boundary between the Lhāsa and Loh (Bhutān) territories is three days' journey from Gyāntse. Rice and tobacco are imported from Bhutān, while wheat, flour, barley, oil, radish, peas, *ghī*, produced in the place, are sold very cheap. Very fine crops are raised here, although it appeared to me to be higher above the sea level than either Shigätse or Lhāsa. The following are the names of three different descriptions of woollen cloth manufactured in this city, for which it is famous, *viz.*, *getha*, *nambu*, *chuktu*, *purik nambu*, this last being very superior. It is also the seat of the manufacture of a kind of small bell, called *yārka*, with which they adorn their horses. To the south-west, north-west, and south-east of the city are plains stretching from 6 to 10 miles, through which the Pen-nang-chu stream flows. At this time of the year the river becomes frozen, and men pass over on foot. We started from hence on the 28th. *28th.*—Arrived at Gob-shi village. *29th.*—Arrived at Ra-lung village. *30th.*—After crossing Ka-ro pass we arrived at Dza-ra halting place. *31st.*—Arrived at Nang-kar-tse a village on the Yam-drok Tso, with a fort on a small hill.

*January 1st, 1866.*—Arrived at Pe-de Ta-sam on the bank of the Yam-drok Tso. Its small fort is situated so close to the lake that the water washes its walls.

*2nd.*—Marching along the bank of Yam-drok Tso we came upon a band of robbers. One of them took hold of my horse's bridle and told me to dismount. Through fear, I was on the point of resigning my horse to him, when a Muhammadan who accompanied me raised his whip; whereupon the robber drew a long sabre and rushed on the Muhammadan. Taking advantage of this favourable moment I whipped my own horse forward, and as the robbers could not catch us they fired on us, but without effect, and we arrived at Demālang village all safe.

The Yam-drok Tso from this point stretches to south-east about 20 miles, and then turns west. The breadth of this lake varies from 2 to 3 miles, and it is said to be very deep. In the centre of the lake stands a hill, at the foot of which are situated a number of villages. The circumference of the lake is about 45 miles; it is crossed in wicker boats covered with leather. We halted at Demālang this day, the 3rd, to procure yaks and coolies.

*4th.*—After crossing Kam-pa pass we arrived at Kam-pa-par-tse village, situated on the right bank of the Brahmaputra River, and taking boat from hence we were rowed down the stream to Chu-shul village, passing Chak-sam village, which is situated on the right bank of the river, at foot of hill, and alongside an old bridge (formed of iron chain and rope), which, owing to its insecurity, is seldom or never used, the ferries being preferable.

\* Officially called Lopehak, his own name in this case being Chyanggonboo.

The Kam-pa mountain forms the boundary between the two districts U and Utsang, from Kam-pa west to Kā mountain being the Utsang, and from Kam-pa east to Chari being the U district. Chu-shul (Fort and Ta-sam) is ruled by a Jongpon. On the bank of the river, situated on a low hill, stands a fort. We stayed here three days.

8th.—Arrived at Chabonang village.

9th.—Marching along the right bank of the Kyi Chu River we arrived at Netang village. The Kyi Chu River comes from the direction of Lhāsa, and falls into the Brahmaputra at Chu-shul village. The Brahmaputra from thence flows east.

10th.—We arrived this day at Lhāsa, and soon after my arrival I engaged two rooms in a building, called Dhiki Rabdan Tra-shi-lhun-po-gi-Khan Sumba. One of the rooms was well adapted for taking my star observations from within. I had been here some ten days when the Lopchak's men, my late companions, told me they were going to visit the Gaden monastery, and asked me to go with them. I accordingly left Lhāsa in their company on the 21st, and arrived at Se-ra monastery, distant some 3 miles only from Lhāsa, at the foot of the Totiphu Mountain. The circumference of this mountain is little more than 1 mile. Numerous temples, with gilded spires, and of all sizes, are seen in the inclosure. The idols within are studded with gold, silver, and precious stones. They differ in size and hideousness, some having horns, but the limbs and lower portion of the figures are generally those of men. I was informed that there were 5,500 priests in this monastery.

22nd.—Starting this morning from Se-ra, we arrived late in the evening at Dakyarpa monastery, situated half way up a hill. Many temples are to be seen here also, although the number of priests is not more than a dozen.

23rd.—Arrived at Bom-te.

24th.—After crossing the Kyi Chu stream we arrived at Gaden monastery, situated on the summit of a low hill. The circumference of this monastery is about three-quarters of a mile. There are numerous well-built temples, with idols much the same as those at Se-ra. It is reported to be a very wealthy monastery, and is occupied by 3,300 priests.

25th.—Returning to Lhāsa we arrived at Nāngra village.

26th.—Reached Lhāsa. It was my wish now to follow the course of the Brahmaputra River, but I was informed that, unless I went with a well-armed party of at least a dozen, it would be dangerous to proceed.

The city of Lhāsa is circular, with a circumference of  $2\frac{1}{2}$  miles. In the centre of the city stands a very large temple, called by three different names, *viz.*, Māchindrānāth, Jo, and Phokpochengra. The idols in it are richly inlaid with gold and precious stones. This temple is surrounded by *bāzārs* and shops, kept by Lhāsa, Kashmiri, Ladākhi, Azimābād, and Nepālese merchants, a number of whom are Muhammadans. Chinese tradesmen are numerous here also.

The city stands in a tolerably level plain surrounded by mountains, the level or open ground extending about 6 miles on the east, 7 on the west, 4 on the south, and 3 on the north. At the northern end of the city there are two monasteries, called Mūru and Rāmoche. At the north-west corner stands the Chumuling monastery; at the west end the Tankyāling monastery. The monastery called Kontyāling is about 1 mile west of the city, at the foot of a low isolated hill called Chāpochi, which has a house on its summit. About three-quarters of a mile west of the Rāmoche monastery there is, on a low hill, a large and strong fort called Po-ta-la, which is the residence of the Lama Guru, who is also called Gewāring-bo-che, his head minister being generally called Rāja. The fort is  $1\frac{1}{2}$  miles in circumference and 300 feet above the surrounding level; steps lead up to the fort on every side. The village Jol lies under the fort. Four miles west of the city stands the Dre-phung monastery, at the foot of a hill; it is occupied by 7,700 priests, who are held in great veneration by all classes of the Lhāsa people. South of the city and distant 3 miles (beyond the Kyi Chu River), is situated the Chocholing monastery. I accompanied the Ladākhi merchant, called Lopchak, on the 7th of February, to pay homage to the Gewāring-bo-che (the Great Lama of Tibet) in the fort, ascending by the southern steps. A priest came out to receive us, and we were conducted into the presence of the Gewāring-bo-che, a fair and handsome boy of about thirteen years, seated on a throne 6 feet high, attended by two of the highest priests, each holding a bundle of peacock feathers. To the right of this boy, and seated on a throne 3 feet high, was the Rāja Gyalbo-Khuro-Gyāgo, his minister. Numbers of priests in reverential attitudes were standing at a respectful distance from them. We were ordered to be seated, and after making offerings of silks, sweets, and money, the Lama Guru put us three questions, placing his hand on each of our heads: "Is your king well?" "Does your country prosper?" and "Are you in good health?" We were then served with tea, which some drank and others poured on their heads, and after having a strip of silk, with a knot in it, placed by the priests round each of our necks, we were dismissed, but many were invited to inspect the curiosities that were to be seen in the fort. The walls and coils of all the chief houses in the fort, and all the temples that contained images of gold, were covered with rich silks.

The Lama Guru is the chief of all Tibet, but he does not interfere with state business. He is looked upon as the guardian divinity, and is supposed never to die, but transmigrates into

anybody he pleases. The dead body from which the Lama Guru's soul has departed is placed in a gold coffin studded with the finest gems, and kept in the temple with the greatest care. The belief of the people is that the soul of one Lama Guru is privileged to transmigrate thirteen times. The present Lama Guru is now in his thirteenth transmigration. Churtans are placed over the coffins containing the Lamas' bodies, and it is said that these dead bodies diminish in size, while the hair and nails grow.

The Rāja, or Gyalbo, is next to the Lama Guru in rank; below him there are four ministers, called *kaskak*, who conduct all state business, under his orders. The Chinese *wakil* at Lhāsa, who is called *ambān*, has the power of reporting against either the Rāja or the four ministers to the King of China, and, if necessary, can have them removed from office.

The general belief of all the Tibetans is, that no sooner is the Lama Guru born than he speaks, and all withered plants and trees about his birthplace at once begin to bear green leaves. The moment news gets to the Lhāsa court of such an occurrence, then the four ministers repair to the house in order to ascertain the truth by the following method:—Articles of all descriptions are placed before the child, and he is requested to tell which belonged to the late Lama Guru, and which did not. Should he be able to select from the articles put before him such of those that belonged to the Lama Guru, then he is pronounced to be no impostor, and is forthwith carried away to the fort of Po-ta-la and placed upon the throne as Lama Guru.

The Muhammadans of Lhāsa gave me the following account as to the selection of the future Lama Guru:—From the day of the death of a Lama Guru all male births are recorded by the Lama about the city, and the ministers are secretly informed of them. Names are given to the children, and on the thirtieth day after the decease of a Lama Guru slips of paper, each bearing the name of a child born within the month, are placed in a vessel; the chief of the four ministers then draws out one of the slips with a pair of pincers, and whichever child's name that bears, he is pronounced to be the future Lama Guru. He is then taught all that is required of him by the priests, and when they think he has come to years of discretion, the previously narrated ceremony of the choosing of articles is conducted. The people of Lhāsa are kept in the dark as to this method of adopting a Lama Guru. The Lhāsa people are, by strangers, supposed to adopt a Lama Guru, in order to prevent the government of the country from falling entirely into the hands of the Chinese.

Of all the monasteries in these parts, the largest, apparently, are Se-ra, Dre-phung, Gaden, &c., and occupied likewise by the largest number of priests; but in former days the monasteries held in greatest esteem were Kontyāling, Tankyāling, Chumuling, and Chochoing; and on the death of the Po-ta-la Rāja the successor was chosen from one of these four monasteries, while now he is chosen from the Dre-phung monastery only. The reason that the Po-ta-la Rāja is not selected from one of the four monasteries, but only from Dre-phung, is because, not very long ago, Sāta Safāde, allied with the Dre-phung priests (7,700), and also with the people, and aided by the Chinese *wakil*, managed to remove the then reigning Rāja, Gyalbo Riting, from the throne and drove him to Pekin, where he died shortly after. Sāta Safāde then assumed the position of rāja, and ever since the recognised heir to the Po-ta-la throne has been the head Lama of the Dre-phung monastery.

Three days' journey (36 miles) east of Lhāsa, situated on the left bank of the Brahmaputra River, stands a monastery called Samaye, the seat of the Jam Rāja, who is believed to possess the power and authority to punish or reward the souls of departed men. The state treasury of Lhāsa is also at this place. Samaye, and, on the occasion of war, the four ministers repair thither, and, after a little ceremony, receive the amount they solicit, with an injunction to return the same within a certain period. Within 40 miles east of Samaye monastery, and on the right bank of the Brahmaputra, is situated Chetang city, rivalling in size the city of Shigātse. The Brahmaputra River flows from hence in an easterly direction for a distance of 120 miles, and then flows due south.

I observed that there was but little order and justice to be seen in Lhāsa.

The new year of this people commences with the new moon, appearing on or about the 15th of February; they call it *Lohsar*. On New Year's eve an order from the court goes round to have every house in the city cleaned; the houses are swept and whitewashed and the streets are cleaned. On the day following each household displays as many flags, &c., from the house-top as it can afford. Throughout the day and night singing, dancing, and drinking are kept up. On the second day of their new year all the people of the city assemble before the Po-ta-la fort to witness the following feat, performed generally by two men:—A strong rope is fastened from the fort walls to strong rivets in the ground, 100 yards distant from the base of the fort. The two unfortunate men then have to slide down this rope, which very often proves fatal to them; should they, however, survive, they are rewarded by the court. The Lama Guru is always a witness of the performance from the fort.

From the commencement of the new year, whoever pays the highest sum is considered the judge of the Rāja's court, and for twenty-three days he exercises his authority in the most arbitrary manner possible, for his own benefit, as all fines, &c., are his by the purchase. The purchaser of

such authority must be one of the 7,700 priests attached to the Dre-phung monastery; the successful priest is called Jalno, and announces the fact through the streets of Lhāsa in person, bearing a silver stick.

The priests attached to all the temples and monasteries in the neighbourhood assemble in the fort, and offer homage. This assembling of the priests is called *Molam Chambo*, and the holidays go by the same name. The Jalno's men are now seen to go about the streets and places, in order to discover any conduct in the inhabitants that may be found fault with. Every house is taxed in Lhāsa at this period, and the slightest fault is punished with the greatest severity by fines. This severity of the Jalno drives all the working classes out of the city, till the twenty-three days are over. The profit gained by the Jalno is about 10 times the purchase-money. During the twenty-three days all the priests of the neighbourhood congregate at the Māchindrānāth temple, and perform religious ceremonies. On the fifteenth day of the new year all the priests, assembling about Māchindrānāth temple, display hundreds of idols in form of men, animals, trees, &c., and throughout the night burn torches, which illuminate the city to a great distance. The day on which the authority of the Jalno ceases the Rāja's troops parade through the streets, and proclaim that the power of the Rāja has again been assumed by him. Twenty-four days after the Jalno ceases to have authority, he again assumes it, and acts in the same arbitrary manner as on the first occasion, for ten days, after which authority is once more assumed by the Rāja. These ten days are called *Chokchut Molam*.

On the first day the Lamas all assemble, as before, at Māchindrānāth temple, and, after a religious ceremony, invoke the assistance of their deities to prevent sickness, &c. among the people, and, as a peace-offering, sacrifice one man. The man is not killed purposely, but the ceremony he undergoes often proves fatal. Grain is thrown against his head, and his face is painted half white, half black.

On the tenth day of this vacation, all the troops quartered at Lhāsa march to the temple, and form line before it. The victim, who has his face painted, is then brought forth from the temple, and receives small donations from all the populace assembled. He then throws the dice with the Jalno, and if the latter loses it is said to forebode great evil, and if not, and the Jalno wins, then it is believed that the victim, who is to bear the sins of all the inhabitants of Lhāsa, has been permitted by the gods to do so. He is then marched to the walls of the city, followed by the whole populace and troops, hooting and shouting, and discharging volleys after him. When he is driven outside the city, then people return, and the victim is carried to the Samaye monastery. Should he die shortly after this the people say it is an auspicious sign, and if not, he is kept a prisoner at Samaye monastery for the term of a whole year, after which he is released, and is allowed to return to Lhāsa.

The day following the banishment of the man to Samaye, all the state jewels, gold and silver plate, &c., are brought out from the fort, and carried through the streets of Lhāsa, protected by the troops armed, and followed by thousands of spectators. Towards evening everything is taken back to the fort, and kept as before. The day following, immense images of the gods (formed of variegated paper, on wooden frame-work) are dragged by men through the city, protected by armed troops. About noon the whole populace, great and small, assemble on the plain north of the city, and publicly carouse, race, and practise with the gun at targets. I was informed that the *Molam Chambo* and *Chokchut Molam* vacations, with all the religious ceremonies and observances, were instituted from time immemorial, but that the business of putting to the highest bid the powers of sole and chief magistrate dates from the tenth transmigration of the soul of the present Lama Guru.

One crop only is raised here in the year. Seed is sown in April, and the crop cut in September. The grains raised are *Sua*, *Ne*, *Do*, *Doo Sanmu*, *Youkar* (barley, another description of barley, wheat, another kind of wheat, peas, and mustard). Radish, carrots, onions, potatoes, beans, garlic, and various other edibles are cultivated. There are two kinds of trees, called *Chingma* and *Jaoar*, but they are not indigenous, and are only to be seen in gardens. There is no jungle hereabouts, and, excepting one thorny bush called *Sia*, the hills are absolutely barren.

A very few of the rich men's houses are built of brick and stone, all others are of mud. Some few are built of sun-dried bricks. The manufactures of Lhāsa are woollen cloths, felt &c. The cattle of Lhāsa are cows, sheep, goats, yaks, horses, asses, &c.; pigs and dogs are also reared, the latter being a very big animal; there are quantities of domestic cats, mostly black, and a few white and red. Fowls, pigeons, kites, crows, ducks, and pheasants, together with a variety of small birds, are very numerous. Snakes, reptiles, scorpions, &c., are not known.

The water supply of Lhāsa is from wells, and a tax of two annas on every house is imposed monthly on the inhabitants for the use of the wells.

During the month of December merchants from all parts bring their merchandise here (from China, Tartary, Ta-chien-lu, Chiampo, Kham, Towāng, Bhutān, Sikkim, Nepal, Darjeeling, Azimābād, and Ladākh). From China, silks of all varieties, carpets, and chinaware. From Jiling, in Tartary, is brought gold-lace, silks, precious gems, carpets of a superior manufacture, horse-saddles, and a very large kind of Dumba sheep, also valuable horses. From Ta-chien-lu immense

quantities of tea (Ta-chien-lu is said to be situated north-east of Lhāsa, and to be distant two months' journey). From Chiamdo city, in the Kham territory, an enormous quantity of the musk perfume is brought, which eventually finds its way to Europe, through Nepāl. Rice, and other grain that is foreign to Lhāsa, is brought from Towāng, in Blutān. From Sikkim, rice and tobacco; and from Nepāl, Darjeeling, and Azimābād, broad-cloth, silks, satins, saddles, precious stones, coral, pearls, sugar, spices, and a variety of Indian commodities. *Charas* and saffron (*keasar*) come from Ladākh and Kashmir. The merchants who come here in December leave in March, before the setting in of the rains renders the rivers impassable. The inhabitants use ornaments of coral, pearls, and precious stones, and occasionally of gold and silver, which are more especially worn by women on their heads. Coats lined with the skins of sheep are generally worn.

During the month of December, at nights and early in the mornings, the mercury in the thermometer sank below 32°, and during the days never rose over 40° to 45°. The river Kyi Chu was frozen at that time of the year and water kept in the warmest parts of a house froze, and burst the vessels holding it.

The chief divinity worshipped in this part is Buddha.

The food of the inhabitants consists chiefly of salted butter, tea, mutton, beef, pork, and fowls. Rice is not much eaten, owing to its high price, and because it is considered a fruitful source of disease. Other edibles, such as wheat, barley, and kitchen produce, &c., are cheap.

The current coin of the country is a silver piece called *Naktang*, two and a half of which pieces being the equivalent of one rupee. The silver pieces are cut into either halves, or into three pieces, the half pieces are called *Chikyah*, and one-third of the *Naktang* is called *Karma*, and two-thirds of the *Naktang* piece called *Shokang* or *Miscal*. There is also a large lump of silver, bearing the seal of the Chinese Emperor, the value of which is equal to 333 *Naktangs* called *Dojah* or *Kuras*.

To the north-east of Lhāsa, distant about one month's journey, there is a country called Kham or Nyahrong. Thousands of the inhabitants of this country annually pay Lhāsa a visit, some under the plea of wishing to worship, while others come with the ostensible reason of trading, but all really come with the object of robbing and stealing whatever they can. These people are held in terror by all the peaceable inhabitants of the Lhāsa territory, who have named them Golok Khamba. Highway robbery and murder are perpetrated by them without compunction. They appear to be exempt from the wrath or punishment of the Lhāsa chiefs. The Lhāsa government never takes notice of any complaints brought against this marauding tribe, and the reason I heard for this silence was that the Lhāsa *vakil* with government merchandise, on his annual journey to Peking, has to pass through the territory appertaining to this tribe, and to insure a safe journey for these the government connives at the mischief done by them in the Lhāsa territory. Another reason I heard was, that in case of a war, this Khamba tribe would render good service.

North of Lhāsa, and four miles distant, is situated a long hill, stretching from east to west, reported to contain immense quantities of silver; but a government order prohibits anyone from working the metal. The government itself refuses to work the metal, for the general belief is that the country will be impoverished, and the men will degenerate, should the metal be worked.

A Chinaman, not many years ago, worked a large quantity of silver here, but intimation was given to the government of the fact, and the man was seized, and sent to Peking, where his hands were cut off. The name given to this hill is Totiphu. On the summit of this hill is a spring, and a large flat slab of stone called *Dargāh*, the seat of the Muhammadan Pir. Another large slab of stone close to this is called *Jāc Namūz*; it bears the impression of a large hand, said to be the hand of a Muhammadan Pir, who lived here in former days. The Muhammadans of Lhāsa resort to this place to worship. It is also reported and believed that gold exists in the Totiphu hill, and near the monasteries Drephung and Rāmoche, but it is not worked. Gold is, however, worked to a very slight extent near the monasteries by the priests, but should they, in their search, discover a nugget of large size it is immediately replaced in the earth, under the impression that the large nuggets have life, and germinate in time, producing the small lumps, which they are privileged to search for.

To the north-east of Lhāsa, and one and a half months' journey from it, at Sa-ka or Thok, gold is extracted in large quantities, there being no prohibition as to working it. This gold is carried to Lhāsa, Gar-tok, and Shigāte. In this country no grain is raised near Sa-ka, the gold-diggers barter the metal for grain, &c., brought by merchants.

The strength of the standing force in Lhāsa is 1,000 Bhotia and 500 Chinese soldiers, armed with long flint guns, and of late seven small pieces of ordnance have been introduced. During the war between the Gurkhas and the Lhāsa government, in 1854, an order was given for a census of the inhabitants, and, exclusive of the military and priests, Lhāsa was found to contain 9,000 women and 6,000 men. The reason of this preponderance of females over the males is easily accounted for in consequence of the large number of males who become priests, who are compelled to vow celibacy.

The Nepālese residents of Lhāsa, though believing in the same divinity, Buddha, as the Lhāsa people, yet differ from them in many minor points. Another reason of the scanty population of Lhāsa is traced to the custom of one family, consisting say of four or five males, who cohabit with one woman.

Regarding the disposal of their dead, the Lhāsa people of poorer classes bind the corpses tightly with rope, and place them erect against the inner walls of their houses for two or three days, while the richer well-to-do classes detain the corpses in their houses for a length of fourteen days; after which time priests are invited, who pretend to read from their ritual the manner in which these corpses are predestined to be disposed of. Sometimes their decision is to cut the corpse into pieces, and scatter the fragments to the birds and beasts of prey, and sometimes to bury them. The reason assigned by them for detaining the bodies springs from the belief that they may become demons if disposed of without the blessings of the priests.

The inhabitants of Lhāsa report that the ready cash possessed by the government of Lhāsa, and deposited in the Po-ta-la fort, equals, if not exceeds, the wealth of the whole world; but I was of a contrary opinion, as I learnt that, during the war between Lhāsa and the Gurkhas in 1854, the Lhāsa government had to bring two *lacs* of rupees from Samaye monastery, to conduct the war.

Having made such a long stay in Lhāsa, I had completely exhausted my funds and was driven to teach some Nepālese merchants a little Hindi calculation for my support, since I could get no credit in the place, and no opportunity to return to Nepāl offered itself. I was one day questioned as to who I was by two Muhammadan merchants of Lhāsa, who appeared to be of a better class than the generality of the people. I told them (as I had told everyone who asked me the same question) that I was a Bashahri, but they contradicted me familiarly, and said that I, they were convinced, was no Bashahri, and at last they forced me to confess the truth, but solemnly swore to secrecy. By this confession of mine I was enabled to borrow of them a sum of money, on pledging my watch, and after borrowing another small sum, I made up my mind to start from Lhāsa by the first opportunity that presented itself.

I was at about this time very much alarmed by seeing the Kerun Shahr Jongpon in the streets of Lhāsa one day; and I was still more alarmed on seeing the summary manner in which treachery in these parts was dealt with, in the person of a Chinaman, who had seditiously raised a quarrel between the priests of the Ser-ra and Dre-phung monasteries. He was (on the receipt of an order from Peking to kill him) brought out before the whole of the people, and beheaded with very little hesitation. Owing to my alarm, I changed my residence, and seldom appeared in public again.

At this time I learnt that the Ladākh merchant, with whose servants I had travelled hither, was sending his party back to Ladākh with large quantities of tea, &c., that he had purchased. Hearing this, I went to see him, and after making a few presents, preferred my request to be allowed to return to my own country along with his party. He assented, and ordered that I should be well provided for, giving his servants injunctions to receive from me all that I might owe him on our arrival at Manasarowar.

*April 21st.*—Left Lhāsa early this morning, and arrived at eve at Netang village. *22nd.*—Arrived at Chu-shul. *23rd.*—Arrived at Kam-pa-par-tse village. *24th.*—Crossed Kam-pa pass and arrived at Pe-de village. *25th.*—Arrived at Nang-kar-tse village. *26th.*—Crossed Ka-ro pass, and arrived at Ra-lung village. *27th.*—Arrived at Gyāntse city; halted here the 28th. *29th.*—Arrived at Takse village. *30th.*—Arrived at Pen-nang village.

*May 1st.*—Arrived at Shigātse city; made a stay of six days here, while collecting provisions for the road. *8th.*—Left Shigātse in the morning, and arrived at Ne-tang village. *9th.*—Arrived at Shap-ge-ding village. *10th.*—Arrived at Shikkar village. *11th.*—Arrived at Tamcheding village. *12th.*—Arrived at Pin-dzo-ling village. *13th.*—Arrived at Chap-trang village. *14th.*—Arrived at Janglāche town; halted here one day, seeking provisions for the road as far as Manasarowar. *16th.*—Crossed the Brahmaputra river, and arrived at Sen-ge-lung village. *17th.*—Arrived at Larcha village. *18th.*—Arrived at Gnapp-ring Ta-sam. *19th.*—Arrived at foot of Rigu Tapjang monastery, situated on a hill. *20th.*—Arrived at Sang-sang-Knu Ta-sam; halted here one day. *22nd.*—Arrived at Gø camp. *23rd.*—Arrived at Sang-sang Ta-sam. *24th.*—Arrived at Gangbiako camp. *25th.*—Arrived at Ra-ga Ta-sam. *26th.*—Arrived at Se-mo-ku Ta-sam. *27th.*—Arrived at camp near Gyacho Jhil. *28th.*—Arrived at Sa-ka (Ta-sam). *29th.*—Arrived at Jagung camp. *30th.*—Arrived at Shricarpo camp, after passing Nyuk-ku Ta-sam. *31st.*—Arrived at Thuku camp.

*June 1st.*—Arrived at Tra-dom monastery. *2nd.*—Left Tra-dom, and after crossing Chachu stream, arrived at Barmalung camp, on the left bank of the Brahmaputra. The Brahmaputra river is called by the people in these parts by three names, Tamjan-Khamba, Mar-tsang, and Nari-chu. *3rd.*—Arrived at Totu camp. *4th.*—Arrived at Truk-sum Ta sam; sheep, goats, yaks, and horses are seen in large numbers here; salt, which is got from Chaba, is bartered here for grain, brought from Mukti-nāth and Jumla, this place producing no grain. *5th.*—Arrived at Demar camp. *6th.*—Arrived at Lahro camp. *7th.*—Arrived at Tamjan Ta-sam; sheep, goats, yaks, &c., are seen here in large numbers, and salt is bartered for grain brought from



Junla; halted here one day. 9th.—Arrived at Tha Kabjor; my servants here fell ill, and I was compelled to ask the assistance of my Ladākhi companions for the prosecution of my work. 10th.—Arrived at Gyamzar camp; halted here one day. 12th.—Crossed Ma-yuin pass, and arrived at Uk-rung Ta-sam, situated near Gun-chu lake; this lake is about 10 miles in length and 2 miles in breadth. 13th.—Arrived at Nyuk-chu camp. 14th.—Arrived at Tok-chen Ta-sam, on the right bank of Some stream; halted here one day. 16th.—Arrived at Sarniah Uniah camp, distant half a mile from bank of Manasarowar lake. 17th.—Left Sarniah Uniah camp this morning, and travelling fast arrived at Tar-chen, a large village. Here I met Supia Shopol, an inhabitant of the Kumaun district, through whose assistance I was enabled to discharge my debts, which had been accumulating since I left Jhāsa. The party whom I had accompanied hither went on to Gar-tok, while I, in company with two of Supia's sons, started for Kumaun. I left my servant, who was ailing, at Tar-chen, as a security for the fulfilment of my promise to return and pay Supia all he had lent me. The watch I, however, could not redeem, but told the men who had possession of it to leave it at Gar-tok, and that I would send the money to redeem it. 20th.—Left Tar-chen this morning and arrived at a camp, name not ascertained. 21st.—Arrived at Gya-ni-ma camp. During the rains Tar-chen and this place are resorted to by many traders, who come here to dispose of their merchandise. 22nd.—Arrived on the right bank of Nagu stream. 23rd.—Arrived at Lam Thazing camp, and was surprised to see the low hills in the vicinity covered with snow, in a way I had never seen before. The road over Kingri Kingri mountain was covered with snow, and rendered quite impracticable, this caused me to journey on to Niti, but even this road was so much covered with snow, that, on crossing over a hill, I accidentally slipped, and the thermometer I was carrying fell and broke. I left Lam Thazing this same day, and arrived at Shipchalam camp. 24th.—Arrived at Nak-tsok camp, on bank of Sag stream. 25th.—The Sag stream was not fordable, so I travelled alongside it till we arrived at Dongpu village; there I was asked who I was; I answered that I was a Bhotia, like themselves; but they refused to let me pass unless I showed them my authority for travelling thither. They told me if I had come from Taklakhar, as I said, to produce the passport of the Jongpon residing there. I told them I was on my way to Niti, but this did not satisfy them; and so they told me I must be detained till they had reported, and got back word from the Da-pa Jongpon. I was told that whenever the passes were opened news of the fact was sent officially to every village, and that none of the passes were yet open, hence their suspicion of me. On seeing their determination to stop my further progress, I told them that I had a passport from the Jongpon of Taklakhar, but had forgotten, and left it at Tar-chen, and, if they would not let me pass on, I would return to Tar-chen. They then informed me that they would allow me to return to Tar-chen, but could, on no account, let me pass for Niti, and with this, I returned three miles by the Tar-chen road, and struck out by a jungle-path over hills, &c., and arrived at night at Lhaudong camp. From Dongpu to this place I was unable to continue my route-survey.

26th.—Arrived at Laphal camp. Here I saw four Bhotia soldiers, who were sent here to stop the progress of Major Brereton. They questioned me as to who I was, where I had come from, and whither I was going; my answer to them was that I had come from Niti, knowing this would not excite suspicion. This village is on the extreme border of the Lhāsa territory. 27th.—Arrived at Khingur camp, where I met Major Brereton's camp. I halted here a portion of the next day, and was very kindly treated by Major Brereton. 28th.—Arrived at Topi Dhunga camp, where I left my servants, in consequence of one of them having been taken suddenly ill. 29th.—Crossed Utdhura or Untadhura pass, and thence made my way, through Kumaun and Garhwāl, to Mussooree. My servant Chumbal, whom I had left at Tar-chen, rejoined me on the road, having quite recovered from his illness.

My brother, who had returned to the British territory some time before me, had been instructed to cross the passes, in order to assist me. I gave him my sextant, and told him to carry a route survey back to Dongpu (where I was forced to leave off), and thence to carry on the route-survey to Gar-tok, in order to fix that place, and at the same time to redeem my watch, which the Ladākhis had left there for me. My brother was successful in both these objects.

## Route-Survey from Nepal to Lhasa.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
168	360 0*	...	...	...	In Kātmandu city, near the left bank of the Vishnumati river. This stream, after flowing 1,000 paces, joins the Bagmati river, which comes from the east. Thāpātālī, the house of Jang Bahādūr, is on the right bank of the Bagmati, at 1,000 paces from the junction. Pātan city, opposite to Thāpātālī, is on the left bank of the same stream. The temple of Pashupatinath is 10,000 paces east of the station.
			3,000	...	To station 169. At the north end of the Kātmandu bazar.
169	331 30	...	1,000	...	To 170. On bridge on the left bank of the Vishnumati stream.
170	343 0	1,100	...	...	Balaji bazar.
		1,000	2,100	...	To Pawa resting place, on right bank of the Vishnumati stream.
171	360 0	1,700	...	...	To a small nāla from the N.E., joins the Vishnumati.
		1,500	...	...	To Dharmatali village.
		600	3,800	...	To station 172.
172	326 0	...	1,900	...	To Jitpur village.
173	286 30	...	1,400	...	
174	337 30	...	500	...	To a small nāla which flows westward.
175	258 30	...	1,100	...	To Pawa, or halting place, on the right of the road.
176	360 0	...	1,000	...	To station 177.
177	292 30	2,800	...	...	To Kaharia Pawa, a house.
		1,300	4,100	...	To station 178.
178	337 30	800	...	...	To Jaiphāl Pawa.
		1,700	2,500	...	To station 179.
179	315 0	700	...	D†	To Rani Pawa.
		3,000	...	D†	To Barmanadi village.
		1,000	...	D†	To Chaotria-ka-pawa.
		2,400	...	...	To Sundriphedi, at the base of the hill. Here a nāla from the east, and another from 151° join, and flow towards 315° for 900 paces.
		900	8,000	...	To station 180.
180	270 0	3,500	...	...	At this point the Tari nadi from the N.E. joins the nāla from Sundriphedi; at the junction is Malkot village. On the right bank of the Tari nadi is a building for the court of the Rāju of Nainkot.
		2,000	5,500	...	To Batar bazar, on the left bank of the Gandak.
181	360 0	...	2,400	...	Near Trisuli bridge, on the left bank of the Gandak. On the right bank of the river is Khimehat bazar. A road from Trisuli bridge runs in a westerly direction to Pokhra and Sil Garhi, two places of some importance.
182	28 0	...	8,000	...	To station 183.
183	45 0	2,000	...	...	To Dnyabhang (Pawa).
	45 0	4,000	6,000	A‡	Helango, a small Bhotiā village. The road runs about half way up the slope of the hill, which appears very high. Hence the people along the road are all Bholiās.

\* 0° or 360° = North, 90° = East, 180° = South, and 270° = West.

† D—Descending.

‡ A—Ascending.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
184	348 30	1,000	...	Level	Bekuti village.
		700	1,700	Do.	
185	33 30	...	1,400	Do.	
186	348 30	...	3,000	Do.	Rancha village. To the west of Rancha village is seen a very high snowy range, running in a northerly direction.
187	33 30	...	2,500	Do.	Here a small stream runs by from the east, and two miles lower falls into the Gandak, near the place where another small stream empties itself. From this point the Gandak is distant about two miles.
188	343 0	400	...	Do.	Gurung village. This village, and all others on the road from hence, are roofed with wood only.
		1,400	1,800	Do.	
189	50 30	3,400	...	Do.	Tengu, a small village.
		200	3,600	Do.	
190	78 30	2,000	...	Do.	Boldong, a small village.
		1,600	3,600	Do.	Naklungphu a resting place for travellers.
191	28 0	2,000	...	Do.	Lanchachimbo, a small village.
		500	2,500	Do.	A pyramidal pile of stones at which the villagers worship (Churtan).
192	67 30	1,200	1,200	Do.	Dunglang, a very large village.
193	45 0	1,100	1,100	D	Tinghori, a small stream, flows from the south, and falls into the Gandak river at about $\frac{3}{4}$ of a mile from hence. This stream has its origin in a large sheet of water, named Gushii, well-known as a place of annual resort by the inhabitants, for the purpose of worship.
194	360 0	1,700	1,700	Slight A	
195	56 0	800	800	Level	Bhārku.
196	16 30	1,000	1,000	Do.	
197	39 0	500	...	D	Along the left bank of the Gandak river.
		3,600	4,100	Level	Shābru village, at the junction of the Gandak and Langdong (Khola), a small stream from the N. E. The Langdong (Khola) is bridged, and a toll is levied on all goods and men passing over.
198	360 0	1,800	...	Do.	Unḡal village (small).
		600	2,400	Do.	Opposite this point a small stream from the W. falls into the Gandak, and about four miles up the stream the village of Gūljun is visible.
199	16 30	1,400	...	Do.	Here the Gandak is bridged, and on the opposite (R) bank of the river is situated the village of Medongpodo.
		700	...	Do.	Here a small stream from the E. falls into the Gandak.
		2,000	...	Do.	Biting village.
		1,800	5,900	Do.	Here a small stream from the E. falls into the Gandak.
200	800 0	1,800	1,800	Do.	Here the Gandak is bridged.
201	33 30	1,500	...	Do.	Tomure, a large village where tolls are levied.
		200	1,700	Do.	
202	45 0	1,500	1,500	Do.	A corn-mill. Here a small stream from the E. falls into the Gandak.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
203	11 0	1,500	...	Level	A fort called Rasuagarhi, built by Jang Bahādur, stands here. A good-sized stream, named the Lendi R., coming from the N.E., falls into the Gandak. This stream forms the boundary between the Lhāsa and the Gurkha territories. A stone 4½ feet high and 3 feet in breadth has been erected here as a boundary pillar; it bears an inscription in Chinese characters.
		300	1,800	Do.	Dongkhung (Dharmasāla).
204	292 30	2,900	2,900	Do.	Along the left bank of the Gandak river.
205	348 30	1,000	1,000	Do.	Do. do.
206	343 0	300	...	Do.	Opposite this point a stream from the W. falls into the Gandak.
		300	600	Do.	Paimanesa Chauki. Travellers are examined here.
1	343 0	3,400	3,400	Do.	Along the Gandak. This (station) is identical with No. 206 above.
2	16 30	15,200	15,200	Slight A	Thusa village.
3	320 30	3,000	...	Do.	A small stream from N.E. by N. flows from hence parallel to the Gandak, and falls into it about one mile below Thusa.
		2,800	5,800	A	
4	298 0	1,300	...	Slight D	Kerun Shahr, a small town, with a large temple dedicated to the Saint Phakpachengra, which stands at the N. end of the town. A fort called Sharba (jong) lies to the east, and a place called Nūb (jong) to the west. A house at the N.W. end, the residence of a Labrang, was the place from which observations for latitude were taken.
		500	...	Do.	A corn-mill, on the left bank of a small stream from the west.
		1,300	...	Level	A bridge across the last mentioned stream. From this two monasteries (Gom-pa) are seen at about four and five miles.
		600	...	Do.	Opposite on the right bank of the Gandak is the village of Dūlbo.
		1,500	...	Do.	Chongdai village. Opposite which a small stream falls into the Gandak.
		2,000	...	Do.	Janding village.
		400	...	Do.	Pansi village.
		2,000	...	Do.	Opposite this on the other bank of the Gandak stands the Garū monastery (Gom-pa).
		2,900	...	Do.	On the right bank of the Gandak river, which was crossed by a bridge.
		700	...	Do.	Māgnal village.
		2,500	16,300	Do.	Half mile from the Gandak river. A good-sized stream comes from the W., and passing this place, falls into the Gandak.
5	343 0	1,300	...	Do.	Rakma village.
		80	...	Do.	On the left bank of the Gandak river, which was again crossed by a bridge called Rakma Yūsam. Tolls are levied here during the months of September and October on all goods taken across.
		3,200	...	Do.	Tildi-fu, an immense fragment of rock to the right of the road, bearing inscriptions in Chinese and Lhāsa characters.
		1,300	...	Do.	On the left bank of the Gandak. On the other bank, and about ½ mile from it, is a Gom-pa (monastery) half way up the hill side. A small stream from the E. falls into the Gandak at this point.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
5	343 0	1,400	...	Level	Today. The houses of this village are on both banks of the Gandak. A small stream from E. here falls into the Gandak.
		1,700	...	Do.	On the opposite bank a glacier is visible, from beneath which a small stream flows into the Gandak.
		700	...	Do.	A small stream from N.E. falls into the Gandak.
		200	...	Do.	On the right bank of the Gandak, which is bridged.
		1,600	...	Do.	A small stream from the N.W. falls into the Gandak.
		100	12,200	A	The ruins of Lende Fort.
6	33 30	1,000	...	Level	On the left bank of the Gandak, which is here bridged.
		500	...	Do.	On the right bank of the Gandak, which is here bridged.
		500	...	Do.	On the left bank of the Gandak, which is here bridged.
		1,400	...	Do.	A small stream from the S.E. falls into the Gandak. This stream is the boundary between the two districts Kerun Shahr and Jongkha.
		2,500	...	Do.	A stream from glacier on the east falls into the Gandak.
		1,000	...	Do.	On the right bank of the Gandak, which is bridged.
7	298 0	2,100	...	Do.	Sangda village, a stream flowing from W. falls into the Gandak.
		500	9,500	Do.	A small stream from W. falls into the Gandak. The road to Jongkha and Lhása follows a northerly direction from this; Jongkha is about 24 miles from hence. Followed the course of this small stream.
		4,200	...	Slight A	At Mun village.
		7,600	...	Great A	* On the top of Lájük Thumba mountain. Thermometrical observations taken here.
8	236 0	8,700	20,500	Steep D	A grazing-ground (chuks). Along the bank of a stream called Buria Gandak.
		400	...	Slight D	At this point a good-sized stream coming from N.W. falls into the Buria Gandak.
9	180 0	3,300	3,700	Do.	Kolung grazing-ground (chuks). A stream called Chike K., from the N.W., falls into the Buria Gandak. From hence a large road crossing a high mountain, distant about 16 miles, leads to Tibet.
		4,600	...	Do.	Churtan (temple). A small stream from E. falls into the Buria Gandak.
		1,200	...	Do.	A small stream from W. falls into the Buria Gandak.
		1,900	...	Level	On the left bank of the Buria Gandak, which is bridged.
		600	...	Do.	On the opposite bank a stream from N.W. falls into the Buria Gandak.
10	225 0	2,600	...	Do.	Opposite, on the right bank of the stream, stands the village of Chum, also called Niluo; this is a very large village.
		500	11,400	Do.	At the village called Chülúe a small stream from the E. falls into the Buria Gandak.
		1,200	...	Do.	A very large temple (Churtan).
		1,200	...	Do.	A village called Pangdun.
		1,000	...	Do.	A village called Phürúe; the stream is bridged at this village.
		300	...	Do.	On the right bank of the stream. A small stream from S.E. falls into the Buria Gandak on the opposite side.
		700	...	Do.	On the other bank the village of Láhar. A small stream from N.W. falls into the Buria Gandak.

\* This forms the boundary between the Lhása and Gurkha territories.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
10	225 0	2,200	...	Level	A village called Nah (small).
		1,500	...	Do.	A large village called Nik-yu. A stream from the N.W. into the Buria Gandak, and a second from the S.E. falls in on the opposite side.
		800	8,900	Do.	A (Gom-pa) monastery. The country from hence is covered with jungle.
11	247 30	1,300	...	Do.	A good-sized village, called Jonghil.
		1,000	...	Do.	A small village, called Faldap.
		500	...	Do.	A small village, called Chokang. The road from hence is very bad.
		4,400	...	Up & Down	A large stream, called the Khimulung R., from the north falls into the Buria Gandak.
		600	...	Slight A	A small village called Lohong; opposite stands the village of Go.
		600	8,400	Level	The small village of Pangu. A small stream from the S.E. falls into the Buria Gandak. From this point, for about four miles, the Buria Gandak assumes a south-westerly course, and then changes to a southerly one. Two villages are visible, distant about four miles, viz., Shipche village on the left, and Chumuling on the right bank.
12	286 30	6,000	6,000	A	Charan phuk. This village lies between two small streams, which coming from the north, and joining near the village, fall into the Buria Gandak about one mile lower.
13	236 0	2,000	...	Level	The village of Chumge.
		1,000	...	Do.	A pile of stones (Lapcha).
		1,400	...	D	A small stream from N.W. falls into the Buria Gandak one and a-half miles below. A corn-mill stands here.
		3,500	...	Great A	On the top of the Lachumu Phurphur mountain near a pile of stones (Lapcha). Thermometrical observations taken here.
		600	...	Up & Down	Pile of stones (Lapcha).
		1,100	9,600	D	From this the junction of the Nubri R. and the Buria Gandak is visible, the joint stream flows south. Near the junction is a large village called Njak, one mile lower the village called Pansi, and a mile below the latter Tara village.
14	286 30	4,800	...	D	On a small stream which falls into the Nubri lower down.
		1,200	6,000	Level	On the left bank of the Nubri river; a small stream falls into the Nubri opposite this point.
15	360 0	1,500	...	Do.	Rāna village; here the stream is bridged, and a road via Njak and Pansi leads to Nepal.
		900	...	Do.	A small stream from the E. falls into the Nubri.
		800	...	Do.	Another stream from E. falls into the Nubri.
		700	3,400	Do.	On the left bank of the Nubri.
16	315 0	1,000	...	Do.	At Bhi village.
		600	...	Do.	A small stream from the N.E. falls into the Nubri.
		1,500	...	Do.	Lung village.
17	181 0	1,900	5,000	Do.	A stream from north falls into the Nubri.
		1,500	...	Do.	On the right bank of Nubri, which is bridged.
		600	...	Do.	Kap village; opposite, on the right bank of the river, distant about half a mile, are the villages of Chak and Gopa.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
17	181 0	1,800	...	Level	At this point a large stream, called the Nola R., from the N. falls into the Nubri.
		2,000	6,900	Do.	A stream from the S.W. falls into the Nubri.
18	303 30	3,200	...	Do.	Namdul village, on right bank of Nubri R.
		300	...	Do.*	Here a small stream from the W. falls into the Nubri.
		3,500	7,000	Do.	Lidada village.
19	281 0	1,000	...	Do.	The Human stream from W. falls into the Nubri, over it is a bridge called Haman (Samba).
		1,200	...	Do.	Shao village; (small). Immediately opposite, on the other bank of the Nubri, stands the village of Ning.
		3,400	...	Do.	Loha, a large village.
		1,200	6,600	Do.	A small stream from W. falls into the Nubri river.
20	275 30	4,000	...	Do.	A stream from S.W. falls into the Nubri river.
		3,000	7,000	Do.	Rue village; (very large).
21	348 30	600	...	Do.	To the left of this point, distant quarter of a mile, stands a monastery (Gom-pa).
		1,500	...	Do.	Here a stream flowing from W., and coming from under a large glacier, falls into the Nubri.
		5,700	...	Do.	On the left bank of the Nubri stream, which is bridged, a small stream, coming from a glacier distant about quarter of a mile, falls into the Nubri here.
		2,400	10,200	Do.	At Babuk Chuksa grazing-ground, which is at the junction of the Nubri and another large stream coming from an immense glacier, three-fourths of a mile distant, lying west of this point. From this place a road runs in a westerly direction to an important place called Muktinath, distant five days journey. Babuk Chuksa is on the right bank of the Nubri stream, which is bridged.
22	11 0	4,000	4,000	Slight A	Here the stream is crossed by a bridge called Dilung (Samba). This point is on the left bank of the Nubri. On the other bank of the stream, in a N.W. direction, lies an immense glacier about four miles in length, from which a small stream falls into the Nubri.
		2,800	...	Level	Salang, at the foot of a high mountain.
23	315 0	3,500	6,300	Great A	On the top of Gya P. This forms the boundary between the Lhasa and Gorkha territories. Thermometrical observations were taken here.
		2,500	...	D	A small stream from a glacier on the W. flows past this point, and falls into another stream one mile distant. This latter stream, after flowing a long distance in an easterly direction, falls into the Nubri near the village called Kap.
		2,300	...	A	Near a pile of stones (Lapcha).
24	33 30	2,300	7,200	D	At a village named Sangjomba, on the right bank of a stream.
		3,400	3,400	Level	Somnath camp*, at the junction of two streams, viz., one mentioned above, and a second coming from the W.
25	28 0	4,000	...	Slight A	On the left bank of the stream mentioned above, which is here joined by a stream from the N.W.
		2,000	...	Do.	A small stream from the E. falls into this stream.
		4,900	10,900	Great A	On the top of No pass. Thermometrical observations were taken at this point.
26	22 30	9,500	...	D	At a halting place for travellers called Barudukam, on the left bank of a stream called Shote R.

\* Thermometrical observations were taken here.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
27	22 30	3,000	12,500	Level	
28	343 0	4,000	...	Do.	Opposite this point a large stream from S.E. falls into the Sho-te R.
		4,900	...	Do.	A small stream from the W. falls into the Sho-te R.
		5,200	...	Do.	Zangra Dung or Rebo (camp).
		10,500	24,600	Do.	On the left bank of the Sho-te R.
29	326 0	4,000	4,000	Do.	Opposite this point, on the other bank, stands an isolated hill called Tházam (well-known).
30	309 0	6,000	6,000	Do.	At this point the Sho-te R. follows a north-easterly course for about three miles, and then taking an easterly course for about four miles, falls into the Tamjan-Khamba or Brahmaputra.
31	286 30	10,200	10,200	Do.	Kyang-gyap (Gom-pa). At this point a stream from S. flows past, and falls into the Brahmaputra three miles ahead.
32	320 30	2,500	...	Do.	At Tala Labrang (camp). Observations for latitude were taken here, also thermometrical observations.
		4,400	...	Do.	A stream called Humulung R. coming from W. flows past this point and falls into the Brahmaputra.
		1,600	...	Do.	At Yakkü or Mala Labrang (a large camp). The Brahmaputra river is distant about one and a-half miles N.E.
		2,600	...	Do.	One branch of the Humulung R. flows past this point, and falls into the Brahmaputra river one mile above.
		8,500	19,600	Do.	At Chabdan (Gom-pa), an old monastery about one mile from the Brahmaputra river.
33	337 30	4,500	...	Do.	On right bank of the Brahmaputra. To the left of the road is a small tarn.
		2,000	6,500	Do.	Small isolated hills on both sides of road.
34	11 0	3,000	...	Do.	Rela Gom-pa, a large monastery.
		4,000	7,000	Do.	On the right bank of the Brahmaputra.
35	348 30	2,000	...	Do.	Do. do.
		2,000	...	A	Do. do.
		1,000	...	D	Do. do.
		700	6,700	Level	At Kiudong.
36	45 0	5,000	5,000	Do.	On right bank of the Brahmaputra.
37	22 30	4,000	4,000	Do.	Muna Ferry or Ghät.
1	286 30	5,000	...	Do.	(Station 1). This station is identical with No. 36.
		1,700	6,700	A	On the top of Takolsh mountain.
2	292 30	2,000	...	D	Sateah-dong (camp).
		3,600	5,600	Level	
3	337 30	3,000	3,000	Do.	Jang-thak-dong (camp).
4	303 30	2,000	...	Do.	A small stream from S.E. flows past, and falls into the Brahmaputra two miles ahead.
		2,000	4,000	Do.	
5	286 30	2,800	...	Do.	At Garbadong, to the right of the road is an isolated hill.
		1,000	...	Do.	On right side of the road a tarn called Sangi-gam.
		1,000	...	Do.	Do. do.
		800	...	Do.	Do. do.



Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
5	286 30	19,000	24,600	Level	At Lik-tse My., on right bank of the Brahmaputra. South of this point, distant about one mile, lies a lake one mile long by one mile in breadth. The Brahmaputra at this point is crossed in boats formed by a frame-work of wood covered with leather.
6	354 0	5,000	5,000	Do.	In the vicinity of numerous little patches of water.
7	22 30	7,400	7,400	Do.	Tra-dom (Gom-pa) monastery, and Ta-sam, or halting place, situated on a hillock. Numerous patches of water all round.
8	101 0	18,000	...	Do.	
		2,500	15,500	Slight A	
9	78 30	1,000	...	D	In the vicinity of this point are numerous patches of water.
		3,000	4,000	Level	Thuku camp.
10	95 30	2,500	...	Do.	
		3,200	5,700	Slight A	
11	106 30	2,000	...	D	
		6,800	8,200	Level	Lak-chang camp.
12	140 30	1,000	...	Do.	A tarn.
		5,000	6,000	Do.	Phuchungma camp.
13	139 0	4,000	...	Do.	On the left bank of a small branch of the Brahmaputra river.
		6,000	10,000	Do.	At Shricarpo, on the right bank of the Minchu R., which comes from the E., and falls into the Brahmaputra one mile distant.
14	78 30	7,000	7,000	Do.	On right bank of Minchu R.
15	39 0	5,500	...	Do.	From this point the Minchu R. is seen to come from the N.E.
		1,200	...	Do.	Nyuk-ku ( <i>Ta-sam</i> ), or halting place.
		2,000	3,700	Do.	
16	95 30	9,200	...	Do.	On road to this point crossed a branch of the Minchu R.; a stream coming from the S. flows past and falls into the Minchu R. four miles to the north.
		3,500	12,800	Slight A	
17	112 30	2,000	...	Level	At this point a small stream coming from S.W. flows past, and taking a north-easterly course, falls into the Minchu R. three miles ahead.
		4,000	...	Do.	At this point a stream from S.W. flows past and falls into the Minchu R.
		1,400	...	Do.	Jagung camp.
		6,700	...	Slight A	On top of Lha-lung P. mountain. A small stream, rising at the foot of this mountain, falls into the Minchu R. A large road leads from hence to Jang-thak-dong.
		400	14,500	D	
18	84 0	5,000	5,000	D	A village in ruins.
19	56 0	4,000	4,000	Level	On the right bank of the Charta river. At this point the Charta R. changes its course from a southerly to a south-easterly direction. The ruins of an old fort are seen near, called Gyah-khar-jah-khar.
20	112 30	2,500	...	Do.	On the left bank of the Charta R.
		700	...	Do.	At this point the Charta R. flows in a southerly direction, and empties itself into the Brahmaputra six or seven miles below. To the north of this point, distant about one mile, stands a monastery (Gom-pa) called Darkialing.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
20	112 30	3,100	6,800	Level	On the right of a stream called Chaka river which comes from E. and falls into the Charta river three miles below.
21	84 0	8,000	...	Do.	Jhalung camping place, on the right bank of the Chaka river.
		1,000	9,000	Do.	
22	78 30	5,000	5,000	Do.	Sa-ka, a large village, situated one mile north of the Chaka stream. A fort called Sa-ka ( <i>Ta-sam</i> ) stands at the east end of the village.
23	118 0	3,400	...	Do.	A small stream from N.W. flows past and falls into the Chaka stream quarter of a mile below.
		12,900	...	Do.	On the left bank of the Chaka river which stream from this point appears to come from N.E., flowing past the foot of a very snowy and high mountain called Harkiaug, distant about three miles.
		1,100	17,400	Do.	Naguling camping place. A road from this point running S.E. leads to Jang-thak-dong.
24	112 30	4,000	...	Do.	Larcha; (foot of hill).
		1,000	...	A	
		1,000	...	Level	On top of Gyu P.; pile of stones (Lapcha).
		2,300	8,300	Do.	From this point the Brahmaputra river is visible three miles to the south.
25	140 30	2,000	...	D	
		2,000	4,000	Level	A ruined village.
26	106 30	2,000	...	Do.	
		1,000	...	A	To the right of the road a long tank called Gahlehu.
		1,500	4,500	Slight A	Pile of stones (Lapcha). The tank mentioned above ends at this point.
27	67 30	1,600	1,600	D	Uk-shu village. Grain is raised at this village.
28	129 0	2,800	2,800	Level	The Brahmaputra is two miles south.
29	95 30	8,000	8,000	Do.	Road runs between hills along a small stream.
30	33 30	5,200	...	Do.	At Se-mo-ku Ta-sam. Observations for latitude were taken here.
		2,800	...	Do.	A very small stream from the left.
		1,200	3,200	Do.	
31	50 30	3,700	3,700	Do.	About three miles from this point is a high snowy mountain.
32	73 0	5,200	5,200	Do.	
33	22 30	2,700	2,700	A	On top of Gurla mountain. From this point is distinctly visible a high snowy range fifteen miles distant, stretching about forty miles E. to W. The Ra-ga river has its source at the foot of this mountain.
34	67 30	6,200	6,200	Level	To the right of the road stands a range of hills stretching in an easterly direction.
35	90 0	6,000	...	Do.	At this point a stream from south falls into the Ra-ga R.
		2,500	8,500	Do.	At Tarchung camp; a small stream from south falls into the Ra-ga.
36	95 30	8,000	...	Do.	On the opposite bank of the Ra-ga is a grazing-ground called Able.
		8,000	...	Do.	At Ra-ga Ta-sam, or halting-house.
		4,500	20,500	Do.	At this point the Ra-ga flows in an N.N.E. direction for about four miles, and then due E.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
37	67 30	2,000	...	Level	At Mane; a platform covered with engraved stones.
		1,700	...	Slight A	
		1,200	...	D	A stream from S.E. flows past, and falls into the Ra-ga one mile N.
		1,600	6,500	Level	Gangbiako camping-ground.
38	73 0	5,500	5,500	Slight A	Gang P. To the right of the road a very lofty snowy peak.
39	78 30	2,500	...	Level	Lapcha; pile of stones.
		3,200	5,700	D	On the right bank of the stream mentioned on road from station 37 to 38.
40	101 0	2,200	2,200	Level	
41	73 0	8,400	8,400	Slight A	Singbi P. Lapcha.
42	67 30	600	...	Level	Lapcha; pile of stones. From this point, distant about fifteen miles, is seen a very high snowy range stretching from N.E. to S.W. The Brahmaputra flows behind this range.
		1,800	...	D	At Ruau; camping place foot of hill.
		7,000	9,400	Level	On left bank of a stream which from this point flows to the right of the road, and falls into an immense lake four miles in length called Kyongdom cho.
43	61 30	8,000	...	Do.	The lake called Kyongdom extends to this point.
		3,500	...	Do.	At Sang-Sang Ta-sam. Observations for latitude were taken here, also thermometrical observations.
		1,200	12,700	Do.	Alongside lake.
44	33 30	2,000	2,000	Do.	Alongside lake. This lake is three-cornered. The Ra-ga river supplies it with water.
45	106 30	1,000	1,000	Do.	On the right bank of the Ra-ga R.
46	180 0	900	...	Do.	From this point the Ra-ga R. continues an easterly course, and a large road runs alongside the river leading to Lhāsa. At this point a stream coming from S. falls into the Ra-ga R.
		2,800	3,700	Do.	On the left bank of the stream mentioned above.
47	140 30	4,000	4,000	A	On top of Kichela mountain.
48	67 30	4,000	4,000	D	On left bank of a stream which rises at the foot of Kichela mountain.
49	39 0	1,400	...	Level	A small stream from S.E.
		300	...	Do.	On right bank of stream.
		1,500	3,200	Do.	At this point the stream follows a northerly course, and falls into the Ra-ga R. one mile distant.
50	84 0	5,500	...	Slight A	On top of Ge P.; (Lapcha) pile of stones.
		700	6,200	D	
51	56 0	3,500	3,500	Level	Ge camp, on bank of a small stream which rises at foot of the Ge P., and falls into the Ra-ga river.
52	112 30	1,600	1,600	A	Lapcha; pile of stones.
53	90 0	2,600	2,600	Slight D	From this point the Ra-ga river is seen three-quarters of a mile distant north, and about one mile beyond the stream is the Niaring monastery.
54	106 30	1,500	...	Level	A small stream from S. flows into the Ra-ga R. half a mile north.
		4,000	5,500	Do.	
55	135 0	2,000	2,000	Do.	

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
56	106 30	3,000	...	Level	A stream coming from S.W. flows past into the Ra-ga R.
		3,800	6,800	Do.	Lapcha; pile of stones.
57	112 30	4,000	...	Do.	A large stream from S. flows past into the Ra-ga R. one and a-half miles north.
		2,800	6,800	Do.	Mane; platform covered with engraved stones.
58	135 0	2,200	2,200	Do.	Lapcha; pile of stones.
59	95 30	7,200	7,200	Do.	A small stream from S.W. flows past, and falls into the Ra-ga R. three miles north.
60	78 0	6,000	6,000	Do.	At this point* a stream coming from E. flows past into the Ra-ga R. 1,000 paces north of this point stands Sang-sang-Kau Ta-sam, where latitude and thermometrical observations were taken.
61	135 0	2,000	2,000	Do.	Mane; a platform covered with engraved stones.
62	101 0	1,500	...	Do.	Due north of this point about four miles the Ra-ga R. is seen flowing in a north-easterly direction.
		2,900	...	Do.	On right bank of stream mentioned on road from station 60 to 61, which comes from the S.E.
		800	6,200	Do.	Lapcha; pile of stones.
63	90 0	4,600	...	Slight A	On summit of Ka P., which forms the boundary between the districts of Utsang and Dokthol.
		1,800	6,400	D	
64	106 30	1,800	1,800	Level	
65	78 30	2,000	...	Do.	Mane; a platform covered with engraved stones. A small stream from S.
		1,000	...	Do.	On right bank of stream.
		800	3,800	Do.	
66	140 30	1,100	...	Do.	A small stream from S.E. flows past in a N.W. direction.
		1,800	...	...	At Kûkap camp.
		1,000	3,900	Do.	
67	123 30	2,500	...	Do.	Lache, foot of hill.
		1,300	...	A	On summit of Thang P.
		1,500	...	D	
		2,000	...	...	On left bank of a stream from S.W. and flows in a north-easterly direction. About one mile to the north of this point is situated a very large monastery (Gom-pa) called Rigu Tapjang.
68	90 0	2,800	10,100	Level	On right bank of the stream.
		600	...	Do.	Here another stream comes in.
		2,000	...	Do.	Alongside stream which takes hence a northerly course and falls into the Ra-ga R. some distance away.
69	112 30	1,600	4,200	Do.	Mane; a platform covered with engraved stones.
		800	...	Do.	A stream from S. flows past.
		1,200	2,000	Do.	
70	95 30	1,600	...	Slight A	On top of hill at a small tarn.
		200	1,800	Level	
71	78 30	7,500	7,500	D	On right bank of the Chirku stream, which flows hence N.E. by N., and falls into the Ra-ga R.

\* Thermometrical observations were taken here.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
72	101 0	1,200	1,200	Level	Ra-lung, a large village; observations for latitude were taken here. East of this all villages on the road raise their own grain.
73	90 0	1,500	1,500	Slight D	At the N.W. end of a large lake called Ngap-ring-krim, about five and a-half miles long and three miles broad.
74	123 30	500	...	Level	A (Gom-pa) monastery lies to the north, the lake being about quarter mile distant.
		5,000	...	Do.	To the left of the road another monastery (Gom-pa).
		1,000	6,500	Do.	Mane; a platform covered with engraved stones.
75	185 0	3,600	3,600	Do.	Ngap-ring Khaka village and Ta-sam; latitude observations taken here. About three miles, 60° east of north, is a very large village and fort called Ngap-ring jong. From this point a snowy range is seen about fifteen miles north.
76	157 30	3,100	3,100	Do.	A stream coming from S. flows past into the Ngap-ring-kyim L.
77	106 30	1,900	1,900	A	On summit of a low hill.
78	123 30	300	...	Level	At a small tank.
		300	...	Do.	
		2,900	3,500	Slight D	On left bank of a stream.
79	106 30	2,400	...	Level	Chak-u-lung, a small village on bank of stream.
		2,500	...	Do.	At Chitung, a small village on bank of stream.
		2,200	7,100	Do.	A large stream from 78° east of north flows past, and falls into the Brahmaputra to the south.
80	78 30	2,200	...	Do.	Demalung village, on right bank of above stream.
		3,200	...	Do.	500 paces to north stands the village of Larcha, the large stream comes from the north to this point.
		300	5,700	Do.	
81	84 0	2,500	...	Do.	300 paces S.W. is the village called Nams.
		600	...	Do.	At S.W. end of a large lake called Lang cho gonak.
		300	3,400	Do.	On bank of lake.
82	61 30	2,600	...	Do.	At a (Gom-pa) monastery, on bank of lake. To the left of the road stands a second Gom-pa half way up the slope of a low hill.
		600	3,200	Do.	A large monastery (Gom-pa) on bank of lake.
83	95 30	2,500	2,500	Do.	On bank of lake.
84	90 0	200	...	Do.	At this point the lake becomes very narrow.
		1,200	...	Do.	To the left of the road the Lalung monastery (Gom-pa).
		2,600	4,000	Do.	Extreme E. end of lake.
85	73 0	2,100	2,100	Do.	To the N.E. quarter of a mile the village of Bharka, and to the north a very lofty snowy peak.
86	129 0	4,000	...	Do.	At Khara village.
		8,800	...	Do.	A large Mane; platform covered with engraved stones.
		400	8,200	Do.	Sen-ge-lung village.
87	157 30	3,800	3,800	Do.	Napai village, on left bank of stream, which flows south into the Brahmaputra one mile distant.
88	78 30	6,000	...	Do.	Gadue village, to right of road.
		600	...	Do.	Degung (Gom-pa) monastery to left of road.
		4,500	11,100	Do.	On left bank of the Brahmaputra, which on the opposite bank receives a stream from the south.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
89	90 0	3,000	3,000	Level	Chunka village, on left bank of the river.
90	80 30	4,000	4,000	Do.	Janglache city with a fort, both on the right bank of the Brahmaputra, which was crossed in boats. Latitude and thermometrical observations were taken in the city.
91	326 0	3,200	...	Do.	The Brahmaputra is here spanned by an iron chain suspension bridge called Chak-sum. Opposite this point on the left bank is the Debung Gom-pa (monastery).
		500	3,700	Do.	
92	45 0	3,700	...	Do.	To left of road stands a Gom-pa and a corn-mill.
		1,000	...	Do.	Opposite, on the left bank, is the Dele village.
		3,000	...	Do.	To right of road the Shekcha village.
		1,800	...	Do.	To right of road the Shekcha Okmi village.
		1,200	10,700	Do.	A village is seen on opposite bank, name not ascertained.
93	360 0	3,800	3,800	Do.	The Chola village.
94	16 30	2,500	2,500	Do.	Two villages (names not ascertained).
95	84 0	2,400	2,400	Do.	Chup-trang village. The Brahmaputra is half a mile, from this point.
96	28 0	4,600	4,600	Do.	On right bank of Brahmaputra river. Opposite a village name not known.
97	73 0	2,000	2,000	Do.	Nesa village.
98	56 0	2,000	...	Do.	Ding village, on right bank of river.
		2,000	...	Do.	Phangzi village, on right bank of river.
		2,400	6,400	Do.	On right bank of the Brahmaputra.
99	90 0	3,000	...	Do.	At Tashi jong village.
		2,000	5,000	Do.	On right bank of river.
100	45 0	1,000	...	Do.	At this point a stream from S.E. falls into the Brahmaputra. A village called Tashiling lies 1,000 paces south-east, on the left bank of stream; observations were taken here.
		7,000	8,000	...	Thang; (road precipitous here). At this point the Ra-ga river falls into the Brahmaputra, it comes from 72° west of south (bearing 252°).
101	129 0	3,500	3,500	Do.	Pin-dzo-ling village and Gom-pa (monastery), on right bank of river; the river is here spanned by an iron suspension bridge called Chak-sum.
102	84 0	5,500	...	...	Thang; (precipitous road). On the other bank of the river is the Chohil village.
		3,000	...	Do.	Opposite the Pusum village, on the other bank of the river.
		400	...	Do.	Pangda village, on right bank of river.
		2,000	10,900	Do.	On right bank of the Brahmaputra river.
103	90 0	2,500	2,500	Do.	Do. do.
104	167 30	1,200	...	Do.	At this point the river is spanned by an iron suspension bridge called Chak-sum. A road leading over the bridge and running N.E. goes to Jisang Lungba.
		3,200	4,400	Do.	From this point the Brahmaputra flows 112° bearing.
105	180 0	2,500	2,500	Do.	Dhun-dup-ding village.
106	157 30	3,200	...	Do.	Tra-shi-gang, a very large village.
		2,000	...	...	A small stream from the south flows past into the Brahmaputra three miles north.
		1,000	6,200	Do.	

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
107	112 30	4,000	...	Slight A	Lapcha (a pile of stones).
		2,000	6,000	Slight D	
108	151 30	3,800	3,800	Do.	Road runs between hills.
109	95 30	4,400	4,400	Level	Si-lung, a very large village; observations for latitude were taken here.
110	106 30	6,700	...	Do.	Near Shikar village.
		800	7,500	Do.	Near Shikar Barki villages*.
111	45 0	2,000	2,000	Slight D	Regained the high road, which was left at station 110.
112	67 30	500	...	Level	One mile south the village of Shikar Okmi.
		3,500	4,000	Do.	
113	101 0	500	...	Do.	A very large village called Shap-ge-ding.
		1,000	...	Do.	A stream from S.E. flows past, and after pursuing a north-westerly course for one mile turns to E., and falls into the Brahmaputra three or four miles distant.
		500	2,000	Do.	
114	135 0	1,700	...	Do.	A village (name not ascertained).
		1,200	...	Do.	Thonka village.
		900	3,800	Do.	
115	112 30	4,500	4,500	Do.	Ne village.
116	101 0	2,000	...	Do.	To right of road a Gom-pa (monastery).
		1,500	3,500	Do.	
117	90 0	4,500	...	Do.	Hamadang-jola village.
		6,400	...	Do.	Shu-gu village.
		2,000	...	Do.	Sing-ma village.
		600	...	Do.	Three-quarters of a mile to the north is a large Gom-pa (monastery) called Ganjian.
118	106 30	4,800	18,300	Slight A	On summit of a low hill.
		1,200	1,200	Level	Lapcha (pile of stones). Near this point a stream rises, known as the Zourak-chu lower down.
119	90 0	5,000	5,000	Slight D	At Chia-ri village.
120	67 30	8,000	8,000	Level	To the south one mile is a village (name not ascertained).
121	45 0	5,000	5,000	Do.	Ne-tang village, and Gom-pa (monastery).
122	73 0	3,700	3,700	Do.	To the south about one mile flows the Zourak-chu (stream), which from thence takes an easterly course.
123	360 0	1,900	1,900	Do.	To the north about half a mile the Shābru village.
124	45 0	2,500	...	Slight A	Lapcha (pile of stones). To the north one and a quarter miles Sunduphuk village.
		6,500	...	Level	Dhejanphuk village.
		1,200	...	Do.	Tra-shi-lhun-po Gom-pa (monastery), one mile in circumference*.
		1,000	11,200	Do.	In the caravanserai or konkhan north-east end of the city of Shigütse or Digarchu. N.W. of this point about 500 paces, on the summit of a low hill, stands a fort called Gang Mär Dzong. South about three-quarters of a mile lies a village called Tashikancha; three-quarters of a mile distant, north-east of the city, is the Konkialing Gom-pa (monastery), on the left bank of the Pena-nang chu (river) which, flowing north for three miles, falls into the Brahmaputra. To the south of the

\* Thermometrical observations were taken here.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
124	(Continued.)	...	...	...	city about nine miles is a range of mountains called Maorhi, where gold is said to be found. The city of Digarcha is one mile long and three-quarters broad. Observations for latitude and thermometrical observations were taken in the konkhan or caravansera.
125	140 30	4,800	...	Level	Khārak village; the residence of a high military official called Depung.
		1,100	...	Do.	On the left bank of a stream coming from 151° which falls into the Pen-nang chu (river) three-quarters of a mile distant.
		2,500	...	Do.	Chamchu village.
		3,500	...	Do.	Giadue village.
		2,500	14,400	Do.	Lalung village.
126	123 30	4,900	4,900	Do.	Chongdni village, on the bank of a small stream from south, which falls into the Pen-nang chu half a mile distant.
127	78 30	8,000	...	Do.	Gang village.
		2,000	...	Do.	Juge village.
		2,200	...	Do.	Due village.
		6,000	...	Do.	15° east of north two miles distant stands the Kutong monastery.
		2,000	...	Do.	Phazang village.
		2,800	23,000	Do.	Pen-nang ( <i>Ta-sam</i> ) village, situated on the right bank of the Pen-nang chu (river), which is bridged. Observations for latitude were taken at this village in konkhan or caravansera.
128	112 30	5,800	5,800	Do.	On the right bank of the Pen-nang chu. To left and right of road are hills.
129	146 0	6,000	...	Do.	Shabo village.
		1,200	7,200	Do.	On right bank of stream.
130	123 30	2,600	2,600	Do.	Do.
131	101 0	2,600	2,600	Do.	Do.
132	90 0	2,000	...	Do.	Tashiphu village.
		2,000	...	Do.	Yai village.
		9,800	13,800	Do.	Takse village; a small stream from 56° east of north falls into the Pen-nang chu here.
133	101 0	2,000	2,000	Do.	A solitary hut on the right bank of the Pen-nang chu (river).
134	163 0	2,700	2,700	Do.	On the right bank of the Pen-nang chu, to the left of the road.
135	140 30	2,000	2,000	Do.	Due west three-quarters of a mile is situated Pongche Gom-pa.
136	129 0	2,300	...	Do.	Thakcha village.
		6,400	...	Do.	Chanka Kesu village.
		8,500	...	Do.	Cheko village, on right bank of stream. Due west one mile stands Chichi Gom-pa (monastery).
		3,800	21,000	Do.	At konkhan or caravansera in the city of Gyāntse. A fort commands the city called Gyāntse Dzong. Observations for latitude, &c, were taken here.
137	123 30	8,000	...	Do.	Two miles due south of this point a stream from S.E. falls into the Pen-nang chu (stream).*
		1,000	9,000	Do.	

\* This is Turner's river.



Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
138	118 0	3,800	...	Level	Thagni village.
		4,000	7,800	Do.	On right bank of the Pen-nang chu.
139	101 0	3,800	...	Do.	At Kotang village, on right bank of stream. The road from the city of Shigātse to this point is very good.
		800	4,600	Do.	
140	90 0	3,800	3,800	Do.	On right bank of stream. To the left of road are hills.
141	22 30	1,700	1,700	Do.	A small village (name not ascertained).
142	84 0	1,100	...	Do.	On left bank of the river, which is bridged.
		3,000	...	Do.	Malang village, on left bank of stream.
143	157 30	400	4,500	Do.	
		1,600	...	Do.	Gob-shi village, on left bank of river. Observations for latitude and height were taken here.
144	67 30	500	2,100	Do.	At this point a stream from S.W. flows past into the Pen-nang chu near Gob-shi village. A road from this point runs alongside the stream, coming from S.W. above mentioned, leading to Loh or Bhutan.
		400	...	Do.	On right bank of stream.
145	135 0	1,400	...	Do.	Sakia monastery.
		2,600	...	Do.	Gorch village, on right bank of stream.
		6,700	...	Do.	Shetot village, on right bank of stream.
		600	11,700	Do.	A stream from north falls into the Pen-nang chu near the village of Tushikekang.
146	84 0	1,000	...	Do.	Lungma village; a stream from N.E. falls into the Pen-nang chu.
		6,000	7,000	Do.	On right bank of Pen-nang chu (stream).
147	11 0	6,500	6,500	Do.	Guhkhan* (Palace), on left bank of stream, which is bridged. Here a stream coming from east falls into the Pen-nang chu. Opposite, on the left bank of the former stream, is situated a village called Ra-lung.
148	33 30	5,200	5,200	Do.	On left bank of Pen-nang chu (stream).
149	90 0	7,500	7,500	...	Opposite, on the other bank of the stream, stands the village called Gomtang, at the foot of a very lofty snowy mountain called Ka-ro.
150	61 30	7,400	...	Slight A	Lapcha* (a pile of stones) on summit of hill. Alongside this point lies an immense glacier. Here the Pen-nang chu (stream) has its source.
		2,500	9,900	D	
151	101 0	4,500	4,500	D	On left bank of a small stream rising at foot of Ka-ro mountain.
152	73 0	400	...	D	Dza-ra, a Chinese post-stage.
		2,200	2,600	...	On left bank of stream.
153	84 0	2,400	...	Level	A stream from north.
		3,000	5,400	Do.	On left bank of stream.
154	129 0	2,200	2,200	Do.	Do.
155	45 0	2,600	2,600	Do.	Do.
		2,400	...	Do.	Rigro village.
156	28 0	3,800	6,300	Do.	On left bank of stream, which flows north-east, and feeds the Yam-drok Tso or Lake Palti two miles distant.
		5,000	5,000	Do.	

\* Thermometrical observations were taken here.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
157	16 30	5,000	5,100	Level	Nang-kar-tse village, with a fort called Nang-kar-tse Dzong.
158	355 0	2,000	...	Do.	On west side of the Yam-drok Tso or Lake Palti at a village (name not ascertained).
		6,000	...	Do.	On west side of the Yam-drok Tso.
		4,400	...	Do.	From the foregoing point to this the lake bends in considerably.
		2,600	15,000	Do.	On west bank of the Yam-drok Tso.
159	309 0	7,500	7,500	Do.	On bank of lake, at Yarchi village.
160	118 0	6,500	6,500	Do.	On bank of lake.
161	45 0	6,800	6,800	Do.	On bank of lake, at Pe-de village and fort. Observations for latitude and thermometrical observations were taken at this place.
162	56 0	8,000	...	Do.	On bank of the Yam-drok Tso. At this point the lake widens somewhat.
		12,000	20,000	Do.	On bank of do.
163	95 30	2,500	2,500	Do.	On bank of the Yam-drok Tso, at Domulang village. From this point the Yam-drok Tso bears 120° east of north, stretching in that direction for twenty miles. The Yam-drok Tso, as far as seen, varied in breadth from one and a-half to three and a-half miles, it is said to encircle a very large island about fifteen miles in diameter. This island rises into low rounded hills, at the foot of which several villages were visible. The villagers keep up their communication, with the main land by means of boats.
164	360 0	1,500	1,500	Great A	At Kam-pa pass <i>Lapcha</i> or pile of stones. This mountain forms the boundary between the two provinces U and Utsang. These latter names are derived from the mode of head-dress which their respective inhabitants adopt, the former circular, and the latter conical.
165	11 0	7,400	...	D	At Kam-pa-par-tse village.
		800	8,200	Level	On right bank of the Brahmaputra, which appears to be coming from the W.
166	40 0	10,000	10,000	Do.	At Chak-sam village, on right bank of the Brahmaputra river. The river is bridged at this point. The bridge is formed of iron chain and rope. The river is also crossed by ferry at this point.
167	50 0	6,700	6,700	Do.	On left bank of the river, at a large village called Chu-shul. From this point the Brahmaputra river flows S.E., and at the distance of two miles receives the water of the Kyi Chu river, and from thence flows east.
168	67 30	1,000	...	Do.	At this point a stream from N.W. flows past, and at a distance of two miles S.E. falls into the Kyi Chu river.
		3,200	...	Do.	On the right bank of the Kyi Chu river.
		7,900	12,100	Do.	Chabonang village.
169	84 0	4,000	4,000	Do.	On right bank of the river, which bends in between the foregoing and this point.
170	50 30	1,500	1,500	Do.	On right bank of river.
171	45 0	3,600	3,600	Do.	Zame village, on right bank of river.
172	22 30	2,000	...	Do.	Jang-to village.
		3,000	5,000	Do.	Thang; precipitous road overhanging the river.
173	5 30	9,000	9,000	Do.	Do. do.
174	45 0	2,000	...	Do.	<i>Gakhan</i> or <i>sarai</i> , in Netang village.
		6,000	8,000	Do.	On right bank of the Kyi Chu river.
175	360 0	7,000	...	Do.	At Gang village, on right bank of river.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
175	360 0	2,400	9,400	Level	Tilung village, on the left bank of the Tilung Chu, which stream is here spanned by a stone bridge of two arches, called the Tilung Sumba. The Tilung Chu comes from the north, but for five miles above Tilung the bearing of its course is 293°; it continues to flow in the same direction for two miles below Tilung, and then falls into the Kyi Chu.
176	45 0	4,600	4,600	Do.	Singdonkhar village, on right bank of the Lhāsa or Kyi Chu river.
177	61 30	2,600	...	Do.	North of this point quarter mile stands Dre-phung monastery (Gom-pa); 7,700 priests (Lamas) are said to live in this monastery. The temples belonging to this monastery are gilded.
		1,000	3,600	Do.	
178	95 30	2,000	...	Do.	Two and a-half miles, 51° N.E., stands a large monastery on the banks of a stream, which coming from N.W. flows past into the Kyi Chu river half a mile south.
		4,000	6,000	Do.	Near a Churtan. To the north of this point, on a low hill, stands the fort called Po-ta-la, the residence of the Rāju and the high priest of the Lamas. To the south of this point lies a high isolated hill, called Chakpori, surmounted by a solitary hut. At the foot of this hill stands the Kontyaling monastery.
179	90 0	1,800	1,800	Do.	At Churtan, in the heart of the city of Lhāsa. 300 paces from this point to the south stands a very large temple, called by three different names, viz., Jo, Phokpochengra, and Māchindrūnāth; it is surrounded by shops and <i>bāzārs</i> . West of this temple stands a monastery called Tankyāling. Two monasteries respectively named Mūru and Rāmoche are situated the one E., and the other N.W. of this Churtan, while a third monastery, called Chumuling, stands west of Rāmoche. South of the river Kyi Chu (which flows half a mile south of the city), and distant two and a-half miles, is situated the monastery called Choeholing. The four monasteries Kontyaling (No. 178), Tankyāling, Chumuling, and Choeholing, were held in great repute in former days, the chief Lamas of these monasteries succeeding to the throne of the Po-ta-la Rāju on its becoming vacant; but now their right of succession has been abolished, the Dre-phung head Lama possessing the sole right. To the east of Lhāsa, and within three days journey (about thirty-six miles), on the left bank of the Brahmaputra river, is situated a large monastery and city called Samaye. Thousands of pilgrims resort annually to worship at this shrine. The government treasury is said to be at Samaye. Forty miles east of the city Samaye, and on the right bank of the Brahmaputra river, is situated the large city of Chetang, and 120 miles east of Chetang is situated the city called Chari, forming the extreme east boundary of the Lhāsa territory. The Brahmaputra river is said to flow south from this city. To the north of Lhāsa, and distant about four miles, is seen a range of hills, called Totiphu, stretching from east to west, among which gold and silver are found. Latitude observations were taken in the city of Lhāsa, as also thermometrical observations at a house named Dhiki Rabdan Tra-shi-lhun-po-gi-Khan Sumba, twenty paces east of the Jo temple.
180	360 0	5,500	5,500	Do.	Near the Ser-ra monastery, at foot of Totiphu range of hills; 5,500 priests are said to live in this monastery, which is very large.
181	129 0	4,300	4,300	Do.	A small village (name not ascertained), at foot of Totiphu range of hills.
182	118 0	2,000	2,000	Do.	At foot of Totiphu hills.
183	95 30	4,000	4,000	Do.	At Chak-sam village, on right bank of the Kyi Chu river. This village is on the high road to China.
184	67 30	6,000	...	Do.	On right bank of the Kyi Chu, at Garba village.
		1,200	7,200	Do.	The high road to Gaden bears 76° from this point.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
185	33 30	1,000	...	A	
		1,800	2,800	D	Dūsi village.
186	348 30	5,500	...	Slight A	A small village (name not ascertained).
		1,400	6,900	Great A	Dakyarpa monastery, half way up the hill.
1	112 30	2,900	2,900	Level	On high road to Gaden, alongside the Kyi Chu river.
2	78 30	1,200	...	Do.	Nāngra village, on right bank of the Kyi Chu river.
		3,500	...	Do.	A quarter of a mile from this point, and about S.E., is situated a fort called Dhejān Dzong, on a low isolated hill.
3	45 0	5,000	9,700	Do.	Bom-te village.
		2,400	2,400	Do.	On right bank of the Kyi-Chu river.
4	22 30	1,800	1,800	Do.	On right bank of the Kyi Chu river.
		3,700	...	Do.	Kluire village No. 1, on bank of river.
5	360 0	1,000	4,700	Do.	Kluire village No. 2, do.
		800	...	Do.	At this point a stream coming from west, but changing its course to south within two miles of this place, falls into the Kyi Chu.
6	73 0	500	...	Do.	On left bank of river.
		3,000	...	Do.	At foot of hill.
		3,100	7,400	A	Gaden monastery; this monastery is said to contain 3,300 priests. About three and a-half miles distant, on the other side of the river, with a bearing of 16°, lies the village called Tak-tse.

## Route-Survey from Tra-dom to Manasarowar and Dongpu (in Ngari Khorsum).

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
1	315 0	7,200	...	Level	To the left of the road at this point lies a patch of water.
		1,400	8,600	Do.	A stream from 33° east of north passes, and flowing south two miles, falls into the Brahmaputra river.
2	231 0	7,500	...	Do.	On left bank of the Chachu river, which comes from the north, but changes its course to south-east at the distance of about three miles above this point, and four miles below empties itself into the Brahmaputra river.
		10,100	17,900	Do.	Thang-ring-bo, on the left bank of the Brahmaputra. The valley hereabouts is very open.
3	298 0	4,000	...	Do.	A stream from N.E. falls into the Brahmaputra at this point.
		5,000	...	Do.	Barmalung camp, on left bank of the Brahmaputra.
		6,000	15,000	Do.	On the left bank of the Brahmaputra, which appears to be flowing from the westward.
4	315 0	9,000	...	Do.	A stream from north flows past, and falls into the Brahmaputra one mile south of this place.
		2,900	11,000	Do.	At this point there are hills on either side.
5	292 30	4,500	4,500	Gentle A	Lapcha or pile of stones on summit of low hill.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
6	275 37	6,600	...	D	Totu camp.
		400	7,000	Level	
7	809 22	14,800	14,800	Do.	<i>Lapcha</i> or pile of stones. The road gently ascends for about 1,000 paces.
8	286 52	4,000	...	Slight D	
		2,000	...	Level	From this point distant two miles, bearing 257° 30' stands Gyaze monastery.
		3,500	9,500	Do.	
9	315 0	10,000	10,000	Do.	To the right of the road is a low range of hills, while to the left lies a dangerous quagmire.
10	275 37	2,000	2,000	Do.	On either side of the road there is a conical isolated hill.
11	292 30	3,000	...	Do.	Truk-sum Ta-sam (Gursa) camp.
		13,000	...	Do.	The Chu Nago stream, coming from 345°, flows past this point, and falls into the Brahmaputra river five miles below.
		12,000	28,000	Do.	Demar camp. On either side of the road there is a small lake, and to the north one mile is a range of low hills stretching from east to west, this range has a very red appearance, giving rise to its name Dak Maru (red stone).
12	281 0	14,000	14,000	Do.	At foot of low range of hills, which look very black, giving rise to its name Dak Nagu (black stone).
13	292 30	14,000	14,000	Do.	On left bank of the Brahmaputra river, and at foot of Dak Maru hill.
14	315 0	7,000	...	Do.	On left bank of a small stream from north, which falls into the Brahmaputra one mile to the south.
		1,800	...	Do.	On the left bank of a branch of the stream mentioned above.
		2,500	...	Do.	On the left bank of a third branch of the stream mentioned above. This stream is called Rong. Between the second and third branches of the Rong stream are three low conical isolated hills called Pun-sun.
		7,000	...	Do.	At this point a stream called Lahro from north flows past, and falls into the Brahmaputra one mile distant.
		1,400	19,700	Do.	At foot of a low hill, which is situated on the left bank of the Brahmaputra river.
15	309 0	10,500	...	Do.	On left bank of the Brahmaputra river at Tamjan Ta-sam. The river appears to be coming from the west at this point. To the south and south-west of this point, distant about twelve miles, are seen very high snowy peaks.
		9,500	...	Do.	On left bank of a stream from the W., which changes its course at this point to S.E., and falls into the Brahmaputra near Tamjan Ta-sam.
		6,000	...	Do.	The Kabjor camp, near foot of a low hill.
		1,000	27,000	Do.	
16	331 52	2,000	2,000	Do.	Between low hills.
17	287 0	4,000	4,000	Gentle A	At <i>Lapcha</i> or pile of stones.
18	292 30	14,000	14,000	Level	At the junction of two streams, one coming from north and the other from N.W.
19	326 0	5,800	5,300	Do.	Between the two streams.
20	303 45	3,400	...	Do.	Gyamzar camp, on bank of stream.
		3,500	6,300	Do.	
21	320 37	4,000	...	Do.	At the junction of two streams, one from 23° E. of N., and the other from W.
		1,500	5,500	Do,	

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.																																																																																																																							
22	286 52	7,700	...	Level	On summit of a hill at a <i>Lapcha</i> , or pile of stones, called Ma-yum P. Thermometrical observations were recorded at this place. This forms the boundary between the districts Ngari-Khorsum and Dokthol. South of this point, and distant about eight miles, is seen a very high snowy range, between which and this point the Brahmaputra flows.																																																																																																																							
		4,000	11,700	A		23	298 0	4,000	4,000	D		24	247 30	7,000	7,000	Gentle D	Between two small ranges of hills.	25	286 52	4,500	...	Level	A stream coming from 22° flows on for one mile and then turns west, and empties itself into the Gun-chu L.	10,000	...	Do.	Uk-rung ( <i>Ta-sam</i> ) which is one mile north of the extreme east end of the Gun-chu L.	800	...	Do.	A stream flows past this point, coming from 24°, and falls into the Gun-chu L. half a mile from hence.	14,000	...	Do.	Rebo camp. From this point the Gun-chu L. lies half a mile south.	7,000	...	Do.	A stream coming from north flows past, and empties itself into the Gun-chu L. half a mile from hence.	1,000	...	Do.	At this point the extreme west end of the lake is distant about quarter of a mile. The breadth of this lake varies from one and a-half to two miles. To the south of Gun-chu L. are seen two snowy ranges, one very close, and the other about four miles distant. These ranges stretch from E. to W.	2,500	...	Slight A	<i>Lapcha</i> ; pile of stones.	26	258 45	300	40,100	Level		2,700	...	D	Nyuk-chu camp. A stream from north flows past in a south-westerly course.	27	275 37	2,000	...	Gentle A	On summit of a low hill.	14,000	16,000	D	At foot of low hill.	28	230 37	2,000	...	Level	On right bank of the Some stream.	3,200	...	Do.	On right bank of Some stream. At this point the Pamburgi stream from north falls into the Some stream.	29	286 52	1,000	4,200	Do.		5,200	...	Do.	A stream from north flows past into the Some stream one and a-half miles below.	30	258 45	1,500	6,700	Gentle A	On summit of a low hill.	4,000	4,000	Gentle D	Tok-chen ( <i>Ta-sam</i> ), on left bank of the Some stream. This stream bends in south considerably between No. 29 and this station. South of this point is visible a high snowy range, distant about six miles; between this range and this point the Brahmaputra flows.	31	298 0	8,000	8,000	Level	On right bank of Some stream, which runs between two low ranges of hills.	32	257 37	2,000	...	Do.	On right bank of Some stream, which from this point flows 257°, and empties itself into the Manasarowar lake.	3,100	5,100	Do.		33	315 0	800	...	Do.	A stream from 15° E. of N. flows past, and falls into the Some stream about half a mile below.	5,000	...	Do.	From this point the Kailas Parbat is north-west, and is distant about twenty-four miles. Another very high peak, 215° bearing, is distant about twenty miles, called Guria.	1,000
23	298 0	4,000	4,000	D																																																																																																																								
24	247 30	7,000	7,000	Gentle D	Between two small ranges of hills.																																																																																																																							
25	286 52	4,500	...	Level	A stream coming from 22° flows on for one mile and then turns west, and empties itself into the Gun-chu L.																																																																																																																							
		10,000	...	Do.	Uk-rung ( <i>Ta-sam</i> ) which is one mile north of the extreme east end of the Gun-chu L.																																																																																																																							
		800	...	Do.	A stream flows past this point, coming from 24°, and falls into the Gun-chu L. half a mile from hence.																																																																																																																							
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		3,100	5,100	Do.																																																																																																																								
33	315 0	800	...	Do.	A stream from 15° E. of N. flows past, and falls into the Some stream about half a mile below.																																																																																																																							
		5,000	...	Do.	From this point the Kailas Parbat is north-west, and is distant about twenty-four miles. Another very high peak, 215° bearing, is distant about twenty miles, called Guria.																																																																																																																							
		1,000	6,300	Do.	A stream from north-east flows past into the Manasarowar lake two miles from hence.																																																																																																																							

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
84	303 45	900	...	Level	Sarniah Uniah camp.
		1,400	...	Do.	A stream from 32° E. of N. flows past into the Manasarowar lake one and a-half miles from hence.
		1,100	...	Do.	Close to a small lake called Gurgul, a small stream issues from this patch of water, and falls into the last mentioned stream.
		3,600	...	Do.	At the south-west end of the Gurgul L.
		3,100	...	Do.	About four miles south-west, situated at the foot of a low hill, stands the Lang-po-nang monastery, on the banks of the Manasarowar lake.
		13,500	23,500	Do.	A stream from N.E. flows south for some distance, and then changing its course to W., falls into the Lang Cho lake (Rakas Tal).
85	298 0	21,000	...	Do.	The Jong stream from 32° flows past into the Lang Cho lake (Rakas Tal) some distance south.
		4,600	25,600	Do.	Tar-chen. A stream coming from north flows past into the Jong stream. Tar-chen is situated at the foot of the Kailas Parbat; it boasts of a large official residence. Six miles from Tar-chen, and 172° bearing, is situated the Barkha ( <i>Ta-sam</i> ); three miles from this latter point lies the extreme east end of the Lang Cho lake (Rakas-Tal). The distance between the two lakes Manasarowar and Lang Cho (Rakas-Tal) is two and a-half miles. Lang Cho lake (Rakas-Tal) is the source of the Sotlej river, called in these parts Lang-jen Kum-pa. The point where the Jong stream enters the Lang Cho lake (Rakas Tal) bears from this point 207°, and is distant about six miles. Observations for latitude and thermometrical observations were taken at Tar-chen.
86	230 37	3,000	...	Do.	On the left bank of the Sarsu stream which comes from the north, and falls into the Jong stream.
		6,800	...	Do.	On bank of Kalap stream, which flows from the north and falls into the Jong stream two miles south-east of this point.
		6,000	...	Do.	Longong camp.
		800	...	Do.	At the source of the Sotlej river, N.E. end of the Lang Cho lake, which is also called the Rakas Tal.
		12,000	...	A	
		2,000	30,600	Great A	On summit of high hill. This hill runs south-east for four miles, and terminates near the Lang Cho lake (Rakas Tal).
87	247 30	2,000	...	Gentle D	At the source of a small stream, which flows S.E. for four miles, and then falls into the Lang Cho lake (Rakas Tal).
		2,300	4,300	...	A camping place (name not ascertained). The road ascends at the commencement, and then descends.
88	303 45	3,500	3,500	Level	
89	219 0	4,000	...	A	On a small hill.
		3,000	7,000	D	At foot of hill.
40	247 30	13,000	13,000	Level	At a distance of two to three miles from this point on either side of the road are hills. The high road from Tar-chen <i>via</i> Chumurshala comes from 35°.
41	213 45	3,800	3,800	Do.	
42	241 53	4,000	4,000	Do.	At foot of a low hill.
48	247 30	7,000	7,000	Do.	Four miles from this point, and bearing 341°, stands a ruined fort, called Gya-ni-ma Klar.
44	326 0	4,200	...	Do.	A stream issuing from a small lake four miles south flows past in a north-westerly direction. This lake is called the Tava cho.
		4,800	9,000	Do.	Gya-ni-ma Mandi (Haut), at foot of small hill, is a great mart during the rainy season. Observations for latitude and thermometrical observations were taken here.

Station No.	Bearings of forward station.	Distances in paces from point to point.	Distances in paces to forward station.	Slope of road.	REMARKS.
45	253 0	11,800	11,800	Level	South of this point about ten miles is seen a very high snowy range of mountains bounding the plain which is very open. To the north, and very close, is a low hill stretching N.E. for about three miles.
46	270 0	8,400	...	Do.	At northern foot of Dak Karpo hill. Distant from this point one and a-half miles, and bearing 62°, stands a very high and remarkable conical hill.
		600	4,000	Do.	At foot of Dak Karpo hill.
47	230 37	3,500	3,500	Do.	The Darmiangti R. (from a high snowy range ten miles south) flows past this point, and, following a northerly course for twenty-four miles, falls into the Sutlej. Bearing 67° E. of N., and distant three-quarters of a mile, stands a high conical hill. During the rainy season the inhabitants bring to this place salt, borax, and wool, and barter them for grain, sugar and cloth.
48	253 0	6,000	...	Do.	On right bank of the Guniangti R. from the south, which flowing past in a N.E. direction, joins the Nagu R. six miles from hence. The Nagu R. flows one mile N.E., after receiving the water of the Guniangti R. then falls into the Darmiangti R. At the junction, of the Guniangti R. with the Darmiangti R. stands a conical isolated hill called Jinakhar.
		4,000	10,000	Do.	At foot of Thamba Dhar hill.
49	286 52	3,400	3,400	Gentle A	Thamba Dhar, pile of stones on summit of hill. This hill stretches four miles north and five miles south, meeting a spur of the snowy range. Distant seven miles, and bearing 10° from hence, is Gomba Chen Dang, a grazing ground. A high snowy range is seen from here, distant about thirty miles N.E.
50	236 0	2,400	2,400	D	At foot of hill.
51	258 45	4,500	4,500	Level	On right bank of Nagu R., which comes from south.
52	275 37	4,400	...	Do.	A stream passes this point coming from 200°, and flows north-east, then falls into the Mane Manthanga lake six miles from hence.
		1,500	5,900	Do.	On either side of the road at this point are hills.
53	247 30	2,000	2,000	Do.	At Lam Thazing; a bazar during the rainy season. The high road from Johargati (south) joins at this point.
54	337 30	4,500	...	A	On summit of hill, which stretches from north to south. At foot of this hill, to the east, is situated Hunia Thajan.
		2,900	7,400	Gentle D	
55	360 0	4,700	4,700	Level	At northern end of hill. Distant five miles from hence, bearing 40°, is situated a high hill.
56	343 0	14,000	14,000	Do.	On left bank of Tokpu or Ship R., at Shipchalam camp. The Tokpu or Ship R. comes from the south, and flowing north for a distance of six miles, joins the Sutlej river.
57	303 45	1,000	...	Do.	A stream from 200° flows past to the N.E., and falls into the Tokpu or Ship R. three and a-half miles from hence.
		8,800	...	Do.	
		27,300	37,100	Do.	On right bank of Nukchan stream, which comes from 200°, and flows north-east. To S.W., and distant eight miles, is seen a snowy range of mountains.
58	45 0	6,500	6,500	Do.	At Dongpu village, on right bank of Nukchan stream. The Nukchan stream falls into the Sutlej river two and a-half miles to the N.E.
					NOTE.—Owing to the interference of the Bhotias the Route-Survey was not carried beyond this last point. This point was, however, connected with Kumaun subsequently by another Route-Survey which was carried up to Gar-tok.



Observations for Latitude taken in Nepal, Tibet, &c., with an Elliott 6-inch Radius Sextant, No. 44.

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.	Double Altitude	Single.	Index Error.	Deducted Latitudes.	Mean Latitudes.	REMARKS.
1	1865. Jan. 13	10 5 5	Moradabad city, Alai mohalla, on the house of Janki.	a C. Maj. (Sirius)	Upper	89 18 0	...	+ 30"	28 49 27	28 50 18	This latitude station is about 1½ B. of the kutcherry and 1' 20" E. of the said kutcherry, and according to G. T. Surrey the kutcherry is in lat. 28° 51' 1" long. 76° 48' 36".
2	" 19	11 40 0	Do.	a C. Mino. (Frogon)	...	133 25 50	...	...	28 51. 8	28 60 18	This latitude station is about 20" S. of Bahadur Singh's house, and nearly in the same longitude. By G. T. Surrey, Bahadur Singh's house is in lat. 28° 22' 9", long. 79° 26' 38".
3	" 23	8 32 50	Bareilly city, on the western part in sarai.	B Orionis (Rigel)	...	106 33 0	...	...	28 22 26	28 22 26	This latitude station is about 20" S. of Bahadur Singh's house, and nearly in the same longitude. By G. T. Surrey, Bahadur Singh's house is in lat. 28° 22' 9", long. 79° 26' 38".
4	" 23	16 34 50	Do.	Polaris	Lower	53 57 10	...	...	28 21 17	28 22 8	
5	" 24	10 43 52	Do.	a C. Mino. (Frogon)	Upper	134 23 30	...	...	28 22 16	28 22 8	
6	" 28	8 2 3	Bahajhanpur city, on the eastern part, in a garden.	B Orionis (Rigel)	Upper	107 34 10	...	...	27 51 29	27 51 33	This point is much the same as the G. T. Surrey point in latitude, and about 1 E. of the said G. T. Surrey point. The G. T. Surrey point in Shahjahanpur being lat. 27° 52' 55", long. 79° 57' 16", but the point itself cannot be exactly identified. The latitude given by the Pandit agrees with some of the G. T. Surrey values.
7	" 28	9 35 5	Do.	a C. Maj. (Sirius)	...	91 13 30	...	...	27 51 37	27 51 33	
8	March 7	13 18 0	Katmandu city, on left bank of Vishnumati river, near lower bridge, in sarai.	Polaris	Lower	52 36 30	...	...	27 41 11	27 41 28	This point is rather more than a mile S. of the British Residency.
9	" 18	12 51 0	Do.	...	...	52 37 30	...	...	27 41 44	27 41 28	
10	" 23	6 32 32	Kamcha village, on the road	a C. Mino. (Frogon)	Upper	135 5 50	...	...	28 1 1	28 1 33	
11	" 29	8 17 42	Do.	a Hydru.	...	107 46 50	...	...	28 2 4	28 1 33	
12	" 25	8 10 12	Shabru, outside the village, on the bank of a small made.	...	...	107 32 10	...	...	28 9 24	28 9 24	

13	"	27	6 9 38	Basungarhi, on the right bank of the Lendi R., on the boundary line between Nepal and Tibet territories.	...	134 31 40	...	...	28 16 36	28 16 32
14	"	27	8 0 31	Do.	...	107 18 0	...	...	28 16 28	
	July	30	14 0 0	Kerun Shahr, on Chung Chau's house.	...	62 29 0	...	...	28 27 5	
15	"	31	8 20 0	Do.	...	87 44 10	...	...		
16	Aug.	31	12 45 0	Tala Labrang, near Dong	...	60 53 30	...	...	29 14 8	29 13 21
17	"	31	15 10 30	Do.	...	61 15 40	...	...	29 12 34	
18	Sept.	9	0 41 0	Tra-dome Gemp-a near the monastery.	Sun. (Upper Limb)	131 50 10	...	...	29 39 30	
19	"	11	0 48 30	Do.	...	130 17 40	...	...	29 40 15	
20	"	13	11 44 0	Do.	...	60 3 0	...	...	29 39 26	
21	"	21	0 15 0	Do.	Sun.	122 35 20	...	...	29 39 56	
22	"	21	13 30 0	Do.	Polaris.	62 7 20	...	...	29 38 29	
23	"	22	13 20 0	Do.	...	62 7 10	...	...	29 38 25	
24	"	24	0 0 0	Do.	Sun.	120 16 0	...	...	29 39 26	29 39 21
25	"	25	0 0 0	Do.	Sun.	119 29 10	...	+ 30"	29 39 27	
26	"	27	16 36 0	Do.	B Orionis, (Rigel)	108 59 30	...	...	29 39 25	
27	"	29	12 35 0	Do.	Polaris.	62 6 0	...	...	29 38 52	
28	"	30	23 40 0	Do.	Sun.	115 35 10	...	...	29 39 31	
29	Oct.	2	23 41 0	Do.	...	114 2 10	...	...	29 39 28	
30	"	10	11 0 0	Se-mo-ku Ts-um, Post Office.	Polaris.	61 32 40	...	...	29 21 17	29 21 17
31	"	15	9 10 0	Sung-Sang Ts-um.	a Pis. Aus. (Fomalhaut)	60 19 40	...	...	29 30 59	29 30 59

Watch moved back 48m. 30s. after the observation.

Watch was all right.

Observations for Latitude taken in Nepal, Tibet, &c., with an Elliott 6-inch Radius Sextant, No. 44.—(Continued).

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit	Double Altitude.	Single.	Index Error.	Deducted Latitudes.	Mean Latitudes	REMARKS.
39	1856. Oct. 17	15 45 0	Sang-Sang-Kau Ta-sam.	$\beta$ Orionis	...	104 26 0	...	...	29 25 39	29 19 10	
33	"	11 15 0	Ka-tung village, in the house of Ganbu.	Polaris.	...	61 28 20	...	...	29 19 10	29 15 56	
34	"	16 40 0	Xue-ping-Ta-sam. ...	$\beta$ Orionis	...	104 46 30	...	...	29 15 56	29 8 59	
35	"	9 20 0	Jang-tche city, in the Gia Khang (building for the accommodation of Chinese officials).	a Pis. Aves. (Romalhaut)	...	61 3 30	...	...	29 8 59	29 20 34	
36	"	16 44 0	Tsai-tung village, in the house of Ganbu.	$\beta$ Orionis	...	104 36 10	...	...	29 12 20	29 12 20	
37	"	11 53 0	Si-lung village, in the Gia Khang.	Polaris.	...	61 14 40	...	...	29 16 1	29 16 1	
38	"	15 50 0	Shigare, or Diercha, city, in the Kankoug (building for the accommodation of Chinese officials).	$\beta$ Orionis.	...	104 45 20	...	...	29 16 32	29 16 32	
39	"	17 25 30	Do.	a O. Maj. (Sirius)	...	88 23 40	...	...	16 36	16 36	
40	Nov. 9	16 5 0	Do.	$\beta$ Orionis	...	104 44 10	...	...	16 40	16 40	
41	"	4 0 24 0	Do.	Sun.	...	91 11 30	...	...	16 49	16 49	
42	"	5 0 30 0	Do.	...	...	90 34 30	...	...	16 20	16 20	
43	"	11 10 0	Do.	Polaris.	...	61 22 40	...	...	16 60	16 60	
44	"	0 0 0	Do.	Sun.	...	85 28 30	...	...	...	...	

Observation doubtful. Watch stopped on 13th, and was regulated and made to run on 14th, 12 p.m.

Watch was 35m. fast.

29 16 32

45	"	14	13 46 0	Do.	...	$\beta$ Orionis. ( <i>Élyet</i> )	...	104 44 10	...	...	16 34	...	Observation taken very correctly.
46	"	16	10 0 0	Do.	...	Polaris.	...	61 22 40	...	...	16 22	...	...
47	"	17	0 5 0	Do.	...	Sun.	...	83 58 0	...	...	16 49	...	...
48	"	17	9 48 0	Do.	...	Polaris.	...	61 22 30	...	...	16 17	...	...
49	"	18	9 40 0	Do.	...	...	...	61 22 40	...	...	16 22	...	Watch kept correct time.
50	"	21	15 0 0	Do.	...	$\alpha$ C. Maj. ( <i>Sirius</i> )	...	88 23 90	...	...	16 33	...	...
51	Dec.	23	12 30 0	Pen-nang (Ta-sam) in the Gia Kiang.	...	...	...	88 85 10	...	...	29 10 37	29 10 37	...
52	"	27	12 25 0	Gjantse city, near the fort, in the Caravanseraï or Koukhan.	...	...	...	89 5 0	...	...	28 55 37	28 55 37	...
53	"	29	10 45 0	Gob-shi villages, in the <i>Kenshang</i> .	Upper	$\beta$ Orionis. ( <i>Élyet</i> )	Upper	105 35 30	...	+ 30"	28 50 17	28 50 17	...
54	1866. Jan.	1	10 35 0	Pe-de village, near the fort, on the bank of a small lake named Yam-drok Tso.	...	...	...	105 4 50	...	...	29 6 4	29 6 4	...
55	"	12	17 30 0	Lhasa city, near the temple of Jo or Mächindrânath, in Dhiki Rabdan Tsa-shi-lhun-po-gi-Khun Sumba, (now house called Dhiki Rabdan, the property of Tsa-shi-lhun-po temple).	Lower	Polaris.	Lower	56 21 30	...	...	29 38 44	...	...
56	"	13	17 20 0	Do.	...	...	...	56 31 20	...	...	29 38 39	...	...
57	"	14	9 27 0	Do.	...	$\beta$ Orionis. ( <i>Élyet</i> )	Upper	103 59 10	...	...	38 55	...	...
58	"	15	9 25 0	Do.	...	...	...	103 58 30	...	...	39 14	...	...
59	"	16	9 20 0	Do.	...	...	...	103 59 0	...	...	38 59	...	...
60	"	17	0 12 0	Do.	...	Sus	...	79 41 50	...	...	89 21	...	Observation taken very correctly.
61	"	17	9 25 0	Do.	...	$\beta$ Orionis. ( <i>Élyet</i> )	...	103 58 40	...	...	39 9	...	Do.
62	"	19	9 15 0	Do.	...	...	...	103 58 30	...	...	39 14	...	Do.

Observations for Latitude taken in Nepál, Tibet, &c., with an Elliott 6-inch Radius Sextant, No 44. — (Continued).

No. of Observations.	Astronomical Date.	Watch Time.	Station.	Object on Meridian.	Upper or Lower Transit.	Double Altitude.	Single.	Index Error.	Reduced Latitude.	Mean Latitude.	REMARKS.
63	1868. Jan. 20	0 10 0	Chase city, near the temple of Jor Machindranath, in Diki	Sun	...	80 56 0	...	...	29 39 23	...	Observation taken correctly.
64	" 26	16 55 0	Do.	Polaris.	Lower	56 32 10	...	...	39 4	...	Do.
65	" 27	0 8 0	Do.	Sun.	Upper	84 15 10	...	...	39 21	> 29 39 17	Altitude doubtful.
66	" 28	0 8 0	Do.	...	...	84 46 40	...	...	39 10	...	No doubt, and taken correctly.
67	" 29	0 5 0	Do.	...	...	85 18 0	...	...	39 27	...	Seen on meridian, but doubtful.
68	" 31	0 10 0	Do.	...	...	86 23 20	...	...	39 35	...	Watch stopped, time was taken by supposition.
69	Feb. 6	8 30 0	Do.	$\beta$ Orionis. (Rigel)	...	103 58 30	...	...	39 12	...	Watch was set at 12 o'clock noon, observation taken correctly.
70	" 9	0 0 0	Do.	Sun	...	91 47 50	...	...	39 29	...	Observation taken correctly.
71	" 10	0 0 0	Do.	...	...	92 26 20	...	...	39 34	...	
72	" 13	9 0 0	Do.	$\alpha$ C. Maj (Sirius)	...	87 36 20	...	...	39 51	...	
73	" 26	8 10 0	Do.	...	...	87 36 30	...	...	39 44	...	
74	March 3	8 0 0	Do.	...	...	87 36 30	...	...	39 43	...	No watch, time taken by supposition.
75	June 17	10 0 0	Tarchen village, at the base of the Kaulas Peak, on Dongkhang (sarr).	$\alpha$ Scornii. (Antares)	...	05 44 30	...	...	31 0 26	31 0 26	Do.
76	" 21	7 15 0	Gyani-na Mandi	Polaris.	Lower	58 51 0	...	...	30 49 14	30 49 14	Do.

77	Sept.	23	11 0 0	Sanku Dhura	...	...	...	59 20 50	...	-7' 10"	30 4 56	...	30 5 16	No watch, time taken by supposition.
78	"	24	0 0 0	Do.	...	...	...	119 42 20	...	...	30 5 41	...	...	Do.
79	"	30	17 45 0	Kop kot village, near a bungalow	...	...	...	103 31 10	...	...	29 57 11	...	29 57 11	Do.
80	Oct.	1	10 0 0	Bageshwar, near the bridge.	...	...	...	59 48 40	...	...	29 51 8	...	...	Do.
81	"	4	10 0 0	Almora city, near the walls of Narain, Tewari and the temple, in serai.	...	...	Upper	60 15 40	...	-7' 10"	29 37 32	...	29 37 32	Do.
82	"	5	...	Do.	...	...	...	...	...	...	29 37 32	...	...	Do.
83	"	9	0 0 0	Bogotipokhar, in the school	...	...	...	108 46 50	...	...	29 44 54	...	...	Do.
84	"	9	10 0 0	Do.	...	...	...	61 1 50	...	...	29 14 26	...	...	Do.
85	"	10	9 45 0	Dorahat	...	...	...	59 56 0	...	...	29 47 21	...	29 47 21	Do.
86	"	13	9 30 0	Thangson	...	...	...	59 31 20	...	...	29 59 43	...	29 59 43	Do.
87	"	14	...	Kanurgaon, near the bungalow.	...	...	...	59 27 40	...	...	30 1 29	...	30 1 29	Do.
88	"	15	9 0 0	Chiphnighat village, near the bungalow.	...	...	...	59 16 10	...	...	30 7 53	...	30 7 53	Do.
89	"	16	...	Pauri village, in the yard of Lachman Sing pafraeri.	...	...	...	59 11 40	...	...	30 9 31	...	30 9 31	Do.
90	"	17	0 0 0	Srinagar city	...	...	...	101 49 30	...	...	30 13 52	...	...	Do.
91	"	17	11 0 0	Do.	...	...	...	63 21 40	...	...	11 51	...	...	Do.
92	"	18	8 45 0	Do.	...	...	...	59 4 20	...	...	13 17	...	30 13 10	Do.
93	"	19	0 0 0	Do.	...	...	...	100 22 30	...	...	13 38	...	...	Do.
94	"	23	8 45 0	Jolingh village, in the yard of Kalnu, zamindar.	...	...	...	58 41 30	...	...	30 24 38	...	30 24 38	Do.
95	"	25	8 45 0	Dhanolti, near the bungalow	...	...	...	58 39 0	...	...	30 25 49	...	30 25 49	Do.

*Observations for Latitude taken in Nepal, Tibet, &c, with an Elliott 6-inch Radius Sextant, No. 44—(Concluded.)*

No. of Observations.	Astronomical Date.	Watch Time.	Station.	Object on Meridian.	Upper or Lower Transit.	Double Altitude.	Single.	Index Error.	Deducted Latitudes.	Mean Latitudes.	REMARKS.
96	1866. Sept. 5	11 0 0 y m s	Gar-took, on parade ground	..	..	55 57 10	..	-2' 30"	31 44 14	31 44 14	No watch, time taken by supposition.
97	" 6	..	Namechia ..	..	..	56 11 30	..	..	31 37 5	31 37 5	Do.
98	" 10	..	Dongpu village, in the house of Chispua Partia,	..	..	57 9 10	..	..	31 8 12	31 8 12	Do.
99	" 11	..	Nagbo village ..	..	..	57 11 0	..	..	31 7 17	31 7 17	Do.

Observations of the Boiling Point in Nepal, Tibet, &c.

No. of Station.	Astronomical Date.	Watch Time.	STATION.	THERMOMETER		THERMOMETER.		Deducted Height above sea.	REMARKS.
				No.	Boiling Point.	No.	In Air.		
	1867. June 3	h m 3 0	Mussooree G. T. S. Office ... ..	22	201·18	...	81·0	...	Height determined trigonometrically 6923·2.
	1865. April { 14 18	0 35 } 20 28 }	Almora ... ..	7	203·25	...	64·0	...	Do. do. 5400·0.
1	March 10	0 45	Kātmāndu city, on left bank of Vishnumati river near lower bridge, in sarāi.	22	206·00	10	67·50	4,044·5	Clear sky; gentle south wind blowing. This point is about 200 feet below the Residency, which, according to these observations, would be 4,244 feet.
2	" 16	20 18	Do. ... ..	"	206·25	"	54·75	...	Clear sky; no wind blowing.
3	" 23	18 7	Rancho village, on the road ... ..	"	203·00	"	53·00	5,874·9	Gentle east wind blowing.
4	" 27	16 58	Raeungarhi, on the right bank of Lendi R. on the boundary line between Nepāl and Tibet.	"	202·95	"	55·50	5,901·0	N.E. wind blowing; sky somewhat cloudy.
5	April 5	22 24	Dayabhang, on the sarāi ... ..	"	207·70	"	70·00	3,144·0	South wind blowing; sky cloudy near the horizon only.
6	July 21	20 41	Kerun Shahr, on Chung Chu's house ... ..	7	196·80	6	64·50	9,074·6	S.E. wind blowing; sky cloudy on all sides.
7	" 31	1 50	Do. ... ..	"	197·00	"	71·50	...	South wind blowing; sky cloudy near the horizon; bright sunshine.
8	August 14	1 49	Todang village ... ..	"	194·20	"	58·50	10,619·1	Strong S. wind blowing; rain falling.
9	" 16	23 35	Juktumba P., top of pass ... ..	"	186·00	"	47·50	15,391·8	Strong W. wind blowing; slight rain falling.
10	" 17	19 53	Kolūng Chukas ... ..	"	191·80	"	51·25	11,984·4	No wind; cloudy sky.
11	" 19	6 55	Jonghil village ... ..	"	195·20	"	60·00	10,035·6	Do.
12	" 20	22 57	Lachumu Phurphur, top of pass ... ..	"	192·60	"	63·25	11,590·3	South wind; bright sunshine.
13	" 25	22 29	Gya P., hill top ... ..	"	183·80	"	45·00	16,679·3	Gentle west wind; cloudy sky.
14	" 26	6 18	Sonnāth ... ..	"	188·40	"	57·75	14,043·2	Do.



*Observations of the Boiling Point in Nepal, Tibet, &c — (Continued.)*

No. of Station.	Astronomical Date.	Watch Time.	STATION.	THERMOMETER.		THERMOMETER.		Deducted Height Above Sea Level.	REMARKS.
				No.	Boiling Point.	No.	In Air		
15	1865. August 27	4 17	No P., crest of pass ...	7	181-00	6	51-25	16,622-9	Slight N.W. wind; clear.
16	" 31	4 58	Tala Labring, near Dong ...	"	187-40	"	55-00	14,617-0	No wind; rather cloudy sky.
17	September 7	23 0	Tra-dom Gom-pu, near the temple ...	"	189-00	"	48-75	14,187-4	Gentle north wind; clear sky.
18	" 25	21 46	Do. ...	"	186-10	"	47-50	...	No wind; clear sky.
19	" 26	4 0	Do. ...	"	188-00	"	52-00	...	Do.
20	October 25	6 30	Tashling village, in the house of Genbo ...	"	188-80	"	53 50	13,774-1	North wind; clear sky.
21	November 3	19 26	Shigatse, or Digarcha, city, in the Konkhan (building for the accommodation of the public)	"	192-00	"	38 25	...	Do.
22	" 14	4 0	Do. ...	"	191-95	"	49 75	...	West wind; clear sky.
23	" 14	10 0	Do. ...	"	192-00	"	47-25	11,822-4	Slight north wind; clear sky.
24	" 14	16 0	Do. ...	"	192-00	"	32-50	...	Do.
25	" 14	22 0	Do. ...	"	191-90	"	36-50	...	No wind; clear sky.
26	December 28 1866.	20 0	Gob-shi village, Konkhan or Caravanarai ...	"	188-60	"	40-00	13,779 8	South-east wind; clear sky.
27	January 12	4 0	Lhasa city, near the temple of Jo or Mä-hin-draugh, in Dhiki Kadän Tra-shi-luun-po-gi-Khur Sumba.	"	192-20	"	36 25	...	No wind; sky very cloudy.
28	February 9	1 0	Do. ...	"	191-90	"	43-50	...	West wind; clouds here and there in the sky.
29	" 9	4 0	Do. ...	"	192-10	"	40-50	...	Do.; cloudy sky.
30	" 9	10 0	Do. ...	"	192-20	"	33 50	...	Gentle south-west wind; sky cloudy.

31	"	9	16	0	Do.	"	"	192-20	"	32-50	"	...	Very faint west wind; clear sky.
32	"	9	22	0	Do.	"	"	192-20	"	32-00	"	11,699-1	No wind; clear sky.
33	April	22	7	0	Chur-shul Dzong, on left bank of the putra river.	"	"	192-90	"	50-00	"	11,334-3	From this date time taken by supposition. East wind blowing violently; cloudy sky.
34	"	24	...	...	Pe-de village, near the fort, on the bank of a lake named Yam-drok Teo or Lake Felti.	"	"	186-80	"	40-00	"	13,663-1	Light north-east wind; clear sky.
35	"	26	1	30	Ku-ro P., crest of pass	"	"	183-80	"	48-00	"	16,711-7	Gentle west wind; clear sky.
36	"	26	5	30	Ra-lung village, Gia Khang	"	"	188-20	"	38-00	"	13,996-6	Strong south wind; cloudy sky.
37	"	27	20	30	Gyantsé city, near the fort <i>Kankhang</i>	"	"	190-30	"	55-00	"	12,895-2	Gentle east wind; sky somewhat cloudy near the horizon.
38	May	9	23	30	Sikar village, in house of Gambo	"	"	190-40	"	52-00	"	...	North wind blowing strongly; clear sky.
39	"	14	3	30	Jangché city, in Gia Khang (building for the accommodation of Chinese officials).	"	"	189-40	"	74-00	"	13,579-8	West wind; clear sky.
40	"	17	22	30	Ngap-ring Tu-sam	"	"	189-30	"	54-50	"	13,486-1	North wind; clear sky.
41	"	20	1	0	Sang-sang-Kau Tu-sam	"	"	188-20	"	61-50	"	14,203-1	Strong north wind; sky cloudy.
42	June	11	20	0	Ma-Yum P., crest of pass, on the boundary-line between Ngari Khorsum and Dokthal.	"	"	185-80	"	43-00	"	15,462-3	Gentle east wind; clear sky.
43	"	17	6	0	Tar-chen village, at base of the Kailás mountain, on Dongkhang ( <i>serat</i> ).	"	"	187-60	"	53-50	"	14,489-0	N.E. wind; clear sky.
44	"	21	6	30	Gya-ai-ma Mendi	"	"	188-60	"	49-75	"	13,860-2	South wind blowing violently; clear sky.
1	July	22	9	0	Trisuli mudi	"	22	210-0	10	84-25	"	1,760-6	
2	August	5	Noon	...	Muktinath, at Rani-ka-pawa	"	"	190-80	"	61-25	"	13,086-0	
3	"	7	3	0	Denjia P.	"	"	183-80	"	65-0	"	17,310-9	
4	September	15	6	0	Jamlu, at Tattapani village	"	"	199-80	"	69-0	"	7,734-1	
5	October	2	6	0	Bharat village	"	"	202-50	"	59-0	"	6,158-2	
6	"	5	6	0	Do.	"	"	202-60	"	67-50	"	6,158-9	
7	"	5	2	0	Do.	"	"	202-50	"	75-50	"	6,145-4	
8	"	8	7	0	Bank of Karnali river	"	"	200-25	"	64-50	"	2,280-5	

Observations of the Boiling Point in Nepal, Tibet, &c.—(Continued).

No. of Station.	Astronomical Date.	Watch Time.	STATION.	THERMOMETER.		THERMOMETER.		Deduced height above sea level.	REMARKS.
				No.	Boiling Point.	No.	In Air.		
9	1865. October 15	6 0	Sil Garbi, at Paikhan	22	204.50	10	75.50	4,978.2	
10	" 16	6 0	Do.	"	204.50	"	65.25	4,999.5	
11	" 20	7 0	Seti-gñat, on bank of the Seti river	"	211.0	"	60.0	1,811.5	
12	" 24	2 0	Ganghushie	"	200.20	"	56.25	7,491.3	
13	" 29	6 0	Jhulghat, on bank of the Káli river	"	210.40	"	50.75	1,694.6	
14	" 29	1 0	Do.	"	210.40	"	64.75	1,626.2	
15	" 29	6 0	Do.	"	210.40	"	59.50	1,650.6	
16	November 11	6 30	Pithoragurh, near <i>bangla</i> of <i>khazanchi</i>	"	203.40	"	46.25	5,642.9	
17	" 13	7 0	Do.	"	203.40	"	46.75	...	
18	" 15	7 0	Do.	"	203.40	"	47.75	...	
19	" 20	6 0	Do.	"	203.50	"	44.25	...	
20	" 23	1 30	Bank of Seti river, near bridge	"	208.50	"	60.0	2,727.4	
21	" 29	0 30	Burjageshur, at temple on the hill	"	200.40	"	55.75	7,374.7	

*Observations of the Temperature of the Air at Shigatse, or Digarcho, a large town in Great Tibet, 11,800 feet above the sea.*

DATE.	Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1865. November	14	1	6	41·50	Very slight wind from S.W. ; clear sky.
"	14	2	"	43·25	Wind lulled. ... do.
"	14	3	"	44·25	Slight wind from W. ; do.
"	14	4	"	49·75	Do. W. ; do.
"	14	5	"	49·50	Do. W. ; do.
"	14	6	"	50·0	Do. W. ; do.
"	14	7	"	50·50	Do. W. ; do.
"	14	8	"	49·0	Strong wind from W. ; do.
"	14	9	"	48·0	Do. W. ; do.
"	14	10	"	47·25	Slight wind from N. ; do.
"	14	11	"	44·50	Do. S.E. ; do.
"	14	12	"	43·0	Do. S.E. ; do.
"	14	13	"	40·25	Do. S. ; do.
"	14	14	"	38·0	Do. E. ; do.
"	14	15	"	34·25	Do. W. ; do.
"	14	16	"	32·50	Do. N. ; do.
"	14	17	"	31·75	Very slight wind from N.E. ; do.
"	14	18	"	30·25	Do. N.E. ; do.
"	14	19	"	33·50	Do. N.E. ; do.
"	14	20	"	34·50	Do. N.E. ; do.
"	14	21	"	34·25	Wind lulled. ... do.
"	14	22	"	36·50	Do. ... do.
"	14	23	"	38·75	Do. ... do.
"	14	24	"	41·0	Do. ... do.
"	15	1	"	43·50	Do. ... do.
"	15	2	"	45·25	Do. ... do.
"	15	3	"	45·75	Do. ... do.
"	15	4	"	46·25	Do. ... do.
"	15	5	"	44·50	Do. ... do.
"	15	6	"	43·50	Do. ... do.
"	15	7	"	47·0	Do. ... do.
"	15	8	"	45·50	Do. ... do.
"	15	19	"	32·25	Do. ... do.
"	15	20	"	32·50	Do. ... do.
"	15	21	"	32·50	Do. ... do.
"	15	22	"	33·50	Do. ... do.
"	15	23	"	34·75	Do. ... do.
"	15	24	"	36·0	Do. ... do.
"	16	1	"	38·75	Wind slight from N.E. ; do.
"	16	2	"	39·25	Wind lulled. ... do.

DATE.	Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1865. November	16	3	6	41.50	Wind lulled. ... clear sky.
"	16	4	"	42.50	Do. ... do.
"	16	5	"	41.25	Do. ... do.
"	16	6	"	42.25	Wind slight from N.; do.
"	16	7	"	44.25	Wind lulled. ... do.
"	16	8	"	41.25	Wind slight from W.; do.
"	16	9	"	39.25	Do. S.; do.
"	16	10	"	39.0	Do. S.; do.
"	16	19	"	30.75	Do. S.; do.
"	16	20	"	30.75	Do. S.; do.
"	16	21	"	30.75	Do. S.; do.
"	16	22	"	32.75	Do. S.; do.
"	16	23	"	35.0	Wind lulled. ... do.
"	16	24	"	37.50	Do. ... do.
"	17	1	"	39.50	Slight wind from S.; do.
"	17	2	"	42.75	Wind lulled. ... do.
"	17	3	"	43.50	Slight wind from W.; do.
"	17	4	"	49.50	Hurricane from W.; do.
"	17	5	"	46.75	Do. W.; do.
"	17	6	"	47.0	Very slight wind from W.; do.
"	17	7	"	48.0	Strong wind from W.; do.
"	17	8	"	46.50	Do. W.; do.
"	17	9	"	45.0	Slight wind from N.W.; do.
"	17	10	"	43.25	Strong wind from S.; do.
"	17	19	"	29.25	Slight wind from W.; do.
"	17	20	"	32.50	Do. E.; do.
"	17	21	"	33.25	Do. E.; do.
"	17	22	"	34.25	Do. S.E.; do.
"	17	23	"	39.60	Strong wind from S.; do.
"	17	24	"	40.25	Do. S.; do.
"	18	1	"	43.0	Do. S.W.; do.
"	18	2	"	45.0	Do. S.W.; do.
"	18	3	"	44.25	Slight wind from W.; do.
"	18	4	"	44.50	Do. W.; do.
"	18	5	"	43.25	Do. W.; do.
"	18	6	"	41.50	Do. W.; do.
"	18	7	"	42.25	Do. W.; do.
"	18	8	"	41.0	Do. W.; do.
"	18	9	"	37.25	Do. N.; do.
"	18	10	"	36.75	Do. N.; do.
"	18	19	"	24.25	Do. N.W.; do.
"	18	20	"	26.0	Do. N.W.; do.

DATE.		Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1865.						
November	18	21	G	27·0	Slight wind from	S.; clear sky.
"	18	22	"	28·50	Do.	S.; do.
"	18	23	"	30·0	Do.	S.; do.
"	18	24	"	31·75	Do.	S.; do.
"	19	1	"	34·25	Do.	S.; do.
"	19	2	"	36·50	Wind lulled.	... do.
"	19	3	"	35·75	Slight wind from	W.; do.
"	19	4	"	36·50	Wind lulled.	... do.
"	19	5	"	36·0	Slight wind from	W.; do.
"	19	6	"	36·25	Do.	W.; do.
"	19	7	"	42·0	Do.	W.; do.
"	19	8	"	40·0	Do.	W.; do.
"	19	9	"	37·0	Do.	W.; do.
"	19	10	"	36·50	Do.	W.; do.
"	19	19	"	24·75	Do.	N.; fleecy clouds.
"	19	20	"	26·50	Do.	E.; do.
"	19	21	"	26·0	Strong wind from	N.; do.
"	19	22	"	28·25	Slight wind from	N.; light clouds only to south.
"	19	23	"	29·50	Very slight wind from	N.; clear sky.
"	19	24	"	32·50	Do.	N.; do.
"	20	1	"	33·75	Do.	W.; do.
"	20	2	"	35·0	Slight wind from	W.; do.
"	20	3	"	36·50	Wind lulled.	... light clouds.
"	20	4	"	36·50	Slight wind from	W.; do.
"	20	5	"	36·0	Wind lulled.	... rather heavy clouds all over.
"	20	6	"	35·50	Do.	... do.
"	20	7	"	39·50	Slight wind from	W.; sky clear.
"	20	8	"	37·75	Do.	N.W.; clouds to E.
"	20	9	"	40·0	Very heavy wind from	W.; sky clear.
"	20	10	"	39·25	Strong wind from	W.; sky cloudy to W.
"	20	19	"	30·0	Do.	N.W.; sky very clear.
"	20	20	"	30·0	Do.	N.W.; do.
"	20	21	"	32·50	Do.	N.W.; do.
"	20	22	"	34·50	Slight wind from	W.; do.
"	20	23	"	35·75	Do.	W.; here and there light clouds.
"	20	24	"	38·0	Strong wind from	N.; sky obscured by light clouds.

*Observations of the Temperature of the Air at Lhasa, the capital of Great Tibet, 11,700 feet above the sea.*

DATE.	Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.		
1866. February	9	1	6	43·50	Strong wind from W.;	here and there clouds.
"	9	2	"	41·75	Do. W.;	do.
"	9	3	"	40·50	Do. W.;	do.
"	9	4	"	40·50	Slight wind from W.;	clouds all over.
"	9	5	"	39·25	Do. S.;	do.
"	9	6	"	38·50	Do. S.;	do.
"	9	7	"	36·0	Do. N.;	clouds near horizon.
"	9	8	"	35·0	Do. E.;	do.
"	9	9	"	34·50	Do. S.;	do.
"	9	10	"	33·50	Do. S.W.;	do.
"	9	11	"	36·0	Do. W.;	sky clear.
"	9	12	"	36·50	Do. W.;	do.
"	9	13	"	34·0	Strong wind from W.;	do.
"	9	14	"	33·75	Do. W.;	do.
"	9	15	"	33·25	Do. W.;	do.
"	9	16	"	32·50	Slight wind from W.;	do.
"	9	17	"	30·50	Do. E.;	do.
"	9	18	"	28·75	Do. E.;	do.
"	9	19	"	29·0	Do. E.;	do.
"	9	20	"	29·75	Do. S.;	do.
"	9	21	"	30·0	Wind lulled.	do.
"	9	22	"	32·0	Do. S.;	do.
"	9	23	"	33·25	Slight wind from W.;	do.
"	9	24	"	35·0	Do. N.W.;	light fleecy clouds all over.
"	10	1	"	37·50	Very strong wind from W.;	light clouds all over.
"	10	2	"	39·50	Do. W.;	do.
"	10	3	"	39·00	Do. W.;	do.
"	10	4	"	39·0	Very slight wind from N.;	clouds all over.
"	10	5	"	37·50	Do. N.;	do.
"	10	6	"	38·0	Do. N.;	do.
"	10	7	"	37·0	Do. S.;	clouds near horizon.
"	10	8	"	37·0	Wind lulled.	very cloudy.
"	10	9	"	37·0	Do. ...	do.
"	10	10	"	37·75	Slight wind from N.;	do.
"	10	19	"	34·0	Do. S.;	do.
"	10	20	"	34·0	Do. E.;	do.
"	10	21	"	35·50	Do. E.;	do.
"	10	22	"	38·0	Do. E.;	do.
"	10	23	"	37·50	Do. E.;	do.
"	10	24	"	38·50	Do. E.;	do.

DATE.		Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1866. February		11	1	6	40·50	Strong wind from W.; very cloudy all over.
"	"	11	2	"	42·0	Hurricane from W.; do.
"	"	11	3	"	44·25	Do. W.; do.
"	"	11	4	"	43·0	Do. S.; do.
"	"	11	5	"	42·0	Do. S.; do.
"	"	11	6	"	40·50	Slight wind from W.; { at this hour it snowed on all the hills around, and slightly in Lhâsa.
"	"	11	7	"	40·25	Do. W.;
"	"	11	8	"	39·75	Do. W.;
"	"	11	9	"	40·0	Do. W.;
"	"	11	10	"	40·25	Do. W.;
"	"	11	19	"	38·0	Do. W.;
"	"	11	20	"	39·0	Do. W.;
"	"	11	21	"	38·0	Do. W.; { snowed rather more in Lhâsa, but did not collect on the ground.
"	"	11	22	"	37·0	Do. W.; do.
"	"	11	23	"	37·50	Do. E.; { cloudy towards horizon only, zenith clear.
"	"	11	24	"	39·50	Do. E.; do.
"	"	12	1	"	40·0	Very strong wind from W.; sky obscured by clouds.
"	"	12	2	"	40·0	Do. S.; cloudy.
"	"	12	3	"	40·0	Do. E.; do.
"	"	12	4	"	40·0	Do. S.; do.
"	"	12	5	"	39·50	Do. S.; do.
"	"	12	6	"	39·50	Do. S.; do.
"	"	12	7	"	37·75	Slight wind from S.; snowed slightly.
"	"	12	8	"	35·0	Do. W.; do.
"	"	12	9	"	34·50	Do. W.; do.
"	"	12	10	"	35·50	Do. W.; do.
"	"	12	19	"	29·75	Do. N.; { horizon cloudy; awoke, and saw $\frac{1}{2}$ inch of snow on the ground, which had fallen overnight.
"	"	12	20	"	32·0	Do. N.;
"	"	12	21	"	33·0	Wind lulled. ... cloudy, towards horizon sunny.
"	"	12	22	"	33·50	Do. ... do.
"	"	12	23	"	35·0	Do. ... do.
"	"	12	24	"	36·50	Slight wind from W.; { sky completely obscured by clouds.
"	"	13	1	"	37·0	Do. N.W.; sky very cloudy.
"	"	13	2	"	35·0	Hurricane N.; do.
"	"	13	3	"	34·75	Do. N.; do.
"	"	13	4	"	33·50	Do. N.; do.
"	"	13	5	"	33·50	Do. N.; do.
"	"	13	6	"	33·50	Slight wind from N.; sky clear overhead only.



DATE.	Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.		
1866. February	13	7	6	33·0	Slight wind from W.;	sky clear.
"	13	8	"	32·50	Do. N.;	do.
"	13	9	"	32·0	Do. N.;	do.
"	13	10	"	31·0	Do. E.;	do.
"	13	19	"	26·0	Do. E.;	do.
"	13	20	"	26·75	Do. E.;	do.
"	13	21	"	28·0	Do. E.;	do.
"	13	22	"	30·0	Do. E.;	do.
"	13	23	"	31·0	Very slight wind from E.;	do.
"	13	24	"	33·0	Noon, Do. E.;	do.
"	14	1	"	34·75	Very slight wind from N.;	here and there clouds.
"	14	2	"	36·50	Do. N.;	do.
"	14	3	"	36·50	Do. N.;	do.
"	14	4	"	37·50	Do. N.E.;	sky very cloudy.
"	14	5	"	37·50	Do. N.E.	do.
"	14	6	"	35·50	Wind lulled. ...	thin clouds all over.
"	14	7	"	36·75	Very slight wind from W.;	do.
"	14	8	"	36·0	Wind lulled. ...	sky clear.
"	14	9	"	35·0	Do. ...	do.
"	14	10	"	33·75	Do. ...	do.
"	14	19	"	27·0	7 A.M., wind slight from E.;	do.
"	14	20	"	28·50	Do. E.;	do.
"	14	21	"	30·50	Do. E.;	do.
"	14	22	"	32·0	Do. E.;	do.
"	14	23	"	33·0	Do. E.;	do.
"	14	24	"	35·0	Wind lulled. ...	do.
"	15	1	"	37·0	Very slight wind from N.W.;	white clouds towards horizon.
"	15	2	"	38·75	Do. N.W.;	do.
"	15	3	"	43·50	Do. N.W.;	do.
"	15	4	"	43·50	Do. N.W.;	do.
"	15	5	"	43·75	Strong wind from W.;	here and there only clouds.
"	15	6	"	40·50	Wind lulled. ...	sky clear.
"	15	7	"	39·75	Do. ...	do.
"	15	8	"	39·0	Do. ...	do.
"	15	9	"	37·75	Do. ...	do.
"	15	10	"	37·0	Do. ...	do.
"	15	19	"	29·50	7 A.M., strong wind from E.;	do.
"	15	20	"	32·0	Do. E.;	do.
"	15	21	"	33·50	Do. E.;	do.
"	15	22	"	35·25	Wind lulled. ...	do.
"	15	23	"	37·0	Do. ...	do.
"	15	24	"	40·0	Do. ...	do.

DATE.		Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1866, February	16	1	6	40·25	Wind lulled.	... sky clear.
"	16	2	"	41·0	Do.	do.
"	16	3	"	41·0	Strong wind from	W.; clouds to N.
"	16	4	"	43·0	Do.	W.; do.
"	16	5	"	44·0	Do.	W.; do.
"	16	6	"	40·50	Wind lulled.	... sky clear.
"	16	7	"	40·50	Slight wind from	E.; do.
"	16	8	"	40·0	Do.	E.; do.
"	16	9	"	38·0	Do.	E.; do.
"	16	10	"	37·0	Do.	E.; do.
"	16	19	"	31·0	7 A.M., Do.	E.; do.
"	16	20	"	31·50	Do.	E.; do.
"	16	21	"	33·0	Do.	E.; do.
"	16	22	"	35·0	Wind lulled.	... do.
"	16	23	"	36·25	Slight wind from	W.; do.
"	16	24	"	37·50	Strong wind from	S.; { here and there white clouds; bright sun.
"	17	1	"	39·75	Slight wind from	W.; here and there light clouds.
"	17	2	"	39·75	Do.	W.; do.
"	17	3	"	40·0	Do.	W.; do.
"	17	4	"	40·50	Do.	W.; do.
"	17	5	"	40·50	Very slight wind from	W.; a few cirrus clouds.
"	17	6	"	39·75	Do.	W.; do.
"	17	7	"	39·50	Very strong wind from	S.; sky clear.
"	17	8	"	38·50	Wind lulled.	... do.
"	17	9	"	36·75	Do.	... do.
"	17	10	"	36·0	Do.	... do.
"	17	19	"	32·0	Very slight wind from	E.; heavy dark clouds.
"	17	20	"	32·50	Do.	E.; do.
"	17	21	"	34·50	Do.	E.; do.
"	17	22	"	35·50	Wind lulled.	... do.
"	17	23	"	36·50	Slight wind from	E.; here and there clouds.
"	17	24	"	37·50	Do.	W.; do.
"	18	1	"	39·75	Do.	W.; do.
"	18	2	"	40·0	Do.	W.; light clouds obscuring sky.
"	18	3	"	40·50	Do.	W.; do.
"	18	4	"	40·50	Do.	W.; do.
"	18	5	"	40·0	Do.	W.; do.
"	18	6	"	40·0	Do.	W.; clouds to north of horizon.
"	18	7	"	39·75	Do.	W.; do.
"	18	8	"	39·50	Do.	W.; do.
"	18	9	"	39·50	Do.	W.; do.
"	18	10	"	39·0	Do.	W.; light clouds obscuring sky.

DATE.		Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.		
1866, February	18	19	6	34·50	Slight wind from	W.;	sky clear.
"	18	20	"	34·75	Do.	W.;	do.
"	18	21	"	35·50	Do.	W.;	do.
"	18	22	"	37·0	Do.	W.;	do.
"	18	23	"	37·75	Do.	N.W.;	here and there white clouds.
"	18	24	"	39·50	Do.	N.;	{ white and light clouds obscuring sky.
"	19	1	"	41·25	Strong wind from	W.;	here and there light clouds.
"	19	2	"	42·0	Do.	W.;	do.
"	19	3	"	42·0	Slight wind from	N.W.;	do.
"	19	4	"	41·0			
"	19	5	"	41·0	Very slight wind from	W.;	heavy clouds obscuring sky.
"	19	6	"	41·0	Do.	W.;	do.
"	19	7	"	42·0	Strong wind from	S.;	clouds to north.
"	19	8	"	41·50	Do.	S.;	do.
"	19	9	"	40·25	Slight wind from	S.;	do.
"	19	10	"	40·0	Do.	W.;	do.
"	19	19	"	33·0	Do.	E.;	sky clear.
"	19	20	"	33·25	Wind lulled.	...	do.
"	19	21	"	35·0	Slight wind from	W.;	do.
"	19	22	"	35·50	Do.	N.;	{ here and there clouds, sun shining.
"	19	23	"	37·25	Do.	W.;	do.
"	19	24	"	38·75	Noon, Do.	W.;	do.
"	20	1	"	39·50	Do.	W.;	here and there fleecy clouds.
"	20	2	"	40·75	Do.	W.;	do.
"	20	3	"	41·0	Do.	W.;	do.
"	20	4	"	41·50	Strong wind from	W.;	do.
"	20	5	"	40·50	Do.	W.;	do.
"	20	6	"	39·50	Very strong wind from	N.;	do.
"	20	7	"	38·0	Do.	N.;	do.
"	20	8	"	37·0	Do.	N.;	do.
"	20	9	"	36·0	Wind rather strong from	N.;	do.
"	20	10	"	35·50	Do.	N.;	do.
"	20	19	"	30·0	Slight wind from	E.;	sky clear.
"	20	20	"	31·50	Do.	E.;	do.
"	20	21	"	33·0	Do.	E.;	do.
"	20	22	"	34·0	Wind lulled.	...	do.
"	20	23	"	35·0	Do.	...	do.
"	20	24	"	36·50	Very gentle wind from	W.;	do.
"	21	1	"	38·0	Very slight wind from	W.;	do.
"	21	2	"	39·0	Do.	N.;	do.
"	21	3	"	39·50	Do.	N.;	do.

DATE.	Hour.	No. of Thermometer.	Thermometer readings.	REMARKS.	
1866. February	21	4	6	41·0	Very slight wind from N.; here and there clouds.
"	21	5	"	40·25	Do. N.; do.
"	21	6	"	39·25	Do. E.; sky clear.
"	21	7	"	39·0	Do. E.; do.
"	21	8	"	38·0	Do. E.; do.
"	21	9	"	36·75	Do. W.; do.
"	21	10	"	36·25	Do. W.; do.
"	21	19	"	36·50	7 A.M., Do. S.; do.
"	21	20	"	37·0	Do. S.; do.
"	21	21	"	39·50	Wind lulled. ... do.
"	21	22	"	42·0	Very strong wind from W.; do.
"	21	23	"	43·0	Do. W.; do.
"	21	24	"	43·0	Do. W.; do.
"	22	1	"	45·50	Do. W.; do.
"	22	2	"	45·75	Do. W.; do.
"	22	3	"	45·0	Do. W.; do.
"	22	4	"	44·75	Slight wind from W.; light clouds obscuring sky.
"	22	5	"	44·75	Do. W.; do.
"	22	6	"	43·0	Do. N.; do.
"	22	7	"	42·50	Do. N.; do.
"	22	8	"	40·50	Do. N.; do.
"	22	9	"	40·50	Do. N.; do.
"	22	10	"	37·50	Do. N.; do.
"	22	19	"	32·0	7 A.M., Do. E.; sky clear.
"	22	20	"	32·50	Do. E.; do.
"	22	21	"	34·50	Do. E.; do.
"	22	22	"	36·0	Do. E.; do.
"	22	23	"	37·0	Wind lulled. ... do.
"	22	24	"	40·0	Do. ... do.
"	23	19	"	36·0	Slight wind from E.; do.
"	24	6	"	45·75	Do. W.; heavy clouds obscuring sky.
"	24	19	"	35·0	Do. E.; sky clear.
"	25	6	"	45·75	Wind lulled. ... heavy clouds all over.
"	25	19	"	33·50	Slight wind from E.; sky clear.
"	26	6	"	45·75	Do. W.; clouds obscuring sky.
"	26	19	"	33·50	Strong wind from E.; sky clear.
"	27	6	"	45·75	Wind lulled. ... clouds obscuring sky.
"	27	19	"	34·0	Slight wind from E.; sky clear.
"	28	6	"	45·50	Very slight wind from W.; clouds all over.
"	28	19	"	33·50	Do. E.; here and there clouds.
March	1	6	"	43·50	Do. E.; clouds all over.
"	1	19	"	35·50	Do. E.; sky clear.

DATE.	Hour.	Nc. of Thermometer.	Thermometer readings.	REMARKS.	
1866. March	2	6	43·50	Very slight wind from E.;	clouds all over.
"	2	19	36·25	Do. E.;	sky clear.
"	3	6	47·25	Do. W.;	clouds near horizon.
"	3	19	36·50	Do. E.;	sky clear.
"	4	6	48·25	Slight wind from N.W.;	clouds near horizon.
"	4	19	37·0	Do. E.;	sky clear.
"	5	6	48·50	Do. W.;	here and there clouds.
"	5	19	37·50	Do. E.;	do.
"	6	6	50·0	Do. W.;	do.
"	6	19	42·0	Do. E.;	sky clear.
"	7	6	49·75	Do. N.;	cloudy.
"	7	19	41·50	Do. E.;	sky clear.
"	8	6	48·75	Wind lulled.	... cloudy.
"	8	19	38·50	Slight wind from E.;	here and there clouds.
"	9	6	48·50	Wind lulled.	... clouds near horizon.
"	9	19	44·75	Slight wind from W.;	cloudy.

*Remarks as to the Weather, &c., in the Lhāsa Territory.*

During my stay at Lhāsa, Shigātse, and in the Lhāsa territory, I do not recollect either having seen lightning or heard thunder, and on making inquiries I was informed that during the winter season there is neither one nor the other, though there is a little during the rains. Lightning is never known to kill the inhabitants, or to strike houses, &c. The rains (during the season) are very heavy at Shigātse, especially during the months of July and August. The snow fall at Shigātse, and on the country around, never exceeds 1 foot, although the water of running streams freezes if the current is not very rapid. During my journey in Tibet, from October to June, it never rained, and on only a single occasion did I observe a fall of snow of about 3 inches, when on my way to Pen-nang (Ta-sam) from the Takse village.

The inhabitants regard snow as an evil, and attribute the slight fall during the winter to the goodness of their chief divinities and head Lāmas. Should the fall ever exceed a foot, it is looked on as an evil sign, expressing the displeasure of their gods, and to propitiate them large sums of money are expended on the priests, &c. They call snow "khā," after the word *kha*, meaning nothing.

I was informed that earthquakes are unknown in the Lhāsa territory proper, though slight earthquakes are said to occur in Ngari Khorsum.

Strong and high winds are very prevalent throughout the Lhāsa territory.

No rain fell during my three months' residence in Lhāsa. Snow fell twice in the city, but only to the amount of about three inches on each occasion. The fall on the surrounding hills was somewhat heavier.

High winds were prevalent during March and April.

NOTE.—The thermometer observations at Shigātse were taken in a small room off the large one the Pundit had hired for himself in the Kunkung, or *sarai*. There were forty to fifty people in the *sarai* mostly his Ladākhi friends. The small room was entirely open upon one side, the thermometer hanging in the middle; the open side looked to the south.

The walls of the room were of sun-dried bricks, and the roof of wood covered with earth, so that the sun's heat did not penetrate.

At Lhāsa the thermometer observations were taken in a house with a roof and walls quite as thick as those in the *sarai* at Shigātse.

*Memorandum on the Great Tibetan Road from Lhāsa to Gar-tok.*

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The Great Tibetan Road between Lhāsa and Gar-tok is divided into twenty-two stages, of from 20 to 60 miles in length, varying according to the nature of the country.

At the end of each of these stages there is a halting place, called a Ta-sam, where shelter is provided for all Tibetan officials travelling along the road.

These halting places, or Ta-sams, generally consist of one large house, or of several small houses, with a number of tents, sufficient together to supply shelter to at least 200 men, with their baggage and merchandise. The houses have generally walls of sun-dried bricks, and a wooden roof covered with earth.

The Tibetan officials get a change of cattle at each Ta-sam. The Ta-sams are in charge of a man called Ta-sampā, or Julno. He is bound to have coolies, horses, yaks and donkeys in attendance, whenever he receives notice of the approach of a Lhāsa official. The Ta-sampās are supported by the State, and they give the orders to the heads\* of camps and villages near these Ta-sams as to supplying cattle, &c.

From ten to fifteen men, and as many horses, are always in attendance at the Ta-sams.

The horses that are kept in constant readiness form what is called a Taol.

A high official, called Shipchat, is sent every third year from Lhāsa to Gar-tok, in order to see how matters have been carried on.

The Shipchat, and all high officials, receive every attention on the road, and, when travelling on the public service, they and their retinue are supplied with horses, baggage animals, food and fuel free of all charges. Their goods sometimes take as many as a thousand yaks, besides men, &c.

A caravan of yaks, &c., is called a Due. The supply of cattle, &c., forms a kind of tax on the inhabitants, called Changshul and Thoptang.

Although the nomadic tribes and villagers receive nothing for the above, they are nevertheless held strictly responsible for the safe transit of all goods, and are made to pay twice the value of anything lost or damaged.

The higher officials generally trade on their own account, and this adds very much to the tax upon the inhabitants, who, in addition, are often forced to buy the goods at very much over their proper value.

The inhabitants appear to have no remedy, as the Shipchat, or inspector of the road, seems to trade just as much as the other officials.

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\* The heads of villages are called Ganbos.

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*A List of the twenty-two Ta-sams, or Halting places, between Gar-tok and Lhāsa, with the Distances between them.*

No.	Names of Ta-sams, or Halting places, where cattle are changed.	Estimated distance in miles.	REMARKS.
1	Gar-tok to Nik-yu (Ta-sam) ...	6	No houses, only tents.
2	Missar (Ta-sam) ...	37	The Ta-sam consists of a house and tents.
3	Barkha (Ta-sam) ...	40	The Ta-sam consists of a house and tents, and is situated in a very cold place near the Mansarowar Lake.
4	Tok-chen (Ta-sam) ...	34	On right bank of Some stream, only tents, no houses.
5	Tamjan (Ta-sam) ...	77	On left bank of Brahmaputra river, only tents, no houses.
6	Truk-sum (Ta-sam) ...	41	Only tents, no house.
7	Tra-dom (Ta-sam) ...	52	Four or five small houses about the monastery form the Ta-sam.
8	Nyuk-ku (Ta-sam) ...	31	On the bank of the Minchu River. Tents only, no house.
9	Sa-ka (Ta-sam) ...	29	Sa-ka is a large village containing numerous houses built of sun-dried bricks. It is ruled by a Jongpon. The Ta-sam is a house built with sun-dried bricks.
10	Se-mo-ku (Ta-sam) ...	26	Only tents.
11	Ra-ga (Ta-sam) ...	23	Only tents, a very cold place.
12	Sang-sang (Ta-sam) ...	27	The Ta-sam is built of sun-dried bricks.
13	Sang-sang-Kau (Ta-sam) ...	34	The Ta-sam is of a good size, and built of sun-dried bricks. There are many tents, but only two houses besides the Ta-sam.
14	Ngap-ring (Ta-sam) ...	31	This is the first place east of Gar-tok where the people were seen to cultivate the ground; from hence on to Lhāsa the villagers cultivate. The Ta-sam consists of a house.
15	Janglāche or Lha-tse Fort (Ta-sam)	33	A house in town of same name. Travellers from Lhāsa provide themselves with provisions at this place for the entire journey to Gar-tok.
16	Pin-dzo-ling (Ta-sam)	26	The Ta-sam is a house in the large village of the same name.
17	Shigātse (Ta-sam) ...	61	The Ta-sam is a large building in the city.
18	Pen-nang (Ta-sam) ...	19	The Ta-sam is a house in the town.
19	Gyāntse (Ta-sam) ...	29	The Ta-sam is a house in the city.
20	Nang-kar-tse (Fort & Ta-sam)	57	The Ta-sam is a house built of sun-dried bricks.
21	Pe-de (Fort and Ta-sam) ...	18	On border of the Lake Yam-drok Tso or Lake Palti. The Ta-sam is a house built of sun-dried bricks.
22	Chu-shul (Fort and Ta-sam)	25	On right bank of Brahmaputra river. House same as last.
	Lhāsa ...	34	
	Total miles ...	790	

*List of Ordinary Marches between Gar-tok and Lhāsa.*

No. of Ta-sam.	Names of the daily Halting places for ordinary marches.	Estimated distance in miles from stage to stage.	Under the authority of whom.	REMARKS.
	Gar-tok ... ..	...	Chief Garpon of Gar-tok	Two Garpons and a Shipchat reside here.
1	Nik-yu (Ta-sam) ...	6	Do.	
	Lang-bo-chi ...	10	Do.	No accommodation for travellers here.
	Nigri camp ...	12	Do.	Tents.
2	Missar (Ta-sam) ...	15	Do.	
	Da-pa ...	5	Do.	No accommodation for travellers here.
	Ramothal ...	20	Jongpon of Barkha	Do.
3	Barkha (Ta-sam) ...	15	Do.	The Jongpon resides here.
	Lang-po-nang camp ...	9	Do.	Near a monastery.
	Sariniah Uniah camp ...	15	Do.	Tents. This is a large camp.
4	Tok-chen (Ta-sam) ...	10	Jongpon of Purang	
	Nyuk-chu ...	17	Do.	No accommodation here.
	Uk-rung (old Ta-sam in ruins)	14	Do.	Do.
	Gyamzar camp ...	23	Jongpon of Truk-sum	The Jongpon is called Bongpua-Chigap.
	Tha-Kabjor ...	15	Do.	No accommodation here.
5	Tamjan (Ta-sam) ...	8	Do.	
	Lahro ... ..	6	Do.	No accommodation here.
	Demar camp ...	23	Do.	Tents.
6	Truk-sum (Ta-sam) ...	12	Do.	The Jongpon of Truk-sum resides here.
	Totu camp ...	20	Do.	
	Barmalung ...	14	Do.	No accommodation here.
7	Tru-dom (Ta-sam) ...	18	Jongpon of Sa-ka	
	Thuku camp ...	9	Do.	Tents.
	Shricarpo camp ...	16	Do.	Tents.
8	Nyuk-ku (Ta-sam) ...	6	Do.	
	Jagung ... ..	10	Do.	No accommodation here.
	Jhalung ... ..	16	Do.	
9	Sa-lta (Ta-sam) ...	3	Do.	The Jongpon resides here.
	Uk-shu village ...	18	Do.	Mud houses.
10	Se-mo-ku (Ta-sam) ...	8	Do.	
11	Ra-ga (Ta-sam) ...	23	Do.	



*List of Ordinary Marches between Gar-tok and Lhāsa.—(Continued).*

No. of Ta-sam.	Names of the daily Halting places for ordinary marches.	Estimated distance in miles from stage to stage.	Under the authority of whom.	REMARKS.
	Gangbiako ...	6	Jongpon of Sa-ka.	
12	Sang-sang (Ta-sam) ...	21	Do.	
	Ge ...	15	Do.	Camp.
13	Sang-sang-Kau (Ta-sam)	19	Do.	
	Kūkap camp ...	11	Jongpon of Ngap-ring.	
	Ea-tung village ...	14	Do.	
14	Ngap-ring (Ta-sam) ...	6	Do.	
	Larcha village ...	11	Do.	
	Sen-ge-lung village ...	11	Jongpon of Janglāche.	
15	Janglāche or Lha-tse Fort (Ta-sam).	11	Do.	The Jongpon resides here.
	Chap-trang village ...	11	Do.	
16	Pin-dzo-ling (Ta-sam)...	15	Jongpon of Pin-dzo-ling.	A very large village. The Jongpon resides here.
	Chameheding village ...	10	Do.	
	Shilkar village ...	14	Jongpon of Shigātse.	
	Chia-ri village ...	22	Do.	
17	Shigātse (Ta-sam) ...	15	Do.	The Jongpon resides here.
18	Pen-nang (Ta-sam) ...	19	Jongpon of Pen-nang	The Jongpon resides here.
	Thakcha village ...	15	Do.	
19	Gyāntse (Ta-sam) ...	14	Jongpon of Gyāntse	The Jongpon resides here.
	Gob-shi village ...	16	Do.	
	Ra-lung village ...	13	Do.	
	Dza-ra village ...	14	Jongpon of Nang-kar-tse	A Chinese post-stage.
20	Nang-kar-tse (Fort and Ta-sam).	14	Do.	The Jongpon resides here.
21	Pe-de (Fort and Ta-sam)	18	Jongpon of Pe-de	The Jongpon resides here.
	Demālang village ...	12	Do.	
22	Chu-shul (Fort and Ta-sam).	13	Jongpon of Chu-shul	The Jongpon resides here.
	Netang village ...	18	Jongpon of Lhāsa.	
	Lhāsa city ...	16		
	Total miles ...	790		

NOTE.—The tents in Tibet are made from the coarser hair of the yak, and are generally of a black colour.

Muesoree, 30th July 1867.

*Memorandum on 600 miles of the Brahmaputra River, from its source near the Manasarowar Lake, in latitude  $30\frac{1}{2}^{\circ}$  and longitude  $82^{\circ}$ , to the junction of the Lhāsa River, in latitude  $29^{\circ} 22'$  and longitude  $90^{\circ} 40'$ .*

When sending the Pandits to explore the country from Manasarowar to Lhāsa, they were directed to make every enquiry as to the great river which was known to flow from near the Manasarowar Lake to Lhāsa. Care was taken not to give the river any name, it was simply called the great river, and the explorers were told to find out its name.

The Pandit on his return said that the river is called by the Ngari and Lndākḥ people the Tamjan-Khamba (the horse's mouth) from its source to the junction of the Charta R. from the latter to Janglāche it is called Mar-tsang R. by the Dokthol people, and from Janglāche to Lhāsa it is called the Nari-Chu R. by the Lhāsa people, the latter name being given to it because the river runs from near Ngari, the country about Manasarowar, &c.

The Nepālese, the Newārs from Nepāl, and the Kashmīri Muhammadans who were in Lhāsa, all told the Pandit that this great river was the Brahmaputra. All the Lhāsa people who were questioned were unanimous in saying that, after going east for a considerable distance, it flowed down into Hindustān.

For this reason, and others to be given hereafter, the river throughout this paper will be referred to as the Brahmaputra.

The river Brahmaputra was ascertained to rise in about north latitude  $30\frac{1}{2}^{\circ}$ , and east longitude  $82^{\circ}$ .

The great road along which the route-survey was carried does not follow the course of the river for the first 50 miles, but the road was probably never much more than 10 miles north of the river.

The general direction of the river's course during the first 50 miles was, however, quite unmistakable, owing to the gigantic range visible to the south of it, the large glaciers which filled every ravine of that range evidently forming the sources of the river.

The Tamjan (*Ta-sam*) in latitude  $30^{\circ} 21'$ , longitude  $82^{\circ} 51'$ , was the first point of the road actually on the river. The staging-house is called Tamjan, from the Tibetan name of the river, which is Tamjan-Khamba (horse's mouth). From Tamjan there was a good view up the river for a considerable distance. The Tibetans all agreed in saying that it was the main branch of the river.

At Tamjan, on the 7th of June, the river was much swollen, its current rapid, and water turbid. About 40 miles south-east of Tamjan, the first large tributary (the Chu Nago) falls in from the north, intermediately only two small tributaries were noticed. From the junction of the Chu Nago the great river flows south-east, and about 50 miles lower down received a still larger river, called the Chachu R. coming from the north; this tributary was about 200 paces wide, and not very much inferior to the Brahmaputra itself. The junction is near the Tra-dom monastery, a well-known halting place on the great road.

From the junction with the Chachu R. the river runs four to five miles due south, and then continues as before in a south-easterly direction for nearly thirty miles, below which it makes a great bend, and flowing southward for twenty-five miles, receives a large tributary from the south called the Sho-te R., and then flowing north-east for twenty-five miles more, receives another great tributary from the north called the Charta R. The Charta R. was in October about 250 paces in width, and its tributary, the Chaka R., which joins it a few miles below the point where the road crosses, was 150 paces in width. The combined stream forms one of the largest tributaries, if not the largest, that was seen to join the Brahmaputra. In May the Charta R. and its tributary were very slightly swollen; ice was still clinging to their edges.

From the junction of the Charta R. the great river was observed to flow for about forty miles in a direction a little south of east. At this last point, near again till it had reached a point 100 miles further east, above the village of Napsi. Of this 100 miles of the river's course nothing positive is known; according to the natives of the country, it had no good road along it. The Pandit conjectured that the river flows (somewhat as shown in the map by dotted lines) south of a great peak which he observed from the road.

From Napsi the river flows east by north for twenty-five miles, and then turning sharp  
 386 miles from source. east to the north, flows past the large town of Janglache, taking thence a north-  
 east course for twenty-five miles more, where it is joined by a very large  
 river, called the Ra-ga R. The course of this tributary was followed by the Pandit from the  
 410 miles from source. Kur pass, near Uk-shu, where the great road leaves the Brahmaputra, to a  
 place called Ra-tung on the Ngap-ring-kyin lake. At this place it was a large  
 river, but when seen again lower down, at its junction with the Brahmaputra, the Ra-ga R. had  
 become very much larger, having evidently received a large addition by one or more tributaries  
 from the north. Just above the junction it was estimated to be about 200 paces in width.  
 From Janglache some of the Pandit's companions took boat, and were paddled down the great  
 476 miles from source. river to Shigatse, a distance of eighty-five miles below Janglache, and sixty  
 miles below the junction of the Ra-ga R. The Pandit continued his  
 march by land to Shigatse, crossing a good-sized tributary from the south. The great river was  
 seen occasionally, and was evidently never so much as ten miles from the road. His companions  
 who went by boat said the stream was smooth, and the course direct. From Shigatse the great  
 river is again visible at the point where it receives the Pen-nang-chu river from the south. The  
 Pen-nang-chu was about 150 paces wide in December. From Shigatse to Kam-pa-par-tse the river  
 575 miles from source. was not seen for about 100 miles, the main road diverging considerably to  
 the south of the river. The Tibetans said that this portion was too rapid  
 for boats. At Kam-pa-par-tse the river, when again seen, was flowing in a broad deep stream.  
 585 miles from source. The stream flowed so easily that every one of the party went by boat from  
 Kam-pa-par-tse to Chu-shul, a distance of about ten miles.

From Chu-shul the Pandit could see the river flowing eastward for twenty or thirty miles,  
 605 miles from source. and was informed that it continued to flow in that direction for a great  
 distance.

A mile or two below Chu-shul the Lhāsa river, called the Kyi Chu, joins the great  
 river. The Kyi Chu is navigable for small boats for about thirty miles, and in January was about  
 250 paces wide.

During the first week of June, at about 140 miles from its source, the water of the main  
 branch of the Brahmaputra was very dirty and very cold, again, at the end of August, a little  
 lower down the water was of a dirty whitish colour, and very cold.

At Chu-shul, 585 miles from its source, the water of the Brahmaputra was in January  
 very clear, and again in April at the same point the water was only slightly less clear, though  
 the river had swollen. As to the tributaries, the water of the Charta and the Chaka rivers was  
 very clear in October, and in May, after the river had swollen, the water was still only slightly  
 less clear.

The water of the Ra-ga river was very clear and cold in October, and in May it was  
 slightly dirty.

The water of the Pen-nang-chu was very clear in December, but dirty in April.

The Kyi Chu (or Lhāsa river) was clear in January, and again at the end of April it was  
 still clear.

Streams from glaciers are always noted for having exceedingly dirty water, from the action  
 of the glaciers on the rocks and earth in contact with them. Those who have travelled in glacier  
 regions are hardly ever mistaken in deciding as to whether a stream comes from a glacier or not.

The Pandit had been acquainted with glaciers all his life. His evidence as to the water,  
 given above, would tend to show that the main branch of the river rose among glaciers, and he  
 says that he saw the glaciers; again, the Sho-te R. from his own observation, was known  
 to rise among glaciers, and so also does the Pen-nang-chu; so that the two southern tributaries  
 would also appear to rise among glaciers, but none of the four northern tributaries appear to rise  
 among glaciers, or, at any rate, if they do, the glaciers must be very remote or very small, as  
 their streams were clear, even in April and May, after the rivers had begun to rise. Summing  
 up, it appears that at Lik-tse My., near Tra-dom (*Ta-sam*), just below the junction of the first great  
 tributary, the Brahmaputra was in September estimated to be at least one-half wider than the  
 Ganges at Hardwar in December.

Between Lik-tse My. and Chu-shul, a distance of about 450 miles, the great river is  
 known to receive

1st—A large tributary, called Sho-te R.,

2nd—A very large tributary, called the Charta R. estimated to be 250 paces  
 wide in October,

- 3rd—The Chaka R. tributary of the Charta R., estimated to be 150 paces wide in October,  
 4th—A very large tributary, called the Ra-ga R., estimated to be 200 paces wide in October,  
 5th—A large tributary, called Pen-nang-chu, estimated to be 150 paces wide in December,  
 6th—A very large tributary, the Kyi Chu, or Lhāsa river, estimated to be 250 paces wide in January.

The main river below Tra-dom (*Ta-sam*) is never fordable, even at the broadest part, and each one of the six great tributaries, by which it is subsequently joined, are represented as being rapid, deep streams, that are not fordable during summer, and only one or two can be crossed with difficulty on large horses and yaks when the rivers are low, at other times they are invariably crossed by means of boats.

Supposing the Pandit's estimates given above to be correct, a very fair idea may be formed as to the size of the combined stream near Chu-shul.

The Pandit is an accurate observer, accustomed to pacing, and to estimating distances in paces, and as far as can be tested by his ideas of the Ganges, and other known streams, he is not given to exaggeration.

His estimate of one of the tributaries, viz., the Pen-nang-chu, can be tested by direct European evidence, as Captain Turner's route along that stream coincided with the Pandit's route for about fifty miles.

Turner says that the Pen-nang-chu stream near its source formed no inconsiderable river in September. Lower down he crossed the river by a rude bridge. At Page 214. Tehukha he forded the river close to Gyāntse, above the point where it is joined by a very large tributary from the east, which the Pandit considered the main stream. He again crossed it near that town, and sixteen miles lower down, he says, the river ran in a smooth stream, but was no longer fordable; he noticed a boat placed on its end in one of the villages.

At Painom, 10 miles lower, Turner found, "over the broadest part of the river, a long bridge upon nine piers of very rude structure, slight beams of timber were laid from pier to pier."

The Pandit seems to have crossed at this very spot on the 23rd December; he notices that the river was bridged.

In all Tibetan bridges that I have seen, the piers are very broad as compared with the spans, and it would be a moderate estimate to take nine piers of 12 feet each, and ten spans at 25 feet, in all 358 feet, as the breadth of the river at this point. The Pandit puts it down at 150 paces, which gives 375 feet. The Pandit says that the river had a rapid current. The above shows that as far as the size of this particular tributary is concerned, the Pandit is remarkably accurate, and at any rate has exaggerated very little.

As far as the Brahmaputra itself is concerned, Turner saw it from the rock above Tra-shi-lhun-po, some two or three miles from the river.

Near Shigātse, he states that "the Brahmaputra flows in a wide extended bed, and as though the soil gave it an unwilling passage, it has forced itself through many channels, and formed a multitude of islands in its way. But though its bed appears so wide extended from hence, I was told that its principal channel is narrow, deep, and never fordable."

An account which would agree very fairly with the Pandit's description of what he saw from the same point, and also with the Pandit's more detailed description of the river at Chak-sam, 100 miles further down, where the deepest part was spanned by a very fragile chain-bridge. I hoped that this bridge, which I had heard of, would have given conclusive evidence as to the size of the Brahmaputra near Lhāsa. The Pandit was requested to note its breadth in paces; unfortunately, he found that the bridge only spanned the deepest portion, and that, in addition, a great deal of water had to be crossed beyond the bridge. The bridge itself, moreover, was in such a rickety condition that the Pandit was afraid to cross it, the people of the country themselves invariably preferring boats. Consequently, only a rough guess could be made as to the breadth of the river.

The Pandit could only say that the river was very much larger than the Ganges or the Indus, or any other river he had seen. The depth of the stream impressed him very much. He inferred that it was very deep, because, though the water was very clear, and the surface smooth, the bottom was nowhere visible.

The breadth of the stream had not impressed the Pandit so much as the depth, he did not think the breadth at Chak-sam much more than half greater than the Ganges, and he made the same estimate of it at Janglâche, 200 miles higher up, where the volume of the river must have been much less.

After receiving so many large tributaries, it may be a matter of wonder that the river was not broader, but that it should not be so is quite in accordance with what is known of the upper course of the River Indus, which rises not far from the Manasarowar Lake, and flows through the same style of country as the Brahmaputra. The Indus receives the Zâskâr, a river nearly as large as itself, at Suimmo below Leh, and yet the increase in the breadth of the main stream is hardly perceptible to an ordinary observer. The same thing happens at its junction with the Dras river, and, again, it is still more remarkable at the point where the Shyok river joins the Indus, both great streams with but little difference in volume, yet the combined stream appeared to me almost narrower than either of them separately. The increased volume of water having simply made the stream deeper.

The Indus at Attock has run a course of about 700 miles, during which it has received the following six tributaries, *viz.*, the Zâskâr, Dras, Suru, Shyok, Gilgit, and Kabul rivers, and, judging from my knowledge of these rivers, I should say they were not equal to the six tributaries of the Brahmaputra above Lhâsa, as described by the Pandit; but supposing that they are equal, and that the size of rivers are somewhat in proportion to their length of course, *i.e.*, that they would drain the same area, I conclude that the Brahmaputra below the junction of the Lhâsa river is at least equal to the Indus at Attock. The latter probably drains a country which receives very much less moisture than the Lhâsa territory, but during the dry season it discharges about 24,000\* cubic feet per second.

As compared with the Indus, the Pandit's account shows that the Brahmaputra is a very much larger river. The Indus has a wooden bridge over it near Leh, 250 miles from its source, consisting of one span of about 70 feet, and a smaller of 20 or 30 feet, and it is again spanned at Kulsî, 50 miles lower, by a wooden bridge of one span of 80 feet, though the river intermediately receives the Zâskâr, which is nearly as large as the main stream under Leh. Lower, between Kulsî and Skardo, there is another wooden, and several rope or twig suspension-bridges; but boats are not used for ferries anywhere above Skardo, 400 miles from the source, and no portion of the river whilst in the mountains is navigable.

There is not a single wooden bridge over the Brahmaputra, and no twig, rope, or cane bridges. Iron suspension-bridges have been made at Janglâche, and in two or three other places, but the river appears to have been too large for the Tibetan workmanship, even in that material. According to the Pandit's account, they are all dangerous to use, the people of the country preferring boats.

The above, added to the facts that the river was not fordable at 140 miles from its source, or at any point lower down, even at the broadest parts, that ferry boats were used on the six great tributaries, as well as on the main stream, and that the main stream itself was navigable continuously for over eighty miles in one place, and again for ten miles in another, are in themselves sufficient to prove that the river at the lowest point was a gigantic stream. The Tibetans all spoke of the Brahmaputra as a very great river. They call all very large rivers *Tsangpo* and as that term is applied to four of the tributaries enumerated above, it is to be supposed that the conjoint stream is, in their estimation, a very large one indeed.

The navigation at 13,500 feet above the sea, rude though it may be, is an extraordinary fact; navigation of any kind at such an altitude being quite unknown in any part of either the old world or of the new. If the Pandit had any doubt as to the great volume of the river, it was completely removed by a squall which suddenly swept across the broad expanse of water; the wind raising such large waves that the small fleet of boats carrying the Pandit and his companions only escaped swamping by taking to the nearest shore.

Any comparative estimate by eye of such a great river is of course very deceptive, but, as has already been shown in the case of the Pen-nang-chu, a tolerable estimate may be made in that way of a moderate-sized river.

Assuming that the Pandit's other estimates of the main stream and its tributaries were as accurate as that of the Pen-nang-chu, it would follow that in the dry season (December and January) the resulting stream was composed of the stream near Tra-dom (*Ta-sam*), which was at least one and a-half times as large as the Ganges in September (or say only the same size in December), and of six other streams, each of which on the average was probably larger than the Ganges, or, say in all, of a discharge of water equal to seven times that of the Ganges at Hardwar in December.

\* 32,000 cubic feet according to Dr. Lord's measurement.

18,000

„

Colonel Cunningham's estimate.

The Ganges at Hardwar was selected for comparison, as it was well-known to the Pandit, and had lately been re-crossed by him. Its discharge may be taken at about 5,000\* cubic feet per second in December. Consequently, a moderate estimate of the great river's discharge just below the junction of the Lhāsa river would be  $(7 \times 5,000) = 35,000$  cubic feet per second even in the dry season of December and January, without allowing anything for minor tributaries, or for any large ones that were not seen by the Pandit.

The point for which this estimate is made is near Chu-shul, in latitude  $29^{\circ} 22'$ , longitude  $90^{\circ} 40'$ , between it and the highest point of the Brahmaputra, visited by Wilcox, viz., that in latitude  $28^{\circ} 10'$ , longitude  $95^{\circ} 10'$ , we have no direct evidence† as to the river and the tributaries it may receive. The length of course between these two points would probably be about 350 miles. In such a distance it must be allowed that the great river would receive a large increase of water. Consequently, it appears to be very probable that the river, which at the upper end of the 350 miles, had an estimate discharge of 35,000 cubic feet in December, would at the lower end have fully 50,000 cubic feet, the amount ascribed to it by Wilcox in March, when the river had begun to swell. Wilcox found the river at the point referred to 100 yards in width, with every sign of great depth.

No branch of the Brahmaputra west of that referred to by Wilcox, viz., the Dihāng, is large enough to account for the discharge of water noted below Lhāsa. The largest, viz., the Subansiri, in the dry season having a discharge of only 15,000 cubic feet, and as Wilcox has very clearly put it, if the great river that flows to the south of Lhāsa is not the same as the Dihāng, it is impossible to see how a sufficient area can be left to provide the water of the latter.

I consequently conclude that the great river south of Lhāsa forms the upper part of the Brahmaputra, and is identical with, and forms the Dihāng, or main branch of the said river.

The great river flows from Manasarowar, in a south-easterly direction for about 170 miles, and thence adheres very closely to a due east course for at least 500 miles more, being at the end of that distance in exactly the same latitude as at the beginning. The river is nowhere fordable from its source to near Lhāsa, and at 600 miles from its source it would appear to discharge about 35,000 cubic feet per second in December and January, as far as can be determined from description and comparison with other rivers. Positive proof as to whether this river is, or is not, the upper course of the Brahmaputra, can of course only be afforded by tracing the river from Lhāsa downwards.

Every endeavour will be made to supply this missing link, meantime this last exploration tends to show that Turner and Wilcox were right in concluding that the great river which flows through the Lhāsa territory is the upper course of the main stream of the Brahmaputra, the largest river in India.

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\* More correctly 5,500 cubic feet.

† According to the information collected by the Pandit, near the junction of the Lhāsa tributary the river appears to have an easterly course for about 200 miles from Chu-shul, or say to about longitude  $94^{\circ}$ , and then flows in a more southerly direction.



*Narrative Report of the Trans-Himalayan Explorations made during 1867, drawn up by Captain T. G. Montgomerie, R.E., of the G. T. Survey, from the Original Journals &c., of the Trans-Himalayan Exploring Parties.*

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The Trans-Himalayan explorations made during 1865-66 from the Manasarowar lake to Lhāsa 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 1st Pandit heard of these places whilst in Lhāsa and the 2nd Pandit when at the Gar-tok fair heard various particulars from which he gathered that the route to those gold fields east of Gar-tok was likely to be feasible.

It will be remembered that the 2nd Pandit made his way to Gar-tok 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 Gar-tok and the Ladākḥ 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 Ladākḥ, as to the Indus lead 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 Ladākḥ.

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 Ladākḥ 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 same 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 2nd expedition of the Pandits should be in that direction, the first object being to settle various doubtful points as to the position of the Upper basin of the Sulej,—the 2nd object, the question of the eastern branch of the Indus,—the 3rd, the connection of Gar-tok with the regular survey in Ladākḥ, and the 4th, to explore up to the gold and salt mines east of Gar-tok and as far beyond as the Pandits 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 Lhāsa.

Preparations for the expedition were made during the spring of 1867, a third Pandit was entertained and trained to supplement the place of the 2nd Pandit who had proved to be somewhat wanting in nerve. Starting from Mussooree on the 2nd of May the party under the first Pandit reached Badrināth 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 Pandit 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 Dzongpon) of Chab-rang Fort makes inquiry every year as to the political and sanitary condition of Hindustān. 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 Hindustān 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 Pandit's movements not a little. The especial enquiries are made 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 Pandit made complete arrangements for their journey and he gave the 3rd Pandit some further practice in route surveying. Whilst there he was also fortunate enough to secure the services of three men, *viz.*, of a Bashahri trader, a resident of Badrināth and a Ladākhi trader from Zāskūr. All these men knew the routes to the gold and salt



mines east of Gar-tok. They proved moreover exceedingly useful in collecting provisions, servants and asses, the latter for the carriage of the small parcels of merchandise 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 Chab-rang Fort arrived and having made all their inquiries declared the Mana pass open to traders from Garhwal; the party accordingly was able to commence its march on the 26th July. It consisted of 11 men, 12 asses and one pony, the men being all armed with weapons they had borrowed at Badrināth, as they were told that arms would be required to keep off robbers. On the 28th they crossed the Himalaya by the Mana pass (18,570 feet) and on the 29th July reached Lum-ur-ti 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 2nd Pandit however was sent on ahead to intercede with the Chab-rang Fort Jongpon and he succeeded in getting authority for the party to advance alone. Chiar-kang is the place where traders are generally taxed but in this instance the examination was made at Barku. The Abtuk of Chab-rang Fort 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 Chab-rang on their left (north).

At Totling they put up in the monastery, the Monks (Gelongs or Dabas) allowing all travellers to do so. The monastery with its numerous dykes of stones is about one mile in circumference; it has 50 to 60 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 Gar-tok, 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 Gyalbo Kesar or Sikandar 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 Pandit and his party all assumed the costume worn by Bashahri traders.

On the 9th August they crossed the watershed between the Sutlej and the Indus by the Fugeo pass 19,220 feet above the sea and reached Giugti camp close to Gar-tok 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 Gar-tok and after crossing the Giugti pass 19,500 feet above the sea they found themselves on the 14th August in a vast desolate plateau, the lowest points of which they ascertained to be 15,280 feet above the sea.

This plateau is called Chajothol 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 ahead 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 2nd 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 Paba pass 17,650 feet above the sea and descended to the Giachuraf camp on the banks of the Singh-gi river 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 Pandit'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 Tnam 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 Bashahris 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 Bashahris and had been lately in Bashahr, they would never have dared to enter Ngari Khorsum that year, as an order had been promulgated at the time of opening

the passes, forbidding Bashahris 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 suspicions being so strongly expressed, alarmed the Pandits, more especially as they never thought that the disguise of a Bashahri, which had served them so well on the route to Lhāsa, would prove a hindrance on this occasion.

The Pandit thought these suspicions were due to the jealousy of an acquaintance of his who lived near Badrināth. 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 2nd Pandit's nerves were again considerably shaken by the dreary mountains they had crossed and by the check they had received, the 1st Pandit decided to leave him at Giachuraf whilst he and the 3rd Pandit pushed on ahead 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 further entreaties accompanied by presents, that they were allowed to advance. The Pandit left the Giachuraf camp on the 22nd August with the 3rd Pandit; 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 Pandit himself made a very long march, so as to get well clear of the Giachuraf people and by night was far away to the east resting near the bed of a small dry stream. On the 23rd August he hoped to have been able to cross the Chimorong 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 August, when he crossed the Chimorong pass 18,760 feet above the sea and after a very 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 Pandit descended the Chimorong pass, the Thok Jalung camp came in sight, he found it pitched in a large desolate plain of which the prevailing color 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 Pandit had armed himself with a letter from the Giachuraf 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 Pandit 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 Pandit and then advised him to do what he had to do in Thok Jalung quickly and to return to Giachuraf by the same road as he came. The Chief said that it was out of his power to allow the Pandit to stay long and that properly he ought to have sent him back at once as there was an order in force forbidding all Bashahris to enter the country that year.

Hearing that the Pandit had coral for sale he asked to see it. As soon it was displayed the Chief's wife who was present, took such a liking to it that she persuaded the Chief to offer gold in exchange, the Pandit 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 Pandit was allowed to retire.

The Chief was an inhabitant of Lhāsa called Yoodak Mingmār, about 45 years of age. He had been master of the Thok Jalung gold-field† for some time. The Pandit saw him several times afterwards and always found him very civil. His usual dress was a red robe of Lhāsa or Shigātse manufacture, his head was covered with a brown felt hat of Chinese fashion with a broad rim turned up all round. He told the Pandit 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 Pandit's observations make 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

\* Thok Jalung, latitude 32° 24' 26" N., longitude 81° 37' 38" E.

† From previous information it appears that gold was first discovered to be abundant at Thok Jalung about 8 or 9 years ago.

by means of steps. Outside, the Pandit noticed one of the gigantic black dogs of Lhāsa, 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 Pandit had seen many of these dogs in Lhāsa and he at once recognized it by its great size, deep jowls, and the white mark on its chest. The Lhāsa 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 couple of cups or bowls, one for drinking tea and the other for *Chang* or Whiskey. The Chief's tent seems 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 Lāmas. Whether the Chief was also a Lāma was not ascertained but his red dress and the ritualistic instruments point to that conclusion.

The Chief was constantly smoking a silver-mounted Nepālese *Hukka*. Tea was forthcoming at all hours. He had about ten personal servants who lived in small tents round about his own. The Chief was a very intelligent man and all things considered the Pandit thought him well informed. His shrewdness there was no mistaking as instanced in the matter of the coral. He noticed the Pandit's box, examined it carefully and then asked him how he came to have such a good box. The Pandit was fortunately ready with his answer and said he bought it at one of the *Sahab logs'* auctions to carry his coral in. The fume 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 Pandit and used to send for him every now and then in order to discuss over tea and tobacco the great country down below.

The Pandit 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 Pandit's visit was about a mile in length.

The digging is carried on with a long handed kind of spade and occasionally with an iron hoe, the iron for these implements is brought from Bashafr, Ladākh, &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 Pandit 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 Pandit heard during this last expedition and the previous one to Lhāsa, there is a whole string of gold-fields extending all the way from Lhāsa to Rudok along the route which must run close to the northern water-shed of the Brahmaputra, probably in the depression to the north of it.

The gold-fields are carefully watched by the Lhāsa 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  $\frac{1}{4}$  a *tolah* or  $\frac{2}{3}$  the of an ounce. The greater part of the diggers come from the Chang province around Shigātse. The gold commissioner makes an annual tour through the gold district, visiting each field and collecting the taxes.

\* Quaintly painted on cloth, many of that kind can be seen in Ladākh at the Hoinie and other monasteries.

† Sar is the Tibetan name for gold.

The Pandit 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.*, 18,330 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 600 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 Pandit 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 only apology for it being a square *Chorten* 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 Ladākḥ 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 Pandit 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 *tola* and 8 *vattis*), or rather less than Rs. 30 per ounce. There were two tents belonging to goldsmiths in the camp, they came from the Chang or Shigātse province.

Seeing no chance of extending his journey to the east of Thok Jalung the Pandit retraced his route to Giachunaf, there he found the 3rd Pandit who had made his way for a considerable distance up the river Indus to a place called Jiachan.

Though the 3rd Pandit 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 cocanot containing the supply of quicksilver. Fortunately the Pandit 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 Pandit 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 Pandit 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 that 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 Pandit's party having been recollected at Giachuraf he decided to trace the Indus down to its junction with the river upon which Gar-tok 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 5 or 600 horses or large ponies running almost wild, mostly of a white or a greyish color. On the 12th September they reached the junction of the Indus and Gar-tok rivers and crossing the latter encamped near the Lajunchumik spring.

From Lajunchumik the Pandit sent the 3rd Pandit to trace the river down into the Ladākḥ territory, whilst he traced it up to Gar-tok. On the 14th September he reached Gar-gunsa, the winter residence of the Gar-tok authorities. He found only 3 large and 8 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 Pandit reached Gar-tok\* 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 Laochi pass and marching by Shang and Dun-kar reached Totling on the 26th of September. Here they waited for the 3rd Pandit who joined them on the 29th of September, after having traced the Indus down to Demchok in Ladākḥ. 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 Pandits 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 Himalaya by a high pass and descending to Nilang on the upper course of the Ganges.

The Pandit himself returned from Totling to Badrināth by nearly the same route as he advanced by, only making one small variation.

Ultimately the 2nd and 3rd Pandits 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 accompanying map. 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 Pandits to lay down its probable course very closely.

The position of Gar-tok as determined by the two routes of the last expedition has been confirmed by a third route carried up from Badrināth. The mean of three gives a very good

\* Gar-tok is said to be a corruption of Gärtod, tod meaning upper, it is also called Gür Yär-Yärsa, Yärsa meaning summer abode, from Yärsa summer and sä abode. The winter quarters are called Gür-Gunsa from Gungä winter and sä abode.

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

longitude of Gar-tok\* as has been proved by the farther route-survey carried from Gar-tok to Demchok, which latter had been previously fixed by the regular survey operations in Ladākḥ. The longitude by the route-survey only differing from that of the regular survey by 2½ 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 Ladākḥ. Neither of these branches had been previously surveyed in any way, except a small portion of the Gar-tok branch above Gar-tok 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 Pandit's route has now proved that this eastern branch is the main stream known to the natives as Singh-gi or Singli-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 (Gartang R.).

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 Kangri 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 as much as 24,000 feet.

The line of perpetual snow on the southern slopes of the Ladākḥ 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 Pandit first saw it. The Aling Kangri 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 Pangong lake. The Pandit 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 pass, on the watershed between the Sulej and Indus.

Altogether the Pandit 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 Pargial, Kamet &c. which gave very accurate positions to those peaks, forming 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 Pandits were for more than three months at an elevation of over 13,000 feet.

They crossed the great range between the Sulej and the Indus three times, that between Gar-tok and Chajothol once, between Chajothol and Giachural once, the Chimorong 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 Gar-tok 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 Pandit'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 Manasarowar lake and judging

\* Gar-tok, longitude E. 80° 23' 33", latitude N. 31° 44' 4", and height 14,250 feet above sea.  
 † 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 Badrināth to Gar-tok, ...	... 0 50 36	2 495	By 1st Pandit.
„ Gar-tok to Thok Jalung, ...	... 0 40 23	2 513	„ 1st Pandit.
„ Gar-tok to Demchok, ...	... 0 57 17	2 634	„ 1st and 3rd Pandits.
„ Demchok to Totling, ...	... 1 13 24	2 495	„ 3rd Pandit.

‡ It was indicated from Native information by H. Strachey, on his Map of Ladākḥ and Ngari Khorsum.

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.
Hanle,	...	...	14,276 feet	14,500
Pangong,	...	...	13,936 „	14,300
Tankse,	...	...	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 Pandit'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 Pandit's heights agree with those of Badrīnāth 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 support large flocks and herd, the Pandit's coming across camps nearly every day.

The weather until they reached the Chimorong 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 Pandit was on the Upper Indus there was a dense bank of clouds in the direction of the Kailās peak and consequently neither he, nor the 3rd Pandit 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 Giachuraf and Jiachan said it rose at a place called Gangri-Goorgiap which may perhaps refer to the Gangri or Kailās peak; but the direction of the course of the Indus as seen from near Jiachan 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 district (*pattis*) of the Sinchtod and Sinchmet. "Tod" signifying upper and "Met" lower.

At the highest point visited the Indus was still a considerable stream. At Giachuraf the ford was always a difficult one and for 8 days after the fall of snow the Pandit experienced, the river was not fordable in any way. Whilst it was snowing on the Chimorong range, heavy rain fell at Giachuraf and the river consequently rose very much. The stream was generally very clear and full of fish† of all sizes, up to about 18 inches in length.

The 3rd Pandit 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 Giachuraf the Indus flows through a rather broad, flat valley and from Giachuraf to its junction with the Gartang river 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 6 to 4 feet; while the Gartang river was in places as much as 250 paces in width but with a depth of only 1 to 2 feet.

The Gartang river between Gar-tok 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 Pandit made diligent enquiry 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

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

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

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 Pandit however seemed to have very little faith in this part of the story. He heard that 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 accompanying Map. Ting-Che and Rawang are the intermediate districts; the first is a very cold place and has very little sweet water, though plenty of brackish water. Rawang 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 Tra-dom monastery on the great Gar-tok and Lhüsa 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 Pandits have succeeded in the difficult art of intersecting and fixing distant peaks. The way in which the Chief Pandit quartered his group 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 Pandit 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 Pandit proved useful in various ways. The 3rd Pandit in his route-survey from Lajunchumik 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 Pandits were not able to fix the heights of the peaks they intersected, more especially of Aling Kangri, 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.

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\* Jilung, about one month, north of Lhüsa.



## Route-Survey—Badrināth to Totling.

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
Badrināth	9 45	3,400	Latitude observations taken at Badrināth 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 Himalaya by Chirbittia or Mana Pass.
10	22 45	11,800	
11	67 0	11,700	
12	358 0	4,700	Observations for latitude taken at Lum-urti 2,760 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 (Chiar-kang).
15	26 0	12,400	
16	27 0	12,000	
17	37 0	5,500	Observations for latitude taken at station 17 (Daku).
18	76 45	10,000	
Totling 19	...	...	Observations for latitude taken at Totling.

## Route-Survey—Totling to Thok Jalung.

Totling	52 0	88,200	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 Giugti camp 50,340 paces from station 20.
21	47 0	12,700	
22	85 0	5,300	Observations for latitude taken at Donglong-sumdo, station 22.
23	62 0	4,500	
24	44 30	11,300	
25	88 15	4,100	Observations for latitude taken at Chajo Giugti 2,000 paces and with a bearing of 250° from station 25.
26	98 30	8,000	
27	68 0	9,300	
28	20 45	13,800	
29	48 0	56,000	Observations for latitude taken at Giomahi lake 15,300 paces from station 29 on route to station 30.
30	20 0	3,700	Observations for latitude taken at Kiangma Chumik 35,500 paces from Giomahi lake on route to station 30.
31	44 30	80,600	
32	70 0	19,900	Observations for latitude taken at Giachursaf 5,000 paces from station 31 on station 32.
33	94 0	6,000	Observations for latitude taken at Thok Jalung, 4,000 paces from station 33 on route to end of bazar.
End of Thok-Jalung Bazar			

Route-Survey—Giachuraf to Gar-tok by Lajunchunik and Gar-gunsa.

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
Giachuraf	316 30	22,700	
2	800 0	10,100	Latitude observations taken at Shildong camp, station 2.
3	280 0	4,100	
4	246 0	5,700	Latitude observations taken at Giunchung-phu, 2,000 paces from station 4 on route to station 5.
5	291 0	9,400	
6	323 0	4,400	
7	289 0	17,100	Latitude observations taken at Thankur village, 8,000 paces from station 7 on route to station 8.
8	272 0	9,800	
9	225 0	3,500	
10	276 0	6,300	Latitude observations taken at Pekia village, station 10.
11	308 0	2,300	
12	242 30	2,000	
13	290 0	3,300	
14	259 0	3,000	
15	266 30	16,500	Latitude observations taken at Barkung, 900 paces from station 15 on route to station 16.
16	258 0	11,100	
17	287 0	10,000	Latitude observations taken at Marku camp, station 17.
18	209 0	6,700	
19	255 0	7,800	
20	226 15	5,900	Latitude observations taken at Dakmaru, or station 20.
21	260 30	29,000	Latitude observations taken at Halajung, 19,900 paces from station 21 on route to station 22.
22	227 45	9,500	
23	143 0	19,500	Latitude observations taken at Lajunchunik, 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 Gar-gunsa, or station 25.
26	129 0	26,700	Latitude observations taken at Longong camp, 30,400 paces from Gar-gunsa on route to station 26.
Gar-tok			Latitude observations taken at Gar-tok.

Route-Survey—Lajunchunik to Demchok.

Lajunchunik	319 15	16,700	
2	314 30	6,300	Latitude observations taken at Tashigong, 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 Tolling.

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
Demchok	812 30	1,000	
7	224 30	3,900	
8	194 30	6,900	Latitude observations taken at Demchok-Phu, 5,890 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, 4,000 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 Dilehachini-sumdo, 3,500 paces from station 16 on route to station 17.
17	150 30	20,500	
18	153 0	7,500	Latitude observations taken at bank of Lamoche stream, 6,200 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 Chokche village, 600 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 Rabgyaling, 5,600 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 Shangtse village, 7,600 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 Ti-bu, 4,900 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 Dun-kar village, 600 paces from station 11 on route to station 12.
12	181 0	24,300	
Totling			Latitude observations taken at Totling.

## Route-Survey—Barku to Shipki.

Barku	229 0	10,400
2	224 30	3,500

Route-Survey—Barku to Shipki.—(Continued).

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
3	244 0	9,500	
4	287 0	2,000	
5	305 0	1,700	
6	280 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.
10	294 30	3,000	
11	289 0	7,300	
12	292 0	2,500	
13	325 0	4,600	
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 Ri village, or station 22.
23	355 0	19,300	Latitude observations taken at Langjan Samba bridge over Sutlej, 8,500 paces from station 23 on route to station 24.
24	324 30	4,600	
25	278 30	8,800	Latitude observations taken at Dongkhang, 3,100 paces from station 25 on route to station 26.
26	282 0	11,500	Latitude observations taken at Miang village, 2,400 paces from station 26 on route to station 27.
27	216 0	4,000	
28	302 0	2,900	Latitude observations taken at Tiak village, 500 paces from station 28 on route to station 29.
29	315 0	3,300	
30	264 0	13,900	Latitude observations taken at Kuak village, 8,550 paces from station 30 on route to Shipki.
Shipki			Latitude observations taken at Shipki.

Route-Survey—Shipki to Nilang and Mukua.

Shipki	84 0	13,900	
2	135 0	3,800	
3	122 0	2,000	
4	303 0	500	
5	167 30	6,600	Latitude observations taken at Tiak village, or station 5.
6	172 30	4,500	Latitude observations taken at Kuang, 2,800 paces from station 6 on route to station 7.

## Route-Survey—Shipki to Nilang and Mukua.—(Continued).

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
7	222 30	3,600	
8	206 0	1,600	
9	170 30	12,300	Latitude observations taken at Sang, 4,000 paces from station 9 on route to station 10.
10	160 0	2,000	
11	90 0	8,600	Latitude observations taken at Sumna, 5,000 paces from station 11 on route to station 12.
12	138 0	8,200	
13	106 0	8,200	
14	36 0	2,200	
15	63 30	1,300	
16	101 30	6,200	Latitude observations taken at Biar, 4,700 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	166 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 Changjum-sundo, 1,280 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, 1,600 paces from station 40 on route to station 41.
41	196 30	3,800	
42	168 0	1,400	
43	211 0	2,800	
44	251 30	2,700	

Route-Survey—Shipki to Nilang and Mukua.—(Continued).

Name and number of station.	Bearings of forward station.	Distances in paces to forward station.	REMARKS.
45	263 30	4,300	
46	217 0	1,100	
47	255 30	5,600	Latitude observations taken at Nilang village, or station 47.
48	182 0	2,500	
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	
Mukua			Latitude observations taken at Mukua.

Route-Survey—Gar-tok to Dun-kar.

Gar-tok	291 0	9,900	Latitude observations taken at Gar-tok.
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	
Dun-kar			Latitude observations taken at Dun-kar.

Route-Survey—Dun-kar to Totling.

Dun-kar	185 1	5,200	
19	179 0	23,700	
Totling			Latitude observations taken at Totling.

*Route-Survey—Totling to Chiar-kang.*

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

*Route-Survey—Giachuraf to Jiachan up the river Indus.*

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

*Route-Survey—Milam to Gar-Lok.*

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	62 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 Gar-tok.—(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	
Gar-tok			Latitude observations taken at Gar-tok.

Route-Survey—Gar-tok to Milam.

Gar-tok	170 20	10,300	Latitude observations taken at Gar-tok.
27	141 20	8,800	
28	156 30	4,200	Namochia 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	Nabgo village, same as station 41.
41	197 30	7,300	
42	104 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 Gar-tok.
4	202 30	2,800	
3	186 0	9,000	
2	213 0	6,400	
Milam			



Observations for Latitude taken in Great Tibet with Elliott's 6-inch Radius Sextants, Nos. 44 and 45.

No. of observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.	Double Altitude.	Index Error.	Deducted Latitudes.	Mean Latitudes.	REMARKS.
1	1887. May 29	4 m 6 30 P.M.	Badrinath Temple (near).	Polaris.	Lower	59 40 0	+ 3'	30 44 29.4	...	Sextant No. 45.
3	" 31	6 30 "	Do. foot of steps.	"	"	59 41 10	+ 3'	30 45 4.7	...	Do.—See observation No. 84.
4	June 7	11 30 "	Mana village, Ghonoli house.	Antares.	Upper	66 12 10	+ 3' 10"	30 45 20.6	...	Do.
5	" 27	10 0 "	Do.	"	"	66 12 40	+ 2' 50"	30 45 16.0	30 45 17.8	
6	July 27	3 30	Räbn-Thok, camp Lum-urti.	Polaris.	"	65 10 50	+ 2' 30"	81 11 29.6	...	Do. took observations for time 6A. 49m. 42s.
7	" 27	4 30	Do. Lum-urti.	"	"	65 18 20	- 7' 10"	31 10 24.6	31 11 45.5	Sextant No. 44.
8	" 30	3 15	Do. do.	(Fomalhaut)	"	57 4 0	- 7' 10"	31 13 22.3	...	Do.
11	Aug. 1	4 15	Chiac-kang or Shibuk.	Polaris.	"	65 23 10	- 7' 10"	31 12 52.0	81 12 52.0	Do.
13	" 3	4 15	East of Chub-rang village at Thak-houa.	"	"	65 43 0	+ 2' 30"	31 27 35.6	31 27 35.6	Sextant No. 45.
15	" 5	4 30	Todling village.	"	"	65 43 30	+ 2' 30"	31 27 48.9	31 27 48.9	
16	" 7	11 0 P.M.	Nwiding-sumdo camp.	Altair.	"	134 5 30	- 7' 10"	31 32 36.7	31 32 36.7	Sextant No. 44.
17	" 10	2 30 A.M.	Kiangsh.	(Fomalhaut)	"	56 5 0	- 7' 0"	31 42 52.7	31 42 52.7	Do. near a Ravine of the same name.
18	" 11	5 40 "	Dukti camp.	Polaris.	"	66 25 10	- 7' 0"	31 44 0.3	...	Sextant No. 44.
19	" 11	5 40 "	Do.	"	"	66 17 0	+ 3' 0"	31 44 55.3	31 44 47.0	Sextant No. 45.
20	" 11	5 40 "	Do.	"	"	66 16 0	+ 5' 0"	31 45 25.3	...	Pocket Sextant No. 12.
21	" 12	5 40 "	Fort of Giugü.	"	"	66 23 30	+ 3' 0"	31 48 18.7	...	Junction of two streams Donglong-sumdo.
22	" 12	5 40 "	Do.	"	"	66 30 30	- 7' 0"	31 46 48.7	31 47 33.7	Sextant No. 44.
23	" 13	5 40 "	Giugü camp.	"	"	66 39 20	- 7' 0"	31 51 13.1	...	Chajothol District.
24	" 13	...	Do.	(Fomalhaut)	"	55 25 30	+ 3' 0"	31 57 21.9	13 54 17.5	Watch stopped.

26	Aug. 16	...	Nabipa.	Polaris.	Upper	67 0 40	- 7' 0"	32 1 54.1	32 1 54.1	Watch stopped. Bank of a tank.
27	"	19 4 0 A.M.	Kiangma Chumik.	"	"	67 9 30	+ 3' 0"	32 11 20.0	32 11 20.0	District Sinchmet, bank of Singhi R.
28	"	20 4 0 "	Giachuraf camp.	"	"	67 16 0	"	32 14 34.5	32 14 34.5	Also called Thok-Somba. Sextant No. 45.
29	"	26 2 42 "	Thok Jalung, (near gold mine).	"	"	67 37 0	"	32 25 5.6	32 25 5.6	
30	"	27 9 30 P.M.	Do.	(Altair).	"	132 13 0	"	32 23 46.5	32 23 46.5	
33	"	30 9 5 "	Do.	"	"	132 13 10	"	32 23 41.8	32 24 17.5	
34	"	30 12 15 A.M.	Do.	(Fomalhaut)	"	54 33 30	"	32 23 36.9	32 23 36.9	
35	"	30 2 30 "	Do.	Polaris.	"	67 37 20	"	32 25 16.8	32 25 16.8	Sextant No. 45.
36	Sept. 2	12 5 noon	Sinchmet Latti.	Sun.	...	132 14 30	"	32 12 38.4	32 12 38.4	One and half miles south of Giachuraf camp.
37	"	2 11 40 P.M.	Do.	Jupiter.	"	91 15 10	"	32 11 57.8	32 11 57.8	Barometer 16.4 in
38	"	2 "	Do.	Do.	"	91 16 0	+ 5' 0"	32 10 32.8	32 10 25.3	Pocket Sextant No. 12.
40	"	3 12 18 A.M.	Do.	(Fomalhaut)	"	55 2 0	+ 3' 0"	32 9 16.7	32 9 16.7	Wind was high, not confident in the observation.
41	"	3 1 0 "	Do.	Polaris.	...	67 2 0	"	32 7 40.8	32 7 40.8	Do.
43	"	4 8 40 P.M.	Shidong camp.	(Altair).	"	132 27 10	"	32 16 42.9	32 16 42.9	Near Mane.
44	"	4 2 0 A.M.	Do.	Polaris	...	67 31 10	"	32 22 11.0	32 19 27.0	
45	"	5 2 0 "	Giachung-piu camp.	"	...	67 40 40	"	32 26 57.5	32 26 57.5	
46	"	6 8 40 P.M.	Thunhur (one house only).	(Altair).	"	132 0 40	"	32 29 57.6	32 30 47.6	
47	"	6 2 0 A.M.	Do.	Polaris.	"	67 50 0	"	32 31 37.6	32 31 37.6	
49	"	7 8 30 P.M.	Pekia village.	(Altair).	"	131 58 0	"	32 31 18.2	32 31 18.2	
50	"	7 11 30 "	Do.	(Fomalhaut)	"	54 18 50	"	32 30 59.0	32 31 31.0	
51	"	7 1 30 A.M.	Do.	Polaris.	"	67 51 20	"	32 32 17.5	32 32 17.5	
52	"	8 8 20 P.M.	Barkung village (in ruins).	(Altair).	"	131 55 10	"	32 32 43.3	32 32 43.3	
53	"	8 1 36 A.M.	Do.	Polaris	"	67 52 50	"	32 33 2.8	32 33 2.8	

Observations for Latitude taken in Great Tibet, &c.—(Continued).

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.	Double Altitude.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.
54	Sept. 9	8 15 P.M.	Marku camp.	(Altair).	Upper	131 58 30	+ 3' 0"	32 31 3.6	32 31 8.6	Near Singh-gi R.
55	" 10	8 18 "	Dak maru.	(Altair).	"	132 0 30	+ 2' 30"	32 30 18.8	32 30 3.0	(Near Ganuk village) on bank of Singh-gi R.
56	" 10	11 49 "	Do.	Polaris.	"	67 46 50	"	32 29 47.2		
57	" 11	8 15 "	Rehjung.	(Altair).	"	132 5 0	"	32 28 4.4	32 27 52.6	On bank of Singh-gi R.
58	" 11	1 30 A.M.	Do.	Polaris.	"	67 42 40	"	32 27 40.7		
59	" 12	8 15 P.M.	Lajunchumick camp.	(Altair).	"	132 11 40	"	32 24 44.5	32 24 35.1	
60	" 12	1 25 A.M.	Do.	Polaris.	"	67 38 10	"	32 24 25.6		
61	" 13	8 0 P.M.	Name unknown.	(Altair).	"	132 30 50	- 7' 0"	32 17 54.6	32 18 22.8	
62	" 13	1 30 A.M.	Do.	Polaris.	"	67 30 30	"	32 18 50.9		
63	" 14	7 55 P.M.	Gar-gunse vilage.	(Altair).	"	132 50 0	"	32 10 19.0	32 8 45.6	
64	" 14	1 25 A.M.	Do.	Polaris.	"	67 11 10	"	32 7 12.1		
65	" 15	7 50 P.M.	Longong camp.	(Altair).	"	133 10 30	"	32 0 3.6	31 57 45.9	
66	" 15	1 40 A.M.	Do.	Polaris.	"	66 47 40	"	31 55 28.1		
67	" 16	1 30 "	Garyasa, large vilage.	"	"	66 22 80	"	31 42 50.6	31 43 53.9	
68	" 16	7 30 P.M.	Do.	(Altair).	"	133 40 30	"	31 45 4.2		
69	" 18	7 30 "	Do.	"	"	133 40 40	"	31 44 59.3	31 42 41.6	
70	" 19	1 0 A.M.	Do.	Polaris.	"	66 22 10	"	31 42 41.6		
71	" 24	7 15 P.M.	Dun-ka-r vilage.	(Altair).	"	133 47 30	"	31 41 34.1	31 41 7.7	
73	" 24	5 0 A.M.	Do.	Orionis. (Betge)	...	100 3 0	"	31 41 7.7		

74	Sept. 25	noon	Dun-ka village.	Sun.	...	115 54 30	- 7' 0"	31 41 38.9			
75	" 28	7 35 P.M.	Totling monastery.	(Altair).	...	134 9 40	"	31 30 80.3			
77	" 28	10 45 "	Do.	(Fomalhaut)	...	56 31 0	"	31 29 56.2	31 30 2.1		
70	" 29	5 51 A.M.	Do.	Orionis. (Rigel)	...	100 26 0	"	31 29 89.8			
80	" 30	noon	Totling monastery.	Sun.	...	112 23 10	"	31 30 22.5	31 30 8.6		
81	Oct. 2	5 40 A.M.	Do.	Orionis. (Rigel)	...	100 25 30	"	31 29 54.6			
82	" 4	7 0 P.M.	Mang-nang village.	(Altair).	Upper	134 27 0	"	31 21 50.1	31 21 47.2		
83	" "	5 30 A.M.	Do.	Orionis. (Rigel)	"	100 41 50	"	31 21 44.2			
84	Novr. 14		Radinath Temple.	Do.	"	101 56 50	"	30 44 9.9			Watch not going. See observations 1 and 3, preceding.
1	Sept. 13		Tashigong village.	(Altair).	"	132 2 0	+ 3' 0"	32 29 19.4	32 30 13.1		Observations taken near monastery.
2	" "		Do.	Polaris.	"	67 49 0	"	32 31 6.7			
3	" 14		Domakolok camp.	(Altair).	"	131 46 0	"	32 37 18.6	32 38 9.7		Do.
4	" "		Do.	Polaris.	"	68 4 40	"	32 39 0.8			
5	" 15		Demchok village.	(Altair).	"	131 40 0	"	32 40 18.6	32 41 22.6		Thermometer 65°, Barometer 18.2 inches.
6	" "		Do.	(Fomalhaut)	"	53 58 0	"	32 41 22.9			
7	" "		Do.	Polaris.	"	68 11 30	"	32 42 26.2	32 38 30.7		Deduced thermometer 65°, Barometer 17.5 inches.
8	" 16		Demchok camp.	(Altair).	"	131 45 20	"	32 37 38.1			
9	" "		Do.	Polaris.	"	68 5 20	"	32 39 23.3	32 29 8.7		Thermometer 61°, Barometer 16.8 inches.
10	" 17		Debocho.	(Fomalhaut)	"	54 22 30	"	32 39 2.3			
11	" "		Do.	Polaris.	"	67 45 0	"	32 29 15.1	32 20 14.0		Do.
12	" 18		Madokding.	(Altair).	"	132 22 0	"	32 19 17.5			
13	" "		Do.	Polaris.	"	67 28 50	"	32 21 10.5	32 12 8.1		Junction of two streams (Sumdo); thermometer 58°, Barometer 17.2 inches.
14	" 19		Ditchechini-sumdo.	(Altair).	"	132 36 30	"	32 12 8.1			

## Observations for Latitude taken in Great Tibet, &amp;c.—(Continued).

No. of Observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit.	Double Altitude.	Index Error.	Deducted Latitudes.	Mean Latitudes.	REMARKS.
15	Sept. 19	A m	Dichechini-sumdo.	Polaris.	Upper	67 14 40	+ 3' 0"	32 14 4.3	32 13 3.7	Junction of two streams (Sumdo), thermometer 52°, barometer 17.2 inches.
16	" 20	"	Right bank of Lamocho stream.	(Altair).	"	132 58 30	"	32 1 2.9	32 0 47.8	Thermometer 53°, Barometer 17.4 inches.
17	" "	"	Do.	(Fomalhaut)	"	55 19 30	"	32 0 32.6		
18	" 21	"	Near Jus-sumdo.	(Altair).	"	133 1 10	"	31 59 43.0	31 59 43.0	Do.
19	" 22	"	Rebgyuing (near monastery).	"	"	133 10 20	"	31 55 8.0	31 54 6.4	Thermometer 58°, Barometer 17.5 inches.
20	" "	"	Do.	(Fomalhaut)	"	55 30 30	"	31 55 2.4		
21	" "	"	Do.	Polaris.	"	66 30 50	"	31 52 8.8	31 52 68.2	Thermometer 54°, Barometer 18.0 inches.
22	" 23	"	Chokobe village.	(Altair).	"	133 14 40	"	31 52 58.2		
23	" "	"	Do.	(Fomalhaut)	"	55 34 40	"	31 52 58.1	31 49 16.0	Thermometer 54°, Barometer 18.2 inches.
24	" 24	"	Shangtee village (near.)	(Altair).	"	133 21 40	"	31 49 28.3		
25	" "	"	Do.	(Fomalhaut)	"	55 42 30	"	31 49 3.6	31 41 56.6	600 paces S.W. of village.
26	" 25	"	Ti-bu.	(Altair).	"	133 36 0	"	31 42 18.4		
27	" "	"	Do.	(Fomalhaut)	"	55 58 0	"	31 41 18.7	31 39 9.1	
28	" "	"	Do.	Polaris.	"	66 11 0	"	31 42 12.8		
29	" 26	"	Dun-kuar village.	(Altair).	"	133 42 20	"	31 40 16.8	31 39 37.0	
30	" "	"	Do.	(Fomalhaut)	"	56 0 10	"	31 39 25.2		
31	" "	"	Do.	Polaris.	"	66 5 30	"	31 35 50.4	31 25 52.0	
1	" 30	7 25 P.M.	Barku village.	(Altair).	"	134 10 0	+ 2' 0"	31 25 55.9		
2	" "	10 30 "	Do.	(Fomalhaut)	"	56 30 0	"	31 25 55.9		

3	"	"	5 0 A.M.	Do.	Orionis. (Rigel)	Upper	100 24 40	"	31 25 49.7	
4	Octr. 2	"	7 30 P.M.	Puling Gongma.	(Alair)	"	134 20 60	"	31 20 24.7	} 31 20 20.2 Camp.
5	"	"	10 16 "	Do.	(Fomalhaut)	"	56 41 0	"	31 20 22.7	
6	"	"	4 30 A.M.	Do.	Orionis. (Rigel)	"	100 35 50	"	31 20 13.3	
7	"	4	7 30 P.M.	Ridighang village.	(Alair)	"	134 0 0	"	31 30 50.3	
8	"	"	10 10 "	Do.	(Fomalhaut)	"	56 17 0	"	31 32 25.0	
10	"	"	4 40 A.M.	Do.	Orionis. (Rigel)	"	100 13 40	"	31 31 19.5	} 31 31 9.9
11	"	"	5 40 "	Do.	(Sirius)	"	83 55 0	"	31 30 4.7	
12	"	5	7 30 P.M.	Ri village.	(Alair)	"	133 48 10	"	31 36 45.1	
13	"	"	10 55 "	Do.	(Fomalhaut)	"	56 8 20	"	31 36 43.9	
14	"	"	4 55 A.M.	Do.	a Orionis.	"	131 30 0	"	31 37 0.7	} 31 36 53.5
15	"	"	5 42 "	Do.	(Sirius)	"	83 42 0	"	31 36 34.1	
17	"	6	12 15 "	Do.	Polaris.	"	66 2 0	"	31 37 11.0	
18	"	7	7 20 P.M.	Langjan Samba bridge.	(Alair)	"	133 39 30	"	31 41 7.0	} 31 41 8.0 Near bridge over Sutlej river.
19	"	"	5 33 A.M.	Do.	Sirius.	"	83 33 0	"	31 41 9.0	
20	Octr. 8	"	9 42 P.M.	Donghang.	(Fomalhaut)	"	55 51 0	+ 2' 0"	31 45 24.6	} 31 45 49.7
21	"	"	5 30 A.M.	Do.	(Sirius)	"	83 22 40	"	31 46 14.7	
22	"	9	12 O'clock.	Miang village.	Polaris	"	66 23 0	"	31 47 38.0	} 31 47 15.3 Midnight.
23	"	"	3 53 A.M.	Do.	Orionis (Rigel)	"	99 42 0	"	31 47 11.5	
24	"	"	5 21 "	Do.	(Sirius)	"	83 22 0	"	31 46 37.7	
25	"	10	9 20 P.M.	Tiak village.	(Fomalhaut)	"	55 48 10	"	31 46 53.8	} 31 46 59.5
26	"	"	5 15 A.M.	Do.	(Sirius)	"	83 21 20	"	31 47 0.2	

## Observations for Latitude taken in Great Tibet, &amp;c.—(Continued).

No. of observations.	Astronomical Date.	Watch Time.	STATION.	Object on Meridian.	Upper or Lower Transit	Double Altitude.	Index Error.	Deduced Latitudes.	Mean Latitudes.	REMARKS.
27	1867. Oct. 11	6 20 P.M.	Shipki village.	(Altair)	Upper	133 24 50	+ 2" 0"	31 48 27.5	"	
28	" "	9 23 "	Do.	(Fomalhaut)	"	55 44 50	"	31 48 37.4		
29	" "	3 40 A.M.	Do.	Orionis. (Rigel)	"	99 39 40	"	31 48 22.8	31 48 25.6	
30	" "	5 10 "	Do.	(Sirius)	"	88 18 50	"	31 48 14.5		
31	" 12	6 12 P.M.	Kanak village.	(Altair)	"	133 27 20	"	31 47 12.3	31 47 49.6	
32	" "	11 48 "	Do.	Polaris.	"	66 24 40	"	31 48 26.8		
33	" 14	9 6 "	Kunang village.	(Fomalhaut)	"	55 53 50	"	31 44 0.5		
34	" "	3 22 A.M.	Do.	Orionis. (Rigel)	"	99 49 50	"	31 43 44.7	31 43 52.6	
37	" 16	8 55 P.M.	Sumna village.	(Fomalhaut)	"	56 8 20	"	31 36 43.2	31 36 43.2	
38	" 17	8 50 P.M.	Beghar or Bikar village.	(Fomalhaut)	"	56 6 50	"	31 37 32.1	31 37 32.1	
39	" 18	8 45 "	Strang village.	"	56 13 40	"	"	31 34 5.3		
40	" "	10 55 "	Do.	Polaris.	"	65 56 0	"	31 34 12.6		
41	" "	3 4 A.M.	Do.	Orionis. (Rigel)	"	100 8 30	"	31 33 54.6	31 34 11.3	
42	" "	3 32 "	Do.	(Sirius)	"	83 46 50	"	31 34 10.3		
43	" 20	11 30 "	Do.	Sun.	"	96 58 40	"	31 34 29.8		
44	" 23	8 20 P.M.	Changjum-sumdo.	(Fomalhaut)	"	56 47 10	"	31 17 18.6	31 17 81.6	On meridian.
45	" 24	8 15 "	Nonam.	"	"	57 0 40	"	31 10 33.4	31 10 33.4	

46	"	25	8 10 "	Chorges or Nilang village.	"	"	57 7 30	"	31 7 10.3	
47	"	26	noon.	Do.	Sun.	"	93 41 40	"	31 6 16.5	
48	"	"	8 5 P.M.	Do.	(Fomalhaut)	"	57 9 50	"	31 6 0.2	
49	"	29	7 50 "	Do.	"	"	57 10 0	"	31 5 54.8	
50	"	"	"	Do.	Orionis (Eigel)	"	101 4 30	"	31 5 54.0	31 6 17.9 Watch ceased going.
51	"	"	"	Do.	(Sirius)	"	84 43 0	"	31 6 4.5	Do.
52	"	"	"	Do.	(Procyon)	"	128 55 50	"	31 5 4.6	Do.
53	"	30	noon.	Do.	Sun.	"	90 56 40	"	31 7 58.2	
55	Norr.	6	"	Makua village.	"	"	86 42 20	"	31 2 25.6	
56	"	"	7 55 P.M.	Do.	(Fomalhaut)	"	57 18 30	"	31 1 44.3	
57	"	7	noon.	Do.	Sun.	"	86 5 40	"	31 2 47.2	31 2 10.8
58	"	8	7 55 P.M.	Do.	(Fomalhaut)	"	57 18 20	"	31 1 49.1	
59	"	"	"	Do.	(Sirius)	"	84 51 20	"	31 1 55.4	
61	"	9	noon.	Do.	Sun.	"	84 56 20	+ 2' 0"	31 2 21.9	
1	Sept.	26		Lepta camp.	Polaris.	"	56 58 10	- 7' 0"	32 0 23.0	32 0 23.0
2	"	29		Jiachan camp.	(Fomalhaut)	"	55 20 30	"	32 5 27.3	32 5 27.3 A little after transit.
3	"	30		Negpo-shumdo camp.	Polaris.	"	60 44 0	"	31 53 19.2	31 53 19.2



Observations of the Boiling Point taken in Great Tibet.

No. of Station.	Astronomical Date.	Watch Time.	STATION.	THERMOMETER.		THERMOMETER.		Deducted height above Sea.	REMARKS.
				No.	Boiling Point.	No.	In Air.		
1	1867. June 28	5 42 P.M.	Badrināth. ... ..	22	195.40	30	60.0	10,284	On first step of temple.
2	July 4	8 30 A.M.	Mana village, 1¼ mile N. of Badrināth. ...	"	195.10	"	64.0	} 10,510	
3	" 5	4 30 P.M.	Do. ... ..	"	195.00	"	66.0		
4	" 26	7 0 A.M.	Ghastoli (halting place). ... ..	"	190.40	38	51.0	} 13,251	
5	" 26	7 0 "	Do. ... ..	30	191.00	"	50.0		
6	" 27	3 0 P.M.	Tare-sumdo (foot of hill). ... ..	"	185.50	"	50.0	16,587	
7	" 28	9 0 A.M.	Hutoli (pile of stones). ... ..	"	182.0	"	37.0	18,576	On crest of pass, also called Chirbitia and Dungri Pass.
8	" 30	noon.	Lum-urti camp. ... ..	"	185.50	"	57.5	16,660	
9	" 30	"	Do. ... ..	22	185.40	"	57.5	16,317	
10	August 1	5 47 A.M.	Do. ... ..	30	185.50	"	30.0	16,396	
11	" 2	7 40 "	Chirkong. ... ..	"	187.0	"	53.5	15,708	
12	" 4	6 8 "	Barku village. ... ..	"	191.50	"	55.5	13,005	
13	" 5	4 0 P.M.	Totling monastery. ... ..	"	192.75	"	69.0	12,295	On house top about 15 feet above ground, and 60 feet above river.
14	" 7	7 0 "	Be-Songbo-ka-sumdo. ... ..	"	191.50	"	64.0	13,050	At junction of streams.
15	" 8	6 8 "	Larcha, Fugeo Pass (foot of mountain). ...	"	187.50	"	49.0	15,364	
16	" 9	9 0 A.M.	Fugeo Pass. ... ..	"	181.00	"	40.0	19,220	On crest of pass.
17	" 9	6 30 P.M.	On other side of Fugeo Pass. ... ..	30	186.50	38	45.5	15,935	At foot of mountain.
18	" 10	6 30 "	Khangiah camp. ... ..	"	188.00	"	58.25	15,129	

19	August	11	5 10 P.M.	Giugti	...	...	30	186-00	38	57-50	15,205	On bank of Giugti R.
20	"	12	4 25 "	Giugti-samdo	...	...	"	184-50	"	62-50	17,324	Junction of streams.
21	"	13	9 0 A.M.	Giugti P.	...	...	"	180-50	"	37-00	19,490	On crest of pass.
22	"	13	5 45 P.M.	Giugti (Chajohol)	...	...	"	185-00	"	58-25	16,968	On the other side of Giugti P.
23	"	14	5 5 "	Lujung	...	...	"	186-00	"	58-25	16,353	On bank of Lang R.
24	"	15	6 0 "	Chajo Gunas	...	...	"	187-00	"	53-00	15,700	Do.
25	"	16	6 36 "	Name not known	...	...	"	187-75	"	58-25	15,289	
26	"	19	4 23 "	Kiangna Chumik	...	...	"	185-50	"	59-00	16,669	Halting place where water is procurable.
27	"	20	9 0 A.M.	Paba P.	...	...	"	183-75	"	49-25	17,649	On crest of pass.
28	"	20	5 30 P.M.	Giachural (in <i>Zatt</i> Sinchmet)	...	...	"	187-00	"	57-00	15,732	Camp on bank of Singh-gi R.
29	"	22	3 53 "	Chimorong P.	...	...	"	185-00	30	56-00	16,949	Foot of mountain.
30	"	23	6 0 "	Chimorong	...	...	"	184-50	"	45-00	17,151	
31	"	27	7 0 A.M.	Thok Jalung (near gold mine)	...	...	"	185-75	"	41-00	16,346	
32	"	29	2 50 P.M.	Do.	...	...	"	186-00	"	55-00	16,327	} 16,337.
33	"	31	8 0 "	Chimorong P.	...	...	"	182-00	"	53-00	18,765	On top of mountain.
34	Sept.	4	6 15 "	Shildong camp	...	...	"	189-75	38	55-00	14,652	Near stream.
35	"	5	4 23 "	Gianchung ( <i>gopha</i> )	...	...	"	188-50	"	62-50	14,861	
36	"	6	5 30 "	Thankur village	...	...	"	186-75	"	59-75	14,688	On bank of Singh-gi R., about 12 feet over the water.
37	"	7	5 52 "	Pekia village	...	...	"	189-80	"	65-75	14,637	
38	"	8	6 30 A.M.	Do	...	...	"	189-00	"	40-00	14,388	
39	"	8	3 36 P.M.	Barkung village, (in ruins)	...	...	"	189-40	"	64-00	14,324	On bank of Singh-gi R.
40	"	9	4 15 P.M.	Marku camp	...	...	"	189-75	"	57-50	14,071	Do.
41	"	10	5 12 "	Dakmaru, (red hill)	...	...	"	190-00	"	58-25	13,920	On top of hill.
42	"	11	6 2 A.M.	Do.	...	...	"	190-50	"	23-00	13,393	
43	"	11	5 35 P.M.	Ralajung, (on bank of Singh-gi R.)	...	...	"	191-50	"	56-50	13,022	

*Observations of the Boiling Point taken in Great Tibet, &c.—(Continued).*

No. of Station.	Astronomical Date.	Watch Time.	STATION.		THERMOMETER.		THERMOMETER.		Deducted height above sea level.	REMARKS.
					No.	Boiling Point.	No.	In Air.		
44	1867 September 12	5 55 P. M.	...	Lajunchamik	30	191.50	38	54.50	12,999	On bank of Gartang R.
45	" 13	5 0 "	...	On bank of Gartang R.	"	191.00	"	53.00	13,227	
46	" 14	5 30 "	...	Gar-gansa village, near Gartang R.	"	189.50	"	47.00	14,147	
47	" 15	5 30 "	...	Longong, (Zebo) camp ...	38	188.75	"	49.00	14,881	
48	" 17	5 30 A. M.	...	Garyusa monastery	"	188.75	"	30.00	14,241	
49	" 25	9 0 "	...	Dun-kar village	"	190.00	"	51.50	13,652	
50	" 30	6 55 "	...	Todling (monastery)	"	192.50	"	42.00	12,101	
51	October 5	8 0 "	...	Mang-nang village	22	190.80		supposed 30	12,867	
1	August 25	5 30 P. M.	...	Gobartseja-rebo	39	187.00	39	56.00	15,495	In Sinchmet <i>Patti</i> .
2	" 28	6 30 A. M.	...	Chakrang camp	"	186.50	"	40.00	16,659	
3	" 29	7 0 "	...	Niachaphu	"	186.50	"	44.30	15,709	
4	" "	5 30 P. M.	...	Jiachen (house)	"	186.25	"	47.25	15,878	
5	September 23	6 30 A. M.	...	Tushigong village	30	191.50	"	60.25	13,027	Near monastery.
1	October 1	6 30 A. M.	...	Bartu village	38	191.75	"	34.00	12,503	
2	" 2	6 12 "	...	Sharbarak-chu	"	190.00	"	36.25	13,545	
3	" 3	6 6 "	...	Puling Gongma camp	"	189.50	"	29.50	13,801	
4	" 5	5 50 "	...	Ridighang camp	"	189.50	"	17.00	13,709	
5	" 6	5 15 "	...	Ri village	"	189.75	"	20.50	13,634	
6	" 8	5 59 "	...	Langjan Samba Bridge (near)	"	196.00	"	39.75	10,039	On bank of Sutlej river.

7	October	8	4 38 P.M.	Sirang P. ...	...	...	38	185.00	38	32.00	16,401	On top of mountain.
8	"	9	6 0 A.M.	Dongkhong, (one house)	...	...	"	189.50	"	30.00	11,458	The mercury sunk so low that the thermometer could not be read.
9	"	10	5 51 "	Miang village	...	...	"	193.50	"	36.50	9,532	
10	"	11	6 37 P.M.	Tiak village	...	...	"	196.75	"	35.00	10,027	On top of a house.
11	"	12	6 25 A.M.	Shipki village	...	...	"	196.00	"	37.50	10,080	
12	"	13	5 28 "	Kuak village	...	...	"	191.50	"	27.00	12,610	
13	"	15	7 32 "	Kuang village	...	...	"	185.75	"	34.00	16,057	On crest of pass.
14	"	"	12 24 P.M.	Fungrang-che P.	...	...	"	189.50	"	18.00	13,715	
15	"	16	7 7 A.M.	Sang village	...	...	"	183.50	"	33.00	17,403	Do.
16	"	"	12 42 P.M.	Pimik-che P.	...	...	"	190.50	"	28.00	13,201	
17	"	17	7 35 A.M.	Sunna, (junction of stream)	...	...	"	194.00	"	38.00	11,201	
18	"	18	7 6 "	Bikur village	...	...	"	193.00	"	37.50	11,783	
19	"	19	8 55 "	Sarang village	...	...	"	184.50	"	34.00	16,810	
20	"	22	12 55 P.M.	Tago P. ...	...	...	"	180.75	"	16.00	12,984	On crest of pass.
21	"	24	7 32 A.M.	Chuegjum-sundo camp	...	...	"	191.50	"	22.00	12,583	
22	"	25	7 22 "	Ghonam village	...	...	"	194.00	"	32.00	11,181	
23	"	27	6 30 P.M.	Nilang or Chorsa village	...	...	"	193.75	"	51.00	11,407	
24	"	30	1 8 "	Do.	...	...	"	199.25	"	48.00	8,172	Alongside <i>Aharameata</i> .
25	Novr.	7	4 45 "	Makua village	...	...	"	190.50	"	34.00	8,012	
26	"	11	6 42 A.M.	Do.	...	...	"		"			



*Narrative Report of the Trans-Himalayan Explorations made during 1868, drawn up by Major T. G. Montgomerie, R.E., G. T. Survey of India, from the Original Journals &c., of the Trans-Himalayan Exploring parties.*

Early in 1868 preparations were made for sending an exploring expedition beyond the eastern watershed of the Upper Indus river.

The explorations of the Pandits during 1867, had supplied tolerably certain information as to various Tibetan districts lying between Rudok and the Thok Jälung gold-field, and between the latter and the Tra-dom monastery, on the great Lhāsa road; more vague information had also been received, as to an upper road running from Thok Jälung through various gold-fields to the great Tengri Nor, or Nam lake, and thence to Lhāsa: several traders had been met with who had actually travelled along this upper road, but they were all rather reluctant to tell the Pandits much about it, being afraid of spoiling their market. Having the above information to go upon, I decided upon sending the exploring party to Rudok, and thence through the districts of Rawang and Ting-che, to the north of the great Aling Kangri group of peaks, which were discovered last year.

From Thok Jälung the exploration was to be carried, if possible, along the upper road to the Tengri Nor lake and thence to Lhāsa; failing that, to take the route through Majin and Shellifuk towards the Tra-dom monastery.

The Chief Pandit (P. Nain Singh) required a rest after his last expedition, and the 3rd Pandit (P. Kalian Singh) was consequently selected for the work.

This Pandit assumed the character of a Bashahri, and taking a few loads of merchandize started in April with a party of real Bashahris, (or men of *Koonoo*), whom he had induced to accompany him. He made his way from Spiti, through the upper part of Chumurti and Ladāk, to Demchok on the upper Indus. Here the 3rd Pandit measured the velocity of the Indus by throwing a piece of wood into it and then noting how long it took to float down 300 paces. The velocity turned out to be  $2\frac{2}{5}$  miles per hour with a depth of 5 feet, and a breadth of about 270 feet in the month of July. From Demchok he went northwards through Churkang and Roksum, (or Rokjung), to Rudok—*vide* the map accompanying the report of 1867.

Churkang was found to be a favourite place for holding monthly fairs. Roksum turned out to be a large standing camp where one great annual fair only is held, but that a very large one, the Jongpon (or Dzongpon) always attending it in person.

Rudok has hitherto never been actually visited by any European, for although Captain H. Strachey reached a point about 12 miles to the east of the Fort, and Captain Austen another point about the same distance to the north, they were neither of them able to advance any farther, and could never get an actual view of the place itself, owing to the jealousy of the Jongpon who resides there, and governs this most north-westerly district of Tibet.

Though there was but little doubt that the position assigned to Rudok was nearly correct, it was hardly satisfactory not to have a trustworthy account of the place, and the 3rd Pandit was ordered to get all information about it, and to take observations for its latitude and height, and this he succeeded in doing.

He found that the Fort was built on a low rocky hill, rising about 250 feet above the flat ground at its base, having the Buddhist monasteries of Sharjo, Lakhang, Marpo, and Nubradan close up to it on the east, south, and west with about 150 scattered houses along the foot of the hill.

A stream called the Chuling-chu passes the Fort, and flowing in a north-easterly direction for 3 or 4 miles, joins the Churkang-chu, another large southern feeder of the great Pangong lake which is about 9 miles from the Rudok Fort.

The 3rd Pandit heard that there is a small lake, about  $2\frac{1}{2}$  miles north of Rudok, which has not hitherto been shown on any map; it swarms with wild fowl and is celebrated on account of a place called Kalpo Mhai, on its north-eastern shore, where the ground is so intensely hot that it smokes, and readily burns any wood, &c. that may be thrown into it. This place is much resorted to for the purpose of worship. The three monasteries round the Fort contain about 150 Monks.

The 3rd Pandit remained a couple of days at Rudok, and in his assumed character as a Bashahri, he and his party excited no suspicion though they were summoned before the Jongpon.

Leaving Rudok on the 22nd of July the party marched back to Roksum, and then turning eastward by a new road, advanced through the districts of Rawang and Ting-che to Dakorkor, a large standing camp, where an annual fair is held. Several small lakes and a large salt lake called Rawang, or Phondok lake were passed on the way. These lakes supply salt to Bashahr, Spiti &c.

During the last three marches to Dakorkor no water of any kind was met with, and the party were forced to carry a supply in skins. In this arid part of the country the soil was of a dazzling white, a peculiarity which extended as far as the Pandit could see.

The Pandit was informed that 5 days' march to the north there was a large district called Jung Phaiyu-Pooyu, and that throughout its whole extent the earth is of the same white kind as that they were crossing over, so white in fact that the eyes of people who are unaccustomed to it get inflamed from its glare, just as if they were suffering from snow-blindness. The district is inhabited by Dokpa people, it is under Lhāsa but said not to form part of Ngari Khorsum, having a separate Sarpon, or gold commissioner, of its own. The largest encampment in it is called Thok Daurakpa said to have at least 200 tents. The district abounds in small tarns. It must be very elevated as the inhabitants are said to eat very little if any grain.

A large river is said to flow from Jung Phaiyu-Pooyu northwards and then to the east towards China. The district is said to take its name from some high snowy peaks which are probably those at the eastern end of the Kuen Luu range.

The Whor (or Hor) country is said to be due north of the district, and from information gathered elsewhere there is little doubt but that Whor (or Hor) is the Tibetan name for eastern Turkistān.

As to the district of Phaiyu-Pooyu, with its river flowing towards China, it is difficult to decide whether it is known by any other name, but it probably lies considerably to the east of north, communicating with Lhāsa by the Tengri Nor lake district. A similar white soil has been noticed to the east of the Chang Chenmo, and Mr. Johnson, when seven marches to the north of that valley at a place called Yangpa, reported that "on looking down from a height the whole plain has the appearance of being covered with snow." He attributed this to saltpetre. Muhammad Amin, in the route he supplied, said that "beyond the pass (north of Chang Chenmo) lies the Aksai Chin, or as the term implies the great Chinese white desert or plain. It is sandy and gravelly and covered with brush-wood. Its breadth here from south to north may be reckoned to be about sixty kos." "It extends into Chinese Territory, to the east. There are several lakes and gold mines in it &c." This quite answers to the accounts that the 3rd Pandit heard, a separate gold Commissioner proving the existence of many gold-fields. No high peaks were seen to the east of the Chang Chenmo, Mr. Johnson having noticed from the peaks he ascended large plains to the east and south-east, which are believed to merge into the Chang Thang plains of Rudok. Whilst he also gathered that the Kuen Lun range only ran about 100 miles east of the Kara-kāsh river and then terminated on an extensive plain also communicating with the Chang Thang plains.

The Pandit whilst marching from Rudok to Thok Jālūng saw no high peaks to the north or east, evidence which all tends to prove the existence of a large plain in that direction, the term Chang Thang meaning moreover the great plain.

According to modern maps this plain extends a great way east, nearly up to the end of the great wall of China near the city of Sewchoo, to which place the Chief Pandit appears to have got a rough route when in Lhāsa. In his first journal he referred to a place, which he called Jiling, about one month's journey north of Lhāsa. This turns out from farther inquiries made by me to be the same as Siling. The Chief Pandit says that the Lhāsa people called it Jiling, but he heard others calling it Siling, and from what he says it is evidently identical with Siling or Sining in North Latitude 37°, East Longitude 102°, which Astley describes as "a great and populous city, built at the vast wall of China, through the gate of which the merchants from India enter Katay or China."

Lord Strangford, who took great interest in the travels of the Pandit, and was able to identify nearly all the places mentioned by him, was greatly puzzled by the Pandit's description of Jiling, given in his first journal, where it is said to be in Tartary and to produce gold lace, silks, carpets, and other products of a tolerably civilized country. At first the Pandit understood that it was a month or two months' journey to the north of Lhāsa, but from farther inquiries during his second expedition, he made out that it was considerably to the east of north,

and having this hint, there was no great difficulty in identifying it with the large town of Sining on the borders of China proper, the only place from which such civilized products were likely to reach Lhâsa from the northwards.

The Dakorkor Camp, which the 3rd Pandit reached, lies about 20 miles to the north of the Aling Kangri peaks, on the right bank of the Aling-chu river and not very far from the Thok Nianno gold-field. He arrived just as the annual fair was commencing; about 150 tents were already pitched and both the Jongpon and Sarpon were present; but in spite of their presence a band of mounted robbers came down upon the camp and threatened to loot it. These robbers seem to be numerous all over Tibet. This particular band was said to come from the great Namtso lake district. The men actually began to rob, but the Jongpon told them to stop, and he would make each tent contribute something as black mail. The Jongpon then made out a list of those assembled and ordered each tent to contribute a parcha (of about 5 lbs.) of tea, and each trader to give from 1 to 2 rupees according to their means. This arrangement was agreed to, and the proceeds having been collected were handed over by the Jongpon to the robbers who took their departure.

The Chief Pandit in describing the above, expressed an opinion that the Jongpon was in some mysterious way benefited by the contributions, possibly retaining a considerable share, as it is well known that the robbers never succeed in looting his camp nor that of the Sarpon; both of them perfectly understanding how to defend themselves against all comers on the plateaux of Tibet.

The 3rd Pandit paid his contribution and saw the robbers depart, but he came to the conclusion that they might appear again at any time, and that it would not be safe to take his merchandize with him, he consequently, after consultation with his Bashahri friends, decided upon sending the greater part of his goods back by the Indus so as to meet him at Lhâsa, or on the great road to that place. One of his men was despatched for this purpose; his adventures will be adverted to.

The 3rd Pandit, starting again from Dakorkor, continued his march eastward down the Aling-chu river till it fell into the Hagung lake, a large brackish lake which appeared to have no exit for discharging superfluous water, though the Aling-chu river which feeds it was found to be 150 paces in width with a rapid stream just before it fell into the lake. The shores of the lake had marks which showed that it had once been more extensive. Continuing his journey the Pandit passed the Chakchaka salt lake from which the greater part of the Tibetan salt, which goes down to Almora, Nepâl &c, is extracted. The salt from Tibet is preferred by the people of Kumaun and most hill men, though the salt from the plains is to be had at much the same price.

The Pandit heard of another salt lake to the east of Chakchaka, which with other similar lakes probably supplies a portion of that which is generally understood to come from Chakchaka.

The next place of importance seen by the Pandit was Thok Sarlang which at one time had been the chief gold-field of the district, but had been in a great measure abandoned on the discovery of the Thok Jâlung gold-field. The Pandit passed a great excavation, some 30 to 40 feet deep and 200 feet in width and two miles in length, from which the gold had been extracted. He heard of another gold-field to the west, but his route took him direct to the Thok Jâlung gold-field, which he found in much the same state as when visited by the Chief Pandit. The Pandit and his party excited no particular notice, and they were consequently able to march on after halting a day to rest.

From Thok Jâlung they passed through the Majin country, partly undulating, and partly quite level, but all about the same altitude, viz.:—15,000 to 16,000 feet above the sea. The drainage sloped towards the east, and nothing but comparatively low rounded hills were visible in that direction; whilst on the west the party skirted a large plain of a yellowish colour said to be drained by the Upper Indus.

The party passed numerous lakes producing salt and borax, and after 9 days' journey in a south-easterly direction, found themselves at Kinglo, a large camp on the banks of a river called the Chu-Tsang-po, which is so large that it cannot be forded during the summer. This river flows eastward and falls into the lake called Nganglaring or Cho-Sildu lake, said to be about the same size as the Manasarowar lake; it has a small island in the centre. The lake is reported to receive a large stream from the south, another from the east, and a third from the north, the latter draining part of the Phiyu-Pooyu district. Though receiving so many streams, (one of which, as noted above, is a large one), the lake is nevertheless said to have no exit.



To the south of the lake there is a well known monastery called Shellifuk, the residence of a great Lāma. Still farther to the south there are some high snowy peaks, and a district called Roonjor, while to the north are the districts called Gyachun and Girke, the latter probably adjoining Phaiyu-Pooyu. To the east he heard of another district called Shingwar.

From Kinglo the Pandit wished to march on to Lhāsa by the northern route past the Tengri Nor lake, but the Chief of Majin (Kinglo) would not permit it, and the party were consequently obliged to take a south-westerly route to the Manasarowar lake.—They followed the course of the Tsang-po-chu nearly to its source, crossing one very high range called Nak-chel and another called Riego, and finally descending to the Manasarowar lake. The Nak-chel and Riego ranges are evidently off-shoots of the Kailas peak. The Nak-chel peaks appeared to be very high both on the east and west.

When crossing the range the Pandit saw a very large herd of wild yaks; his party counted over 300 of all sizes before the herd ran off: the yaks were all black. These wild yaks are called "Dong"; they were mostly seen between Majin-Kinglo and the Manasarowar lake. Great herds of wild asses were seen throughout; sometimes as many as 200 were in sight at the same time when the plateaux were extensive. The Hodgsonian antelope, wild goats, and sheep, (the latter including the gigantic *ovis ammon*), were all seen in numbers. Large grey wolves were constantly seen but never more than two or three at a time, though packs of them were often heard yelling at night. Numbers of reddish hares and a kind of fox were seen on every march. Marmots were very numerous, their subterranean villages being met with wherever grass and water were at hand. Quantities of geese, ducks, and storks were seen on the lakes. Eagles and vultures appeared to be the same as those in the Himalaya, and were seen everywhere.

Whilst marching from Rudok to Thok Jālung the Pandit heard minute descriptions of no less than 7 separate gold-fields, viz: those of Thok Sarkong, Thok Dikla, Thok Ragyok, Thok Thasang, Thok Maroobhoob, Gunjee Thok and Thok Nianmo, besides those of Thok Sarlang and Thok Jālung which he actually visited, and those of Phaiyu-Pooyu of which he heard vaguely. The Pandit understands the word Thok to mean a mine.

Several salt lakes were passed and others heard of. He describes the celebrated Chakchaka salt lake as being all but connected with the Hagung lake, and stated that an area of about 20 miles by 10 is all about on a level with those lakes. This space is filled with salt, the water having evidently at one time covered the whole.

Borax fields were seen at Roksum and Chakchaka, and numbers of people were working on them. No gold or salt mines were seen or heard of between Thok Jālung and the Manasarowar lake; but numerous borax fields were seen, at one of which about 100 men were at work near a camp of some thirty tents. The other fields were not being worked when the Pandit passed. The borax generally was said to find its way down to Kumaun, Nepāl &c. Altogether this portion of the third Pandit's route has brought to light the position of a large number of gold, borax, and salt fields, testifying to an amount of mineral wealth, as to the value of which we have hitherto had no information. In marching south from Thok Jālung the Pandit appears to have left the gold bearing rocks, and from the information he received, the line of gold-fields is continued more to the north; but it is evident that this part of Tibet contains an inexhaustible supply of gold.

As to borax, there appears to be any amount of it to be had for the digging, the Lhāsa authorities only taking a nominal tax of about 8 annas (or a shilling) for ten sheep, or goat loads, probably about 3 maunds or 240 lbs. Borax sufficient to supply the potteries of Staffordshire and all Europe would be forthcoming, if the supply from Tuscany should ever run short.

The salt fields appear to be the source from which the hill population from Nepāl to Kashmir draws the greater part of its supply of salt.

Throughout his march, the Pandit was at an elevation of over 15,000 feet, and yet an encampment was met with nearly every day. Thieves were numerous, and threatened the party several times; but on seeing that the Pandit's party were armed, they invariably went off again, not liking the look of an English gun. The party arrived at Manasarowar in safety; and the Pandit decided upon waiting for the Ladākhi Kāfila, which was known to be on its way to Lhāsa. Whilst there, the Pandit made a careful traverse of the Manasarowar lake, with bearings to the peaks north and south. A map of the lake will be given hereafter. Though the water was sweet no exit was seen; at one point on the west the ground near the Ju monastery was low, and looked as if water had perhaps at one time flowed through, towards the Rakas Tal lake, though it is now too much above the lake to admit of it.

The Pandit was unable to join the Ladākḥ Kāfila; but made his way by himself along the great road to Shigātse, where he was stopped. This he found was by an order of the Gar-tok Garpon, sent after him by the couriers. He was unable to advance farther. Whilst marching between the Manasarowar and Shigātse he was able to take bearings to various peaks north and south of the road, which no doubt will add considerably to our knowledge of the mountains on either side of that route; but as the Pandit has only just returned, there is no time to give any further account of his route and adventures in the present report.

His servant, who was sent back from Dakorkor, managed to join part of the Ladākḥ Kāfila, and reached the Tra-dom monastery; but the mounted messengers of the Gar-tok Garpon found him out there and prevented him from advancing farther. He very narrowly escaped being sent back to Gar-tok, and would have been lucky to have escaped severe punishment. The Ladākḥ merchant fortunately remembered his old friend the Chief Pandit, and on being told that the man was carrying merchandize on his account, did what he could to protect him; and though he said it was impossible to take him to Lhāsa, he managed to get him released, and ultimately the man was allowed to cross over the Himalaya by a southerly road past Muktināth into Nepāl. In this way he was able to join on to the route the 2nd Pandit traversed during their first explorations. The permission to take a new route, is surprising, as the Lhāsa officials are always careful to make suspected individuals return by the road they entered, so that they may at any rate not get fresh information as to the country. Their carelessness in the present instance was probably due to the humble and rather stupid look of the man, but it has supplied an important link between the Tra-dom monastery and the Muktināth shrine on the Saligrami, a great feeder of the Gandak river. The man, an inhabitant of Zāskār, in spite of his appearance, has a shrewd idea of distances and of the points of the compass; he was able to give a very intelligible though rough route between the two points, which agrees very fairly with the positions assigned to them by the 1st and 2nd Pandits.

When this Zāskāri found that he would not be allowed to go to Lhāsa, he told the Ladākḥ merchant that an agent of the Chief Pandit had gone on ahead, to whom he was to have delivered some goods, and requested that he would see that they were delivered to the agent: the merchant promised to do this and took charge of the packages. The Zāskāri then put his own baggage on a couple of sheep and started off south. Though early in December he was able to cross the Brahmaputra river on the ice, which was then strong enough to bear laden yaks. The first day he reached the Likche monastery, where he found two men from Lohba in the Mustang district north of Muktināth. These men had gone beyond, to the north of Tra-dom, for salt and were returning with it. The Zāskāri managed to make their acquaintance, and on hearing that he was a Bashahri (or man of Koonoo) going to worship at Muktināth, they agreed to take him with them. Their salt was laden on about sixty yaks, each carrying from 1½ to 2 maunds (120 to 160 lbs). The two men were able to manage this large number of yaks as the road was a good one.

From Likche they ascended gradually over a great plain or platen, with plenty of grass and scrub; the latter making good fuel even when green. Three easy marches took them over this plain and landed them at Lohtod, four or five miles beyond or south of the Himalayan watershed. The plain had a few small knolls on it, but was otherwise flat or undulating. The ascent, even up to the watershed, was very slight indeed. From the pass, which the man hardly thought worthy of calling a pass, there was a slight descent for four or five miles. He got a good view of Lohtod, a village of sixty houses surrounded by a number of scattered houses, which he thought might make a total of several hundreds: the houses were all built of sun-dried bricks. He noticed a great many fields, and found that they cultivated barley, buckwheat, mustard, radishes, and a small proportion of wheat, all indicating a moderate altitude, though the only trees visible were two or three poor willows. This is confirmed by the easy slope of the ground to Muktināth, which the 2nd Pandit found to be 13,100 feet. The next day the Zāskāri reached Loh Mantang, where the Loh Gyalbo (or Raja) lives in a stone fortlet, near a small town of some 200 houses, surrounded by a great deal of cultivation.

From Loh Mantang three days' easy march landed the Zāskāri at Muktināth. On the route he passed a large village called Asrang, where the Gyalbo has a house, and at every three or four miles he saw a group of a few houses, mostly to the west of his road, but he met with no tents south of the Himalayan watershed.

Muktināth (or Lohchumik) stands in an open spot, with 4 villages of about 50 houses each, lying a mile to the south of the shrine.

The Zāskāri has given some farther routes which are new and will no doubt prove useful hereafter. The route given above is more especially interesting, as giving another line across the Himalaya: it makes the crest very much as given in the map with the first report of the Pandit's explorations, and shows how very far behind, or north of the great peaks, the Himalayan watershed actually lies, and what a great breadth the highest parts of the range cover.

Another explorer was employed to the east, who made a route-survey of 1,190 miles in length, advancing by one route 640 miles and returning by another 550 miles in length.

A small portion of this man's route was quite new, as he managed to penetrate behind or north of the great Mount Everest peak. His progress in that direction was checked by the obduracy of the Lhâsa officials on the Ting-ri Maidan. As far as it goes this portion of the route is however interesting, insomuch as it gives another determination of the Himalayan watershed, and throws a little more light on that part of the mountains which lies behind or north of the great peaks seen from the Hindustân side.

The remainder of the route is in a great part new; but some of the former explorations went over portions of the same ground, and the positions of several places have been entered on published maps from various information, though hitherto without any regular connection. These new routes will supply the necessary connection, and when combined with former explorations, will add much towards the elucidation of the Eastern Himalaya.

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*Memorandum on the Trans-Himalayan Explorations for 1871, by Major T. G. Montgomerie, R.E., Deputy Superintendent G. T. Survey, in charge of the Trans-Himalayan Exploring Parties.*

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The explorations which I have selected for this year's report have been made by explorer No. 9 (Hari Ram) during more than one expedition.

The explorer, for one portion of his work, made his way from Darjeeling, passing through Sikkim into Great Tibet; it is not however necessary to refer to his journey in detail until he got beyond what Sir William Hooker called the Wallangchoon pass, as up to that point Sir William has already given us an admirable description of the country.

The explorer, on trying to pass into Tibet, was as usual stopped and told that he would not be allowed to proceed farther, as he was not known to any one, nor able to give any satisfactory evidence as to his being what he stated. He was consequently rather in despair, but was fortunate enough to ingratiate himself with the chief official of a large Sikkim district whose wife happened to be very ill. I have always made my explorers take a supply of medicines with them, mostly of native kinds, with only a few ordinary European sorts to present to people on their journeys. In the present instance the explorer had also provided himself with a Hindi translation of a treatise as to using these drugs, and when he heard of the woman's illness he offered to give her some medicine if he was allowed to see her and hear as to her sufferings &c., his offer was at once accepted and the explorer having seen her searched his book until he came across some disease with the same symptoms as she had and he then boldly prepared the medicines directed and gave them to the woman according to the instructions, and awaited the result in not a little trepidation. In a few days' time the woman became wonderfully better and eventually a cure was effected very much to the astonishment of the amateur practitioner. The explorer was treated with marked kindness and hospitality from the day the woman began to improve; he then again urged his request to be allowed to pass into Tibet. The headman said he would be glad to give him permission but that it would be of no use as he would be again stopped by another official before he advanced very far unless he had some one to answer for him. The explorer however continued to urge his point and at last the official said he would himself be his security, and he finally sent one of his own men with the explorer who passed him through the places where he was likely to be stopped.

The explorer consequently marched on without any farther interruption, except the ordinary ones at custom houses, where his baggage was strictly searched; fortunately his instruments were so well concealed that they were never discovered.

From the Tipta pass—the Wallangchoon pass of Sir William Hooker, probably so named from the village south of it, which the explorer gives as Wallungsum—he made his way in two marches to Tashirak. The road was a difficult one, the ground north of the pass being very elevated and barren, so that both food and fuel had to be carried on yaks for the use of the party.

The Tipta pass was covered with snow; it is on the watershed of a very high range that runs nearly east and west forming the boundary between Nepāl and Lhāsa.

Tashirak is a large standing Bhotia encampment on a feeder of the Arun river, which rises in a glacier to the west, and not on the main stream of that river as was formerly supposed; it is 15,000 feet above the sea. Marching north, the explorer crossed the Nila pass, and passing a large Lāma monastery reached the Shara village of some 50 houses, which is under a Thānadār of the Tinki or Tinka district, generally known as Tinki Dzong after its fort (Dzong). Here his baggage was very closely searched, and it was only by means of the man sent by the Sikkim official that he was able to advance farther. After many inquiries were made he got a pass to travel to Shigātse, and being fairly in Tibet he was never stopped again. He made his way first to Lāmādong, a village of 50 or 60 houses, arriving there on the 4th September. Before reaching this place the explorer had latterly seen no cultivation except that of Indian-corn in small quantities, but at Lāmādong itself there was a good deal of wheat and pence and round about several other villages could be seen equally well cultivated; all these villages were on or near the banks of the great eastern branch of the Arun river, called the Rangtang river, which comes from the east.

The next day he arrived at another small village with plenty of cultivation, all tending to show that he had again reached a warmer climate, Lāmādong being 13,100 feet above the sea.

On the 6th September he crossed the Tinki pass and after a trying march reached the village of Tashichirang on the bank of the Mo-tre-tung lake which is a fine sheet of water

about 20 miles in length by 16 miles in breadth,  
at an elevation of 14,700 feet above the sea. This

lake has never been shown in any map that I am aware of, but we have notices of its existence in itineraries collected by M. Hodgson, Dr. Campbell, &c. The explorer found the water very clear and pure, and very good to drink; he and his party used it and were told that the inhabitants took it in preference to that of the two or three streams which were seen to run into the lake. The explorer was unable to go completely round it, but he could see it fully as he passed along its northern shore and yet could discover no signs of an outlet; the inhabitants declare that it has none; the sweetness of the water, however, is against there being no outlet and if so it must be somewhere to the south-east. The lake forms a portion of the boundary between Sikkim and the Lhāsa Territories, the Sikkim Territory lying to the east, that of Lhāsa to the west of the lake. Several very high snow peaks were visible from the lake to the east and south.

On the 7th September he arrived at Ningzi, a Sikkim village which, though it has but 50 houses, boasts of a wonderful number of dogs, the explorer declaring he himself saw at least 200, and was certain that he never met with such a large proportion in a Tibetan village where they are proverbially numerous.

On the 9th September he reached Chajong (or Tattapani) hot springs where he took latitude and thermometer observations, the latter making it 15,000 feet above the sea. Four reservoirs, each about 30 feet in circumference and 3 feet deep, have been built to catch the water of these springs which appeared to be sulphurous and have a high reputation for their curative properties, being visited by numbers of people. The place swarmed with Tibetan (Hodgsonian) antelope which are quite tame being never disturbed, as they are considered to be dedicated to the deity of these hot springs. The next day the party encamped in a ravine and the day after crossed the Lagulung pass which has quantities of glacier ice close down to it being itself 16,200 feet above the sea. This pass forms the boundary between Sikkim and Lhāsa, the march terminated at the village of Thak. On the 15th September he passed the village and part of Sai Dzong which is surrounded by cultivation and has numerous other villages round about, encamped at Chota-Tāpu or Darcha village on the banks of the Sai Dzong stream, which comes from a great distance, rising in Sikkim. The next day he crossed the Gyaling mountains by a pass covered with snow, and reached the Bālu Koti village of 20 houses; this place has a good deal of cultivation, and numerous other villages are visible round about it. Passing thence through a level and well cultivated country, the explorer reached Shigātse on the 17th of September.

The explorer paid the usual homage to the Lāma of Tra-shi-lhun-po, making an offering of two rupees. He found the city of Shigātse in much the same state as described by the chief Pandit, he however heard of the serious rebellion which had been raised against the great Lāma of Lhāsa in April 1871, during which hundreds of people were killed.

The explorer remained in Shigātse till the 20th of September, he then made his way south-westwards, towards the Ting-ri Maidan, resuming his route-survey on the 30th September from a point he had previously visited. By evening he reached the village of Shimrang and the next day crossed the Shabki-Chu river which was 65 paces wide and 4 feet deep, flowing down into the Tsang-po (Brahmaputra), numbers of villages were seen on and off the road. The harvest was being reaped.

On the 2nd of October he reached the great Sa-kyā monastery (*Gom-pa*) which is only second to that of Tra-shi-lhun-po. The explorer was unfortunately not able to stop at Sa-kyā to examine the place more closely. He says the Sa-kyā monastery is on a low spur, it is inhabited by about 2,500 monk Lāmas, ruled by a great Lāma called Sa-kyā-Gangma (king or above all others); he is looked upon as a deity. His Lāmas are the only ones in this part of Tibet that are allowed to marry, they are called *Dhukpās*, other Lāmas who are not allowed to marry being called *Galupās*. The town of Sa-kyā lies at the foot of the monastery and is about half the size of the city of Shigātse. About fifty of the shops in the town are kept by Newārs from Nepāl, all the other shops are kept by Bhotiās. There is a large amount of cultivation around Sa-kyā though it is about 13,900 feet above the sea.

On the 3rd of October the explorer crossed the Dango pass, and again got into ground drained by the Arun river, and on the 5th October reached the Chaikok village, on the left bank of the Phungtu or Ting-ri river, the great western branch of the Arun river.

Continuing westwards along the Ting-ri river, the explorer reached the She-kar river a branch of the Ting-ri river. The She-kar Dzong (fort) is about 8 miles north of the junction, and is the residence of a Lhāsa magistrate. The Gurkhas in 1854 advanced as far as this point when they invaded Tibet.

On the 8th of October the explorer reached the town of Ting-ri which is generally known as Ting-ri Maidan from the large open plain in which it stands, it is also sometimes called Dhingri Ghanga. The town has but 250 houses supplemented with tents on occasions of fairs &c., it is 13,900 feet above the sea.

Five miles above the junction of the She-kar river, the explorer crossed the Ting-ri river by a wooden bridge 75 paces in length, showing that even at that point this great eastern branch of the Arun is a very large stream as might be expected from its draining the great Ting-ri table-land.

North and quite close to the Ting-ri town stands the Ting-ri Khar (fort) on a low isolated hill. A high Chinese officer called a *Daipon* who is the chief military and civil officer, resides in the fort, he has a small garrison of Bhotia soldiers with but one gun.

From Ting-ri there is a very good road which runs north-west to Jongkha Fort and thence by Kerun Shahr to Kātmāndu. Officials are however the only persons who are allowed to travel by this route, traders and all others taking the one followed by the explorer to Nilam, &c.

The explorer did not make any stay in Ting-ri, being afraid that he might be cut off from India by an early fall of snow, he accordingly pushed on as fast as he could. At first he passed through a wide all but level tract, and then getting into rougher ground reached the Thanglang pass on the 10th of October; he found the pass covered with old ice and snow, it being 13,460 feet above the sea.

On the 11th October he reached the town of Nilam 13,900 feet above the sea which has about 250 houses. It is ruled by a couple of Jongpons, the Lhāsa Government sending two there so as to be a check on one another. Nilam being the first Tibetan town on the road from Nepal, is considered to demand extra vigilance and consequently the explorer and his party were very closely examined and their baggage was carefully searched before they were allowed to go on.

From Shigātse to the Thanglang pass, the explorer had passed through a moderately level tract though at a very great elevation, but from the Thanglang pass where he crossed the Himalayan watershed he again entered on very rugged ground much more difficult than even that south of the Tipta (Wallungsum pass).

Between Nilam and Listi Bhansār he followed the general course of the Bhotia Kosia river, and though it is but some 25 miles direct distance between the two places, the explorer had to cross the Bhotia Kosia river 15 times by means of 3 iron suspension, and 11 wooden bridges each of from 24 to 60 paces in length. At one place the river ran in a gigantic chasm the sides of which were so close to one another, that a bridge of 24 paces was sufficient to span it. This was just below or south of the village Choksum. Near this bridge the precipices were so impracticable that the path had of necessity to be supported on iron pegs let into the face of the rock, the path being formed by bars of iron and slabs of stone stretching from peg to peg and covered with earth. This extraordinary path is in no place more than 18 inches and often not more than nine inches in width, and is carried for more than one-third of a mile (775 paces) along the face of the cliff, at some 1,500 feet above the river which could be seen roaring below in its narrow bed. The explorer who has seen much difficult ground in the Himalaya, says he never in his life met with any thing to equal this bit of path. It is of course quite impassable for ponies or yaks, and but very few sheep and goats even go by it though it is constantly passed by men with loads.

There are several other smaller pieces of paths between Nilam and Listi Bhansār which are nearly as bad but they are fortunately not continuous.

From Listi Bhansār the explorer's route does not call for any special notice here being much the same as that in any other part of the mountains south of the Himalayan watershed, being rugged in the extreme for a considerable distance and then becoming easy in the valleys or *Dans*. It may however be noted that the explorer crossed the Indrawati feeder of the Kosi which has 5 small tarns near its source called Panch Pokri. The source is in the snowy mountains to the west as shown on the map.

The lower ground, though not at all noteworthy in itself, had never been surveyed in any way previously, the only land marks being the few great peaks in its neighbourhood that have

been fixed from a distance by the Great Trigonometrical Survey; and I consequently consider the survey of it and other portions of the lower ground a very valuable addition to the geography of that part of the mountains.

On reference to the map it will be seen that by this exploration the position of the great Himalayan watershed has been determined in three different places. In each case it proves to be far behind or north of the lofty peaks that are visible from Hindustān, such as Mount Everest, Kinchinjunga, &c.

The explorer it will be seen went completely round Mount Everest, but his route was so hemmed in by great mountains that he never got a view of Mount Everest itself; it seems to have been invariably hidden by the subordinate peaks which are tolerably close to it. Possibly it may have been seen but never continuously so as to be able to recognise it again and to fix it by bearings with a moderately long base. The Kinchinjunga and Jano peaks were, however, seen from the west of Taplang Dzong but only a short base could be secured. The explorer was much impressed by Kinchinjunga (28,150 feet); it is known to the natives near Taplang as Kumbhkarān Langur. The people south of the Himalaya, in Nepāl, call all snowy mountains *Lanjur*, by which they mean the highest points. They call the peaks that have no snow *Banjung* and the low ground under the said *Banjung* they call *Phedi*. The term Himalaya is not used by uneducated people who only talk of the snowy mountains as "*Barfāni Langur*."

Neither the Bhotiās nor the Gurkhas seem to have specific names for remarkable peaks; the explorer asked all sorts of people but with the exceptions of the case of Kinchinjunga referred to above, he never got any name for a peak, though in a few cases they gave that of the nearest village.

Several of the other peaks fixed by the explorer were very lofty ones covered with perpetual snow to a great distance below their summits, those north of Mount Everest and Kinchinjunga are perhaps the most interesting as being beyond the Himalayan watershed. One to the north of the road between Sa-kyā and Ting-ri, the explorer thought was very much loftier than any others.

The explorer's route-survey may be said in a rough way to give us a general idea as to how the mountain drainage runs between the Himalayan watershed, north-west of Kerun Shahr, and the point where Turner crossed it near Chumalhari up to the Brahmaputra, or Tsang-po river on the north from west of Janglāche to Shigātse. The route between Kerun Shahr, Jongkha Fort, and Ting-ri Maidan is still a desideratum as we are in the dark as to the size of the Pālgū lake, which however it now appears will lie somewhat to the south of the approximate position which I gave it in my map showing the chief Pandit's route to Lhāsa.

A glance at the map at once shows what a large river the Arun must be, the area it drains being so very great. It is one of the few Himalayan rivers which has its source beyond the Himalayan range as seen from Hindustān, the others being the Indus, Sutlej and Karnālī. The length of the eastern and western upper sources is very remarkable, extending on the one side to the north and east of Kinchinjunga, and on the other to the north and west of Mount Everest.

In the route-survey made by explorer No. 9 from Darjeeling to Shigātse, and from Shigātse by Sa-kyā, Ting-ri Maidan, Nilam &c., to Kātmandu, the value of his pace has in the first instance been derived from the difference of latitude between the various places at which star observations for latitude were taken. A mean value of pace, *viz.*, 2.45 feet, derived from a mean of the values of each section, was adopted, and this mean value was applied to the number of paces showing the differences of longitude for each section and the value of the same in degrees and minutes was deduced therefrom in the usual way.

Taking the longitude of Darjeeling at  $88^{\circ} 18' 41''$  as determined by the triangulation of the G. T. Survey, and applying the differences of longitude as determined above, the longitude of Shigātse, by Tattapani, Chota-Tāpu, &c., *vide* map, *i.e.*, by the most direct route would be  $88^{\circ} 46' 44''$ .

Taking the longitude of Kātmandu at  $85^{\circ} 17' 45''$  and applying the differences of longitude as above between it and Shigātse by Nilam, Ting-ri, Pil &c., the longitude of Shigātse would be  $88^{\circ} 32' 45''$ .

On examining the map, however, it is at once apparent that the longitude of Shigātse, as determined by a route-survey from Darjeeling, is likely to be more reliable than that derived from Kātmandu, because the difference of longitude, between Darjeeling and Shigātse is but  $0^{\circ} 21'$ , while the difference between Kātmandu and Shigātse, is  $3^{\circ} 11'$ , or in other words the longitude of Shigātse would be very much more affected by an error in the value of the pace in the latter case than in the former. I have consequently decided upon using only the value as determined from Shigātse.



At page 8 of my report on the chief Pandit's exploration to Lhāsa, I explain that the longitude of Shigātse was determined by the route-survey which Mr. Turner made during his journey to Shigātse, combined with the route of the Pandit, Shigātse was computed to be in longitude  $88^{\circ} 48'$ , a very close agreement with the value as determined above independently by explorer No. 9 *viz.*,  $88^{\circ} 47'$ . It may consequently be concluded that the longitudes of Shigātse and of Lhāsa which depends on Shigātse, as given in my first map, are very close approximations, and it is gratifying to find that my reliance on Turner's route-survey was not misplaced.

The explorer's work has stood all the usual tests satisfactorily, the average value of his pace, 2.45 feet as determined from the differences in latitude, is about what might be expected from a man of his stature. His latitude observations agree very well *inter se* considering that he used but a small pocket sextant. His observations at Shigātse give much the same latitude as that derived from the chief Pandit's observations with a large sextant at that and other places.

His heights are the weakest part of his work, as owing to the larger thermometers originally sent with him having been broken, he was reduced to take his boiling point observations with a very small thermometer. The heights however are probably fair approximations, and give a good general idea of the great elevation of the upper part of his ground.

His bearings to peaks on either side of his road were more numerous than usual, and on the whole he was fairly successful in fixing the more conspicuous.

The exploration with its bearings &c., opens out the geography of nearly 30,000 square miles of what has hitherto been in many portions *terra-incognita* and in others nearly so; the indications on our maps having been of course mostly conjectural. The exploration more especially elucidates the geography of the basin of the Arun or Arun Kosi river, the great eastern feeder, if not the main source of the great Kosi or Kosiki river, which drains the whole of eastern Nepāl. The courses of the upper feeders of the Arun have hitherto been a puzzle to geographers. The explorer's work also defines the course of the great western tributary of the Kosi river *viz.*, the Bhotia Kosia of which we had previously no survey.

His route-survey is 844 miles in length of which 550 miles may be said to be over entirely new ground, and the remainder (though close to a line along which one European has travelled) had never been regularly surveyed before.

The explorer took latitude observations at 11 points upon which the work depends and determined the height of 31 places. His work I think will prove a valuable addition to the Trans-Frontier geography of India.

T. G. MONTGOMERIE, MAJOR, R.E.,

*In charge Trans-Himalayan Exploring Parties.*

*List of positions of the chief places as determined from the Route-Survey of explorer No. 9 in Nepāl and Great Tibet.*

	Latitude		Longitude		Height	Remarks
	°	'	°	'	feet	
Darjeeling ...	27	2	88	19	7253	From G. T. Survey.
Tattapani ...	28	36	88	8	15025	
Chota-Tāpu (or Darcha village) ...	28	57	88	27	14558	
Shigātse (Tra-shi-lhun-po) ...	29	17	88	47	11822	
Pil ...	28	37	87	54	13259	
Ting-ri town ...	28	35	86	40	13865	
Nilam Dzong (or Kuti) ...	28	9	86	5	13911	
Kātmāndu ...	27	41	85	18	...	From Crawford's to G. T. S. Peaks.
Kabiri river, bank of ...	...		87	33	...	No astronomical latitude.
Narahia (Naria) ...	26	26	86	45	...	
Dhankuta ...	26	56	87	21	2927	
Lāmādong ...	27	10	86	52	...	
Amtia on bank of Arun river ...	27	12	87	12	1798	

The longitude of Shigātse is derived from Darjeeling by the route-survey passing through Tattapani and Chota-Tāpu. In the map accompanying this memorandum, 88° 40' was assumed to be the longitude, using a mean between the values derived from Kātmāndu and Shigātse. In future compilations the positions as given on the map, will require to be corrected to those given above.

Observations for Latitudes taken in Nepal and Great Tibet by explorer No. 9. with a pocket sextant.

No. of Observation.	Astronomical Date.	Watch Time.	STATION.	Object	Double Altitude.	Index Error.	Deducted Latitude.	Mean Latitude.	REMARKS.
1	1871 Sept. 11th	h m s 12 0 0	Tattapani.	Fomalhaut.	° ' " 62 14 30	- 1 0	° ' " 28 35 44	} 28 85 33	On Meridian.
2	" "	13 0 0	Do.	β Ceti.	85 28 30	"	28 34 52		Do.
3	" 12th	12 0 0	Do.	Fomalhaut.	62 14 0	"	28 35 50	} 28 56 56	Do.
4	" "	13 0 0	Do.	β Ceti.	85 27 0	"	28 35 37		Do.
5	" 15th	12 0 0	Chota-Tāpu.	Fomalhaut.	61 32 30	"	28 56 44	} 28 56 56	Do.
6	" "	18 0 0	Do.	β Ceti.	84 44 0	"	28 57 8		Do.
7	" 28th	12 0 0	Shigātse.	Fomalhaut.	60 53 30	"	29 16 14	} 29 17 1	Do.
8	" "	13 0 0	Do.	β Ceti.	84 4 0	"	29 17 7		Do.
9	" 29th	12 0 0	Do.	Polaris.	61 23 0	"	29 17 44	} 29 17 1	Do.
10	" 30th	12 0 0	Do.	"	61 24 0	"	29 16 16		Do.
11	" "	13 0 0	Do.	Fomalhaut.	60 54 30	"	29 15 44	} 28 37 16	Do.
12	Oct. 4th	11 0 0	Pil village.	"	62 15 0	"	28 35 26		Do.
13	" "	12 0 0	Do.	β Ceti.	85 20 0	"	28 39 6	} 28 34 30	Do.
14	" 7th	11 0 0	Ting-ri Maiden.	Fomalhaut.	62 18 0	"	28 33 55		Do.
15	" "	12 0 0	Do.	β Ceti.	85 28 0	"	28 35 6	} 28 9 24	Do.
16	" 11th	11 0 0	Nilam Dzong (or Kuti.)	Fomalhaut.	63 4 0	"	28 10 54		Do.
17	" "	12 0 0	Do.	β Ceti.	86 17 0	"	28 10 34	} 28 8 44	Do.
18	" "	12 0 0	Do.	Polaris.	59 1 0	"	28 8 44		Do.

Observations for Latitudes taken in Nepul and Great Tibet.—(Continued).

No. of Observation.	Astronomical Date.	Watch Time.	STATION.	Object.	Double Altitude.	Index Error.	Deducted Latitude.	Mean Latitude.	REMARKS.
19	1872 Jany. 3rd	h m s 11 0 0	Katmandu.	Orionis ( <i>Rigel</i> ).	° ' " 107 50 0	' " - 1 0	° ' " 27 44 2	} 27 43 29	On Meridian.
20	" "	12 0 0	Do.	<i>Sirius</i> .	91 30 0	"	27 42 55		Do.
21	" 17th	11 0 0	Lamudong.	Orionis ( <i>Rigel</i> ).	108 58 0	"	27 10 1	} 27 10 11	Do.
22	" "	12 0 0	Do.	<i>Sirius</i> .	92 35 0	"	27 10 21		Do.
23	" 22nd	10 30 0	Antia village on bank of Arun river.	Orionis ( <i>Rigel</i> ).	108 54 0	"	27 11 59	} 27 12 25	Do.
24	" "	11 30 0	Do. Do.	<i>Sirius</i> .	92 30 0	"	27 12 50		Do.
25	" 29th	10 0 0	Dhankuta bazār.	Orionis ( <i>Rigel</i> ).	103 28 0	"	26 54 58	} 26 56 23	Do.
26	" "	11 0 0	Do.	<i>Sirius</i> .	93 0 0	"	26 57 48		Do.
27	Feby. 7th	9 0 0	Narahia bazār.	Orionis ( <i>Rigel</i> ).	110 42 0	"	26 17 56	} 26 18 21	Do.
28	" "	10 0 0	Do.	<i>Sirius</i> .	94 18 0	"	26 18 45		Do.

*Observations of the Boiling Point taken in Nepal and Great Tibet by explorer No. 9.*

No. of Observations.	Month and date.	Watch time.	STATION.	THERMOMETER.			Deducted Height above sea level.	REMARKS.
				No.	Boiling Point.	In Air.		
1	1871 August 1	8 A.M.	Derjeeling	7	201.15	64.25	7,253	West wind.
2	" "	" "	Do.	10	201.5	"	}	A point in Derjeeling 7170 by G. T. S.
3	August 5	7 A.M.	Phalialung pass	10	195.2	55.2		10,575
4	" "	" "	Do.	7	196.0	"	}	Do.
5	" "	6 P.M.	Suris pass	7	198.0	69.0		9,190
6	" "	9 A.M.	Bank of Kabiri river	7	211.0	78.0	1,677	West wind.
7	" "	8 A.M.	Walangsangola	10	195.3	60.0	}	No wind.
8	" "	" "	Do.	7	196.0	"		10,564
9	" "	1 P.M.	Tipta pass	7	187.0	46.0	16,618	No wind.
10	" "	10 A.M.	Tachrak village	7	188.0	47.0	15,025	North wind.
11	September 1	9 A.M.	Shars village	7	190.0	68.0	13,988	Do.
12	" "	3 P.M.	Lumadong thanka	7	191.5	67.0	13,071	Do.
13	" "	7 A.M.	Tachihwang village at bank of Mo-tre-tung (Chomto Dong) lake	7	188.5	46.0	14,734	East wind.
14	" "	" "	Tattapaal or Chajong	7	188.0	47.0	15,025	Do.
15	" "	11 A.M.	Leguhung pass	7	186.0	44.0	16,201	South wind.
16	" "	4 P.M.	Chota-Tapu or Darcha village	7	189.0	64.0	14,568	East wind.
17	" "	11 A.M.	Shigtse	7	192.0	61.0	}	No wind.
18	" "	7 A.M.	Do.	7	192.5	62.0		11,823
19	October 3	5 P.M.	Sa-ya My: near Tachuk	7	190.0	50.0	13,859	South wind.

20	October	4	7 A.M.	Pil village ... ..	7	191·0	49·5	13,259	South wind.
21	"	9	6 A.M.	Ting-ri Maidan ... ..	7	190·0	51·0	13,865	West wind.
22	"	10	8 A.M.	Thanglung pass ... ..	7	182·0	30·0	18,460	South wind.
23	"	13	7 A.M.	Nilam Dzong or Kuti ... ..	7	190·0	57·0	13,911	Do.
24	"	15	5 P.M.	Tāta Bhansār ... ..	7	205·25	66·0	5,002	No wind.
25	December	7	8 A.M.	Kātmandu ... ..	7	208·0	...	...	
	1872								
26	January	8	7 A.M.	Tribeni bank of San Kosi and Tamba Kosi rivers ...	7	...	50·0	...	
27	"	9	6 A.M.	Hilia pass ... ..	7	206·0	46·0	4,620	West wind.
28	"	11	10 A.M.	Kanjia pass ... ..	7	206·0	46·0	4,620	Do.
29	"	17	"	Kumdia pass ... ..	7	203·0	43·0	6,302	No wind and rain.
30	"	18	7 A.M.	Lankhu village ... ..	7	206·0	46·0	4,622	North wind.
31	"	...	2 P.M.	Chakawa pass ... ..	7	202·0	42·0	6,869	Do.
32	"	22	7 A.M.	Antia village on bank of Arun river ... ..	7	211·0	54·0	1,798	East wind.
33	"	26	noon	Chuwa pass ... ..	7	...	44·0	...	Data incomplete.
34	"	28	7 A.M.	Sadab village ... ..	7	208·0	50·0	3,493	South wind.
35	February	1	9 A.M.	Dhankuta bazar ... ..	7	209·0	52·0	2,927	Do.
36	"	3	7 A.M.	Barah Chetr ... ..	7	...	55·0	...	West wind.
37	"	7	7 A.M.	Nuria bazar ... ..	7	...	55·0	...	South wind.
38	June	19	noon	Mussooree G. T. Survey Office ... ..	7	201·75	75·0	...	
39	August	12	11½ A.M.	Do. ... ..	7	202·00	70·5	...	Mean of six. Cloudy and calm.

NOTE.—The preceding heights above Sea level are computed differentially from height of Mussooree observatory taken at 6937 feet to which the observer's boiling point 201·83 and temperature 72·75 have been assumed as corresponding.

## Route-Survey from Darjeeling (Thāna) to Shigātse (Market place).

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
1	Darjeeling ... ..	294 30	13963	
2	... ..	275 30	4152	
3	Kainchalia ... ..	334 30	7279	Thāna.
4	... ..	285 0	2350	
5	Hamaphong ... ..	281 30	10340	Village.
6	... ..	292 0	15100	
7	Phalialung pass ... ..	274 0	2871	
8	... ..	240 0	8100	On boundary between British and Nepāl Territories.
9	... ..	285 0	13010	
10	Nablang ... ..	297 0	9580	Village.
11	Suriabhanjan ... ..	320 30	6425	Hill.
12	Suria pass ... ..	299 0	7085	Do.
13	Shikārpur ... ..	290 30	15140	Village.
14	Kabiri ... ..	340 0	4566	Stream.
15	Phuwa village ... ..	311 0	13850	200 yards from.
16	Taplang Dzong ... ..	17 30	16807	Village.
17	... ..	42 0	6608	
18	... ..	66 30	3859	
19	Tabkia Thok ... ..	35 0	11150	Village.
20	... ..	66 0	17097	
21	Ebangkhola ... ..	301 0	7270	Stream.
22	Tambar ... ..	11 0	8511	River, on bank of.
23	... ..	18 30	11800	
24	... ..	320 0	8010	
25	... ..	335 0	18001	
26	... ..	360 0	5938	
27	Tashirak Chu ... ..	21 0	10200	Stream, on left bank of.
28	... ..	345 0	12100	
29	Nila pass ... ..	20 0	9910	Hill, on top of.
30	Shara ... ..	40 30	34030	Village.
31	... ..	90 0	4700	
32	... ..	65 30	28530	
33	Tashichirang ... ..	270 0	2288	Village.
34	Mo-tre-tung ... ..	22 30	2500	Lake, on bank of. Called Chomto Dong by the explorer.
35	... ..	67 0	21225	
36	Nangji ... ..	358 0	6065	Village.
37	Chajong ... ..	67 30	5450	Do. Latitude observed.
38	Tinki pass ... ..	75 0	6684	Hill, on top of.
39	... ..	35 0	20104	
40	Lagulung pass ... ..	345 0	11670	Hill. Boundary of Sikkim & Lhāsa.
41	... ..	16 30	18194	

*Routs-Survey from Darjeeling (Thāna) to Shigātse (Market place).—(Continued).*

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
42	Ruksum ... ..	0 0	8955	Stream, on bank of.
43	... ..	53 0	7715	
44	Chota-Tāpu ... ..	26 0	8010	Village. Latitude observed.
45	Gyaling pass ... ..	67 30	5000	Hill, on top of.
46	... ..	25 30	6393	
47	... ..	35 30	9600	
48	... ..	30 0	16896	
49	... ..	33 30	12000	
50	Shigātso ... ..	...	...	City. The Market place. Latitude observed.

*From Changma (village near Shigātse) to Kātmāndu.*

1	Changma ... ..	250 30	14765	Village—10996 paces from station No. 48 on the line from No. 48 to No. 49 of foregoing Numbering.
2	... ..	252 30	10850	
3	... ..	235 0	4300	
4	Nangla ... ..	225 0	15125	Hill, on top of.
5	Shup ... ..	280 0	1280	River, on right bank of.
6	Lingbochen ... ..	175 0	6800	Temple.
7	Fuksum ... ..	235 0	11383	Stream, on bank of.
8	... ..	212 0	12095	
9	Chong pass ... ..	266 0	13790	Hill.
10	... ..	200 0	2500	
11	Ata pass ... ..	270 30	11350	Hill.
12	... ..	194 30	6500	
13	... ..	224 30	7500	
14	Dango pass ... ..	212 0	11100	Hill.
15	Sinas ... ..	183 30	19880	Stream, on bank of.
16	Pil village ... ..	206 0	13300	Latitude observed.
17	... ..	230 0	9118	
18	... ..	215 30	14712	
19	... ..	280 0	13000	
20	Chniokar ... ..	295 30	30760	Village.
21	Phungtu ... ..	267 0	7600	River, on bank of.
22	Ditto. ... ..	275 0	6500	Do.
23	Ditto. ... ..	270 0	10294	Do.
24	... ..	250 0	9690	
25	... ..	265 0	17400	
26	Chakar ... ..	260 30	25100	Village.
27	... ..	279 30	11235	
28	Ting-ri Dzong ... ..	232 0	32016	Town, at entrance to. Latitude observed.
29	... ..	294 0	6500	



## From Changma (village near Shigatse) to Kātmāndu.—(Continued).

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
30	Thung pass ...	269 30	17181	Hill.
31	... ..	225 0	8500	
32	... ..	204 0	7870	
33	Palgu ... ..	235 30	4050	Stream, on bank of.
34	... ..	205 0	5820	
35	Thūkiāling ... ..	195 30	21921	Village.
36	Nilam Dzong ... ..	210 0	4800	Do. Latitude observed.
37	Bhotia Kosia river ... ..	135 0	5170	On right bank of.
38	Do. ... ..	190 30	3200	Do.
39	Do. ... ..	176 0	3540	On bridge.
40	Choksum ... ..	184 30	2870	Village.
41	... ..	195 30	12197	
42	... ..	152 0	2775	
43	... ..	209 0	13017	
44	... ..	207 0	4045	
45	... ..	215 0	6182	
46	Kanglank ... ..	230 0	3800	Hill, on top of.
47	Listi ... ..	252 0	3325	Do.
48	Listi village ... ..	190 30	8725	
49	... ..	215 0	2600	
50	Bisingkhar pass ... ..	255 30	4942	
51	... ..	240 30	5480	
52	Balefi ... ..	200 0	5470	Stream, on bank of.
53	... ..	248 30	3210	
54	Bansapati ... ..	241 30	3600	Village.
55	Chautaria ... ..	229 30	8425	Do.
56	... ..	231 30	5900	
57	Ghetar ... ..	271 30	3360	Village.
58	Sipa ... ..	241 30	4065	Do.
59	Jherkola ... ..	260 30	3826	Stream, on bank of.
60	Dhankola ... ..	271 30	7100	Do.
61	... ..	251 0	9310	
62	Chautaria pass ... ..	226 0	2300	Hill, on top of.
63	... ..	221 30	3890	
64	... ..	270 0	5635	Village.
65	Kalitar ... ..	252 30	8210	Do.
66	Chabeli ... ..	225 0	6170	
67	Kātmāndu ... ..	...	...	At Indar Chauk (centre of city).

*From Kātmāndu (Asan Tol) to Taplang Dzong (Station No. 16 of Route from Darjeeling to Shigātse).*

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
1	Kātmāndu ... ..	112 0	7575	Asan Tol. Latitude observed on this line, 1025 paces from starting point.
2	Dimi village ... ..	110 0	2250	
3	... ..	106 0	3710	
4	... ..	115 0	6300	
5	Bist village ... ..	109 0	2335	
6	Burapa village ... ..	129 0	4060	
7	... ..	113 30	5660	
8	Nabna pass ... ..	126 30	4700	
9	Dāpcha village ... ..	122 0	3230	
10	... ..	118 30	4850	
11	... ..	66 30	2500	
12	... ..	123 30	4415	
13	... ..	135 30	6825	
14	... ..	112 0	5200	
15	... ..	110 0	4910	
16	... ..	127 0	7800	
17	Jhangajholi ... ..	105 0	4786	Village.
18	Mulkotar ... ..	127 30	6400	Do.
19	... ..	74 0	2415	
20	... ..	144 0	5500	
21	Tribeni ... ..	92 0	7200	Junction of two streams.
22	Bedana ... ..	110 0	3950	Village.
23	... ..	100 0	5700	
24	Hilia village ... ..	32 0	3000	
25	... ..	35 0	3500	
26	... ..	112 0	2000	
27	... ..	60 0	1900	
28	... ..	93 0	4000	
29	... ..	103 0	6190	
30	Kuwapāni ... ..	72 0	4770	Village.
31	... ..	122 30	4500	
32	... ..	149 30	3900	
33	... ..	107 0	11060	
34	Kanjia pass ... ..	60 0	6400	
35	Kanjia village ... ..	87 0	6615	
36	Bugnam ... ..	95 0	3400	
37	Galutiatūr ... ..	42 30	2200	Village.
38	... ..	126 30	3715	
39	... ..	95 0	10146	
40	Charku ... ..	74 30	5670	Village.

*From Kātmāndu (Asan Tol) to Taplang Dzong (Station No. 16 of Route from Darjeeling to Shigātse.—(Continued).*

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
41	...	117 30	5481	
42	Dudh Kosi ...	55 0	6225	River, on bank of.
43	Rakhola Fasal ...	120 0	9680	Shop.
44	Kumdia pass ...	45 0	4726	
45	Do. ...	117 0	6500	
46	Nerpa village ...	136 30	5790	
47	Dorpa village ...	85 30	8500	Latitude observed at Lāmādong village 5600 paces from Dorpa on line from Dorpa to Station 48.
48	Lamkhu ...	100 0	7025	Village.
49	Chakawa pass ...	77 30	5900	Hill.
50	Dilpa village ...	61 30	4400	
51	...	140 30	10780	
52	Bhojpur Pati ...	82 0	6597	
53	...	87 0	4600	
54	...	40 30	5210	
55	Soria village ...	57 30	5425	
56	...	48 0	4600	Latitude observed on line 56 to 57 at Amtia village, 2500 paces from station 56 towards 57.
57	Arun river ...	74 0	7290	On bank of.
58	Chainpur ...	55 0	5700	Hill.
59	Do. village ...	77 30	8590	
60	...	92 0	10610	
61	Nundhakia ...	65 30	6400	Pati. Small Bāzār and Dharmśāla.
62	...	110 0	4200	
63	Milkia pass ...	87 30	4410	
64	Do. ...	70 0	8625	
65	...	62 30	13645	
66	Taplang Dzong ...	...	...	Same as Station No. 16 of Route from Darjeeling to Shigātse.

*From Kabiri, Dharmśāla (Station No. 14 of Route from Darjeeling to Shigātse) to Narakia (Naria) Bāzār (Kotwāli).*

1	Kabiri ...	125 0	3900	
2	Tambar river ...	199 30	7310	On left bank of.
3	Chua Pahār ...	267 30	7600	
4	Sambwa ...	210 30	5300	Village.
5	Tukma ...	135 0	2700	Hill.
6	Do. ...	216 0	7520	
7	Majhwa ...	210 0	4525	
8	...	201 0	9470	
9	Kalamati ...	225 0	4597	Hill.

From Kabiri, Dharmśāla (Station No. 14 of Route from Darjeeling to Shigātse) to Narahia (Naria) Bāzār (Kotwālī).—(Continued).

No. of Station.	Name of Station.	Bearing to forward station.	Distance in paces to forward station.	REMARKS.
10	... ..	172 0	2000	
11	Sadab hill ... ..	225 0	3370	
12	Do. ... ..	241 0	3800	
13	Telia khola ... ..	201 30	7820	Stream.
14	Hamjang hill ... ..	249 30	8315	
15	Dhankuta ... ..	187 0	6660	Bāzār, Latitude observed.
16	... ..	246 0	5670	
17	Tambar river ... ..	211 0	8860	On bank of.
18	... ..	241 30	4370	
19	Dhārapāni ... ..	272 0	6040	Village.
20	Barah Chetr. ... ..	191 0	6466	Worshipping place.
21	Chatra ... ..	215 0	23400	Thāna.
22	Megzin or Chaura ... ..	177 0	23300	Ka Thāna.
23	Chapri village ... ..	275 0	4100	
24	... ..	206 30	11476	
25	Kotia village ... ..	220 30	8170	
26	Thakia village ... ..	261 0	5210	
27	Sikrata village ... ..	251 0	5676	
28	... ..	272 0	10085	
29	Dhānsia village ... ..	267 0	6650	
30	Arāha vllage ... ..	251 0	4270	
31	Narahia (Naria) ... ..	...	...	Bāzār, Thāna. Latitude observed.



*Narrative of an exploration of the Nam or Tengri Nor Lake in Great Tibet made by P. Kishen Singh, during 1872, drawn up by Lieut.-Colonel T. G. Montgomerie, R.E., F.R.S., &c., Deputy Superintendent, G. T. Survey of India.*

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During 1871 a party was organised with a view to exploring some portion of the unknown regions north of the Tibetan watershed of the upper Brahmaputra. The party consisted of a semi-Tibetan, a young man who had been thoroughly trained for the work, with 4 reliable assistants engaged from border districts; one of these latter had been employed on a former exploration in a subordinate capacity and his experience, as far as travelling in such countries was concerned, would have been exceedingly useful, but unfortunately he was unable to get more than a march beyond the frontier because the officials on the other side of the Himalaya were determined to arrest him if he proceeded further, though his ostensive object was trade. This being the case there was nothing for it but to arrange for his return and to substitute another man P. Kishen Singh in his place. This was managed satisfactorily after some delay.

The exploring party then passed from Kumaun into the Tibetan province of Hundes or Ngari Khorsum. At first they got on very well but towards the end of July, when in the neighbourhood of the Manasarowar lake, their progress was for sometime interrupted by a band of mounted robbers who had made an incursion from the east: they succeeded in evading the robbers but had to take a circuitous route by Purang, instead of going direct to Shigätse from Manasarowar as first arranged. The party reached Shigätse on the 24th November and remained there 12 days making inquiries as to the best route to go to the Tengri Nor lake and preparing for the journey. Sheep were the only animals likely to stand the journey, as the roads were too stony for yaks and the country was too cold for donkeys, the explorer consequently purchased 50 sheep and put all the baggage on their backs. The party left Shigätse on the 6th December marching as far as the Naisang village; on the 7th they crossed the great Brahmaputra or Teang-po river by means of rafts and encamped at Peting village on the left bank of the river. Peting has about 30 houses. The next day they put up at Cho-lo village. Here the explorer exchanged the silver rupees he had with him for gold which he put into hollow walking sticks prepared for the purpose. On the 11th December they reached Dongdot-lo, a village on the right bank of the Shang, a northern tributary of the Brahmaputra; here they found an official from Shigätse who rules over Dongdot-lo and the surrounding villages which are numerous. On the 13th December they reached Chom a village of 50 houses with a Buddhist monastery (*gom-pa*) on its west. This monastery or rather nunnery is occupied by women only, of whom there were about 100. On the 14th they reached Namling on the right bank of the Shaug river; here there is a large monastery with about 500 Lāmas, all men: the monastery is on a high hill, it is a place of some importance boasting of an iron bridge over the river and commanded by a strongly situated fort which is the residence of the Jongpon, or Governor, with about 500 Tibetan soldiers; Namling itself has about 200 houses surrounded by gardens with a small *bizār* in the centre. The *Sokpo Giäju* tribe—who bring salt—trade through this *bizār* which produces all ordinary provisions. The name of Namling is derived from the two Tibetan words *nam* sky and *ling* garden, the monastery being on a high hill with gardens at its foot. On the 17th December the party reached Kholam village on the left bank of the Shlang river which was crossed by means of the iron bridge: Kholam has about 50 houses; the land round about is very productive. On the 19th they reached Gonkiäng a village of 60 houses with a well built monastery on rising ground. In this monastery there are about 100 Lāmas ruled by a Lāma of high rank, called Chu Ring-bo-che, who is very much respected by the people round about.

On the 20th December the party halted at another monastery, called Rabdan Chuling, built about 80 years ago; it is the residence of another high Lāma called Shaptung Ring-bo-che said to be 100 years of age who was both the founder and builder of this monastery. The people of the country say that whilst out hunting he heard a voice which told him to put down his gun and go to a certain spot where he would find unlimited riches buried in the ground, with this he was commanded to build a monastery: he had obeyed the inspiration and had ever since passed his life in religious duties. *Rabdan* means house, *chu* wisdom and *ling* garden. The Lāma, when the explorer saw him, was evidently a very old man, his body so small and shrunk that when sitting his knees projected a great deal above his head.

From the time the explorer left Namling on the 14th December it was so cold that the mercury of his thermometer did not rise out of the bulb till after 9 or 10 in the morning. The streams were all hard frozen. The wind moreover blew so hard that their tent was torn by it and they had consequently to make a halt of 5 days in order to repair the damage. On the 26th December they marched on and reached Gunje; the people of this village said white bears called *tik-dumba* were very common from thence to Nam lake and committed great havoc amongst their cattle.

On the 27th December he reached Nai-kor which has about 30 houses and some cultivation; beyond Nai-kor there was no more cultivation, and the only inhabitants are nomadic, going by the name of *Dokpa*; they graze sheep, goats and yaks.

On the 28th December the explorer encamped at Chutāng-chāka where there are some 15 hot springs, whose water was found to be at a temperature of 166° Fahrenheit, boiling water at the same place only rising to 186° Fahrenheit. There were 8 baths supplied by these springs; the baths were put at some distance from the springs so as to allow the water to cool sufficiently for bathing. The water has a smell of sulphur. There were a number of *Dokpa* tents at a short distance from the springs.

From the Brahmaputra river near Shigātse up to these springs the country is called Shang and that to the north, Lahu.

On the 29th December the Chaping encamping ground was reached; here there were more *Dokpa* tents; the road was so slippery with ice that one of the men fell and broke a thermometer. On the 30th December they arrived at Pe-ting-chuja near which, on the right bank of the Lahu river, there is a large stony place about 120 paces in length from which about a dozen columns of hot water issue; these rise to a height of 40 or 50 feet, and produce so much steam that the sky is quite darkened with it, the noise moreover was so great that they could not hear one another speaking; the water of these jets was found to be 176° Fahrenheit. Similar jets of water were noticed issuing from the middle of the river, shooting up to 40 or 50 feet height and evidently at much the same temperature as those on land, as they produced clouds of steam, and the river was free from ice for a quarter of a mile below them though everywhere else both above and below it was hard frozen. The Jāwar monastery lies about 3 miles to the east of these springs. The explorer went to the monastery which he found had a number of highly ornamented idols, in front of which were arranged a number of petrified stones called *naidhowas*, these are in various shapes, such as hands, shells, &c. and are objects of worship as well as the idols. Jāwar is the name the Tibetans have for Suket-Mandi in the Punjab hills, N. by W. of Simla. This according to a tradition was given in honour of a daughter of a Rāja of Sulet-Mandi who was supposed to have married Laban one of the idols.

On the 31st December the encampment of Salung-sumdo was reached, here they found some 40 tents. On the 1st January they halted at Salung which boasts of 50 *Dokpa* tents. The *Dokpas* said there were no regular encampments beyond Salung, the only people about being thieves on the look out for plunder, against whom it would be necessary to be on their guard.

On the 2nd January the explorer reached Naisum-chuja. *Chuja* or *Chusa* means source of hot water springs. The name is given to the place from the great number of hot springs which there are here on both sides of the Lahu river. The water from these springs is so hot that the river is not frozen for about 3 miles below them though everywhere else it was frozen over. On the right bank of the river there are two very remarkable hot springs which throw up a jet of water over 60 feet in height; the water in falling again freezes and forms pillars of ice which are nearly up to the full height of the jet. These pillars are about 30 feet in circumference and look like towers with holes at the sides just as if they had been made artificially. The water is thrown up with great violence and noise. The thermometer when put in the water inside the pillars stood at 183° Fahrenheit the boiling point there being only 183°·75.

The party was delayed at Naisum-chuja for 3 days owing to one of the men getting sick; it is said to be a great place of worship or pilgrimage. Owing to cloudy weather the explorer was unable to take any astronomical observations.

On the 6th January they reached Dung-chaka 15,700 feet above sea-level where there are more hot springs but not of such high temperature as the last, their water showing only 130° Fahrenheit, while the boiling point was 183°: about 10 miles to the east there is a lofty snowy peak called Jhomogangar somewhat of the same shape as the Kailas peak near the Manasarovar; it is a noted object of worship being considered as a female divinity. On the 7th January they encamped at the foot of the Khalamba pass crossing over on the 8th, the highest part of the

pass being 17,200 feet above the sea and water boiling at 180°. The crossing was very difficult owing to a heavy fall of snow which made the descent on the opposite side very dangerous. The only fire that they could make after crossing was from goats' dung with which they managed to warm up a brew of tea. The next day the explorer returned to the pass in order to re-observe the boiling point, not being quite satisfied that the water was properly boiling the first day that they crossed over. He was again troubled with snow and when he got back to camp was half dead with the intense cold, and did not recover till he had drunk a bowl of hot tea. The encamping place is called Dung Nagu Chaka; there were several hot springs round about, the water in them raising the thermometer to 180°, while boiling water only raised it two degrees higher.

On the 10th January they reached Kiang pass and on the 11th Dakmar encampment, where the *Dokpas* generally keep their sheep, goats, &c., during the summer. On the 12th they encamped on a plain and on the 13th reached the Ghaika camping place from whence they got a view of a very large lake which they found was called by the Tibetans Jāng Nam-cho Chidmo and supposed to be called Tengri Nor in the Tartar language. A camp of several tents was seen to the east at a place called Dungehe. As a road was seen to branch off from this camp two of the men were sent in disguise as beggars in order to inquire about the road and as to why a camp was kept there; they found the camp all but deserted the only occupants being an old man and a woman who were seated in one of the tents; the man said the tents belonged to the *Dokpas* who had concealed all their property, women, children, &c., while the men themselves had armed and gone out to meet a band of robbers who they had heard intended to plunder them. As to the road they said it went to Lhāsa by the Ninchin-thaug-la to Jyang Hyangpachen monastery and thence by the Tulung Dinga monastery to Lhāsa.

One mile north of Ghaika the road crosses the Ghaika a large river which coming from the west flows into the Nam lake about 12 miles east of the road. The river though very wide was completely frozen over; in the summer it is said to rise very much.

On the 16th January after crossing the Ghaika river the explorer reached a place called Chakri which is surrounded by a 10 feet high wall enclosing a space about 200 paces by 200 paces. There were several houses of sundried bricks inside the wall but they were all in ruins; the place was said to have once been the residence of a man of some rank. As a great deal of snow was falling the explorers were very glad to take advantage of the shelter which the ruins afforded. On the 18th they arrived at Sinjam where they found about 70 *Dokpa* tents; as robbers were known to be in the vicinity every tent was guarded by an armed man. The robbers were said to come from a district called Jāmaāta De which lies to the north. Jāmaāta De is said not to be under Lhāsa and the inhabitants consequently plunder the Lhāsa district whenever they are in want, as they often are in consequence of the severity of the climate which kills off their cattle whenever there is an extra heavy fall of snow. Sinjam being one of the nearest places to these freebooters has very often been plundered.

The party were detained two days at Sinjam owing to heavy snow and did not start again till the 21st of January, when they marched to Tara on the shores of the great Nam lake which was completely frozen over and seemed to extend to a great distance eastward. The next day they continued their march along the shores of the great lake and reached the monastery called Dorkia Lugu Dong situated on a small hill overlooking the lake. *Dor* means a rock *lugu* a sheep, and *dong* a face, the monastery looking something like a sheep's head.

A chief Lāma lives here with some forty ordinary Lāmas. The monastery commands a splendid view of the lake and surrounding snowy mountains which were more especially grand to the south-east.

The lake is a magnificent sheet of water and near Dorkia it has the advantage of having an island close at hand which sets off the scenery. The island is about a mile long and half a mile in breadth; it has a hill about 400 feet high in the centre which is crowned by a temple of the goddess *Dorje Phāmo*. The explorer determined to make a complete survey of the lake and he consequently deposited his property in the monastery with 3 of his men, being afraid of robbers, having done this he started off with 3 other of his men; on the 24th January they reached Ringa Do on the margin of the lake, here there is another island, called Kubi Ne Dobo close to the shore, which is about 1½ miles in length by about 1 mile in breadth.

On the 25th they reached Jādor Sundryaling monastery. Here they saw 3 pyramids or cones of earth of sundried mud each about 500 feet in circumference rising to a considerable height. The explorer went under these mounds by an artificial passageway and found that one of them was open in the centre. The people say that they were originally all closed and that when a certain very devout Lāma, who used to worship under one of these mounds, died he was taken up into heaven through the opening. The Jādor Sundryaling monastery has about 50 Lāmas. Near the monastery there are a great many fossil stones which are held in veneration; they are called



*Naidhowas.* The explorer saw a gigantic doorway cut in the rock through which the Lāmas say the god *Ninchin-thang-la* passes, its height is about 25 feet. Owing to heavy snow the explorer was detained two days at Jādor.

On the 29th they reached Nāngba Do which is also on the shore of the lake close to some small hills which are considered to be sacred. The next day they halted at Langdāng or Chogola; here they found the *shukpa* bush very abundant. On a low hill there is a temple of a god called *Chogola*. On the 30th they got to Dakmar and passing Thuigo Sumna shrine they reached Nai Chu Sumna on the 31st. On their way they crossed the Nai which is a very large stream, being the largest that flows into the lake, it comes from the east. At the time the explorer crossed it was 40 paces in width and completely frozen over.

On the 1st February the explorer reached the Tashi Doche monastery which is on a low hill near the lake, it has 35 Lāma monks. To the south-west of this monastery there are a number of magnificent snowy peaks which are called the Ninchin-thang-la peaks. The Lāmas say the highest peak is a god and that he is surrounded by 360 smaller snowy peaks which act as his servants.

To the east of Tashi Doche there is another mass of high peaks called Nuchin Gāsa which appeared to the explorer to rise higher above the Nam lake than the Kailas peak does above the Manasarowar lake. The whole of these peaks were very imposing as seen from the monastery which also commands a full view of the whole of the lake. Though the water of the lake is so salt as to be unfit for drinking it is nevertheless quite frozen over in November, the lake being about 15,200 feet above the sea; when the explorer saw it the surface looked as if it was made of glass; it is said to remain in that state till May when the ice breaks up with great noise. The lake contains fish, and quantities of small shell are found on the banks. The lake itself is a great resort for pilgrims.

On the 3rd they halted near a small river; on the 4th they reached an open plain at night and were put to great straits owing to a heavy fall of snow. They had left their tent behind at Dorkia and no shelter being available they had to clear off the snow and lie on the ground without any fire; they thought the cold would have killed them, but they managed to survive the night through; in the morning they found they were well covered with fresh snow. On the 5th they went on to the Ghaika river; it was snowing all the time and they were forced to camp out again without any fuel or covering and passed another very miserable night. On the 6th they saw the sun again and were able to get some fuel and to make themselves tolerably comfortable, but whilst crossing at the side of the lake near a small stream, (the Sinjam Chu) one of the men fell through the ice which was covered with snow and would have been drowned had he not got hold of another man who pulled him out again. The man's clothes froze hard directly he got out, and he was only brought round by means of a fire which they at once lighted.

On the 7th February they reached the Dorkia monastery from which they originally started, having been 15 days in making the circuit of the lake. They halted 3 days at the monastery and started off on the 11th, getting that day as far as Rīnga Do; on the 13th they reached the Jādor monastery before mentioned and on the 14th Nāngba Do. Here the explorer heard there was a lake called Bul Cho (San lake) about 6 or 7 miles to the north, he accordingly climbed a peak in that direction and saw the lake. He estimated it to be about 6 miles by 5. A kind of borax is found by and in the lake, it is called *bul* and hence the name. This borax is used by the inhabitants of Lhāsa and Shigātso as a spice for meat, for tea and for washing clothes, bathing &c. It is carried away by the traders in great quantities.

On the 15th they reached Langdāng, on the 16th Dakmar, on the 17th the plain of Chāng Phāng Chuja where there are several hot springs in which the thermometer rose to 130°. On the 18th as they were about to start some 60 armed men arrived on horse back and began plundering their property and in spite of their entreaties took away everything except the instruments which they said they did not care to keep in case the authorities should find them on them and ask how they came into their possession. After a great deal of begging the robbers gave them back a piece of cloth each with two sheep and two bags of food, a cooking vessel and a wooden cup to each man; with these they had to be contented, the robbers saying if they troubled them any more they would kill them.

The explorer had intended to make his way from the Nam lake to the north as far as the city of Sining, but after the robbery there was no possibility of doing that and indeed they were so far from habitations that it was a question whether they could exist, and there was nothing for it but to march as quickly as they could to the south in the direction of Lhāsa where they were likely to get into inhabited ground soonest. The day after the robbery they halted in order to consult as to the best course to follow. On the 20th February they went as far as the banks of the Nai Chu; here one of the men got sick and they were obliged to

remain there all the 21st, their food consisted of one pound of flour and hot water, they had moreover nothing to cover themselves with, the robbers having taken the tent, and were exposed to the snow and wind which blew very hard.

On the 22nd they reached Dam Niargan pass. The explorer says that he had got so weak that he took much shorter paces than he had hitherto done. On the 23rd they ascended the Dam Niargan pass, after crossing they decided to kill one of their two sheep as they had exhausted all their flour; at the same time seeing tents in the neighbourhood all the men went out to beg and after a long round came back with 8 pounds of flour and began to feel more hopeful. On the 25th another man got ill and they were obliged to halt again.

From Dam Niargan there is said to be a road to Lob Nor and to Jiling or Sining. From Dam Niargan it is about 10 days' journey to Nākchukha, a place that has a bad reputation as to the number of robbers who prey upon travellers; from thence it is about 45 days' journey to Sokpohuil which is quite a barren country infested however by robbers; after passing Sokpohuil the inhabitants are more civilized and are said to be very kind to travellers.

The Lob Nor (? Koko Nor) lake is in the Sokpohuil territory, and close to it is the town of Kharka. It is about 15 days' journey from Sokpohuil to Sining city, where a Chinese Amban, a man of considerable authority resides. Sining is described as being very superior to Lhāsa, good horses, sheep, &c., are procurable and the shops are well supplied with silk, woolen articles, carpets, &c.

On the 26th they halted under the Chāna pass, the country up to this point was called Dam Niargan. On the 27th they halted at Angchusa where they noticed 6 *Dokpa* tents. On the 28th they reached Lachu Sumna the extremity of the Bādām district which begins at Chāna pass.

The Urirong district extends from Lachu Sumna to Dhog pass. On the 29th they reached Siwalungi Ritu monastery which has some 60 Lāma monks. Here the height was observed by boiling point, but owing to the loss of his quick silver, when robbed at Chāng Phāng, the explorer was unable to take latitude observations; he however hoped that on reaching Lhāsa he would be able to borrow sufficient money to enable him to refit and to return to this same place on his way north-east to China.

On the 1st of March he crossed the Dhog pass encamping on the other side, the district of Talung extends from the Dhog to the Cha pass. On the 2nd they reached the very large monastery called Talung which has 2 head Lāmas with about a thousand monks. Here they halted during the 3rd in order to rest and examine the monastery; inside they found a large number of images carved in the walls the whole of these were adorned with gold. The road from Lhāsa to Lob Nor (?) and Jiling (Sining) passes about one mile south of the monastery. The Sining Kāfilas pass by this route with their camels laden with merchandize. On the 4th March he crossed the Cha pass and encamped at its foot on the opposite (south) side near the village of Lāngmo where they saw the first signs of cultivation that they had met with since the 29th of December. On the 5th they reached Jhokār Churtan; on the 6th Naimār village which has about 20 houses surrounded by a number of smaller clusters of houses. On the 7th they reached the monastery of Nehlin Dāk, on the 8th after crossing the Pen-po-go pass they halted at Lingbu Dzong. The Pen-po district ceases at the pass of that name. On the 9th March the party reached Lhāsa; they were excessively glad to get back to a civilized place again where they would at any rate have no chance of being starved as they were at one time likely to be.

Though the Lhāsa people were hospitable enough the explorer found there was no chance of his being able to borrow sufficient money to enable him to march to Sining as he had intended; with the greatest difficulty he managed to borrow 150 rupees from a trader who was going to Gar-tok, but he insisted upon the explorer accompanying him and in addition took his aneroid barometer and compass as a pledge for the money, the aneroid which was a large one he apparently took for a magnificent watch and at the end of the journey the explorer's messenger who was sent with money to redeem the instruments had some difficulty in recovering them. Having the command of so little money the explorer decided upon returning to India and after a long and difficult journey reached the Head Quarters of the Great Trigonometrical Survey in safety.

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*Memorandum by Lieut.-Colonel T. G. Montgomerie, R.E., F.R.S., &c., on the results of an exploration of the Nam or Tengri Nor Lake in Great Tibet made by P. Kishen Singh.*

Amongst other attempts to explore the various countries beyond the borders of British India, I have always borne in mind the necessity to explore the vast regions which lie to the north of the Himalayan range, from E. Longitude 83° to E. Longitude 93°, and I have consequently, from time to time, tried to get more information as to this *terra incognita*; but since the Pandit made his way from Kumaun to Lhāsa, I had not till lately succeeded in getting much advance made to the north of his line of explorations, though a good deal was done to the north of the Manasarowar lake. One explorer made his way from Rudok on the Pangong lake to Thok Jālun and thence back to the Manasarowar, passing quite to the east of the great Kailas peak. The same explorer subsequently made his way to Shigātse, but he was unable to penetrate to the north of the main course of the upper Brahmaputra. Though disappointed with this I continued to try and get an explorer to penetrate into those regions, and after many failures I have at last the satisfaction to be able to report that some progress has been made in exploring to the north of Shigātse and Lhāsa.

The accompanying narrative gives the details that I was able to gather from the explorer.

As usual the party was troubled at the frontier; but once fairly in Tibetan territory they had no difficulty in making their way down the upper Brahmaputra to Shigātse, at least had no difficulty that would not equally have affected ordinary inhabitants of the country. They found no good opportunity of penetrating to the north till they reached Shigātse; there they, as directed, made inquiries about the Tengri Nor lake. They found that there was a regular route to this lake frequented by traders in borax, salt, &c., and also by pilgrims; they consequently decided to try and make their way there in the character of pilgrims, taking with them a small supply of goods with a view to meeting their wants on the road by barter, the ordinary custom of such pilgrims.

They were told that sheep were the only means of carriage that would answer and they made their arrangements accordingly, purchasing some of the large long-legged sheep with the usual bags for loading. They marched down to the Brahmaputra, crossing that great river by means of rafts; this point was about 11,200 feet above the sea. Ascending the Shang tributary of the river the party day by day got into still higher ground, until they reached the Khalamba pass, 17,200 feet above the sea, and there crossing over from the basin of the Brahmaputra they descended into the basin of the Tengri Nor lake, which was found to be about 15,200 feet above the sea.

For 8 days after leaving the Brahmaputra the explorer marched from village to village, passing many Buddhist monasteries and some nunneries with numbers of small villages surrounded by a good deal of cultivation. Nai-kor was the last village with cultivation; northward they were informed they would find nothing except the camps of *Dokpas*, as the nomadic people of that part of the country are called; and they were warned to be on their guard against the white bears which were said to commit havoc amongst the cattle, sheep, &c. The explorer was well acquainted with the brown bear of the Cis-Himalayan districts and he believed this white bear to be a different animal and not the brown bear in its winter coat.

During the great part of his journey to the Nam lake the explorer found the streams all hard frozen, and he was consequently much struck by the number of hot springs that he met with and more especially by the great heat of the water coming from them, his thermometer showing it to vary from 130° to 183° Fahrenheit, being generally over 150° and often within a few degrees of the boiling point, being in one case 183° when the boiling point was 183°-75. The water generally had a sulphurous smell and in many cases was ejected with great noise and violence; in one place the force was sufficient to throw the water up from 40 to 60 feet. These springs in some respects seem to resemble the geysers of Iceland; in winter they are very remarkable in consequence of the water when falling being converted into ice which forms a pillar of ice round each jet. The quantity of warm water which escapes from below must however be very considerable, as the streams into which they drain were free from ice for some distance below where the warm water comes in, though everywhere else hard frozen.

The great lake, which at distance was called the Tengri Nor, was found on nearer approach to be called Namcho or Sky-lake (*nam sky* and *cho lake*) from the great altitude at which it is. It proved to be a splendid sheet of water about 50 miles in length by from sixteen to twenty-five miles in breadth. It receives the water of two considerable rivers and several minor streams, but has no exit; the water is decidedly bitter, but owing to intense cold it freezes readily and at the time the explorer saw it was one continuous sheet of ice.

To the south the lake is bounded by a splendid range of snowy peaks, flanked with large glaciers, culminating in the magnificent peak Jāng Ninchin-thang-la which is probably more than 25,000 feet above the sea. The range was traced for nearly 150 miles, running in a north-easterly direction. To the north of the lake the mountains were not comparatively speaking high, nor were there any high peaks visible farther north as far as the explorer could see from a commanding point which he climbed up to. He only saw a succession of rounded hills with moderately flat-ground in between them. Immediately north he saw a lake of about 6 miles in length which he was told was called Bul Cho (San lake) from the borax (*bul*) which is produced there in large quantities, supplying both Lhāsa and Shigātse with most of the borax that they require.

The Nam lake is considered to be a sacred place like the Manasarowar lake, and although at such a very great distance from habitations and so high above the sea it boasts of several permanent monasteries and is visited by large numbers of pilgrims. There are several islands in the lake, two of them large enough for monasteries: at the time the explorer was there the Lāmas on the islands kept up their communication with the shore by means of the ice, but he did not hear as to what was done in summer. Fish are said to be abundant and modern lake shells were found on the shore as well as fossil shells, which were very numerous and of all sizes; a few of the smaller ones have been examined by Mr. Oldham, the Superintendent of the Geological Survey; he thinks they are not older than cretaceous and are probably nummulitic "none of them actually agree with the Sind and Punjab nummulitic fossils yet" described, but they come near them; there is a small *Fusus*, two specimens at the upper "whorls of a *Vicarya* or *Cerithium* with a cast of probably the same species, also a cast or "internal mould of a *Tapes*." The specimens sent to Mr. Oldham were however too few and too badly preserved to enable him to give a decided opinion about them, I had unfortunately started for England before I knew this, otherwise I should have sent him larger specimens. The first opportunity will be taken to have them more thoroughly examined as also the few modern shells that reached me. The Chief Pandit on his first journey remarked on the stone bones, shells, &c., that he saw in the Lhāsa *bāzār* where they are sold in great quantities for medicine, charms, &c. The explorer had also noticed them in other parts, and there is very little doubt but that Tibet will prove to be very rich in fossils and will amply repay the first European that has the luck to penetrate into the country.

The explorer was only able to bring back some of the smaller specimens.

In most places the margin of the lake was utterly desolate, but near Langdāng the *Shukpa* bush was abundant. In another place there was a little vegetation near some hot springs.

The explorer's examination of the lake was unfortunately brought to a sudden close by a band of robbers from Jāmaāta De the district north of the lake. These robbers stripped the party so completely that they were forced to make their way to Lhāsa as fast as they could. They were very nearly starved to death and underwent very great hardships before they got there.

In Lhāsa they managed to raise a little money by pawning their instruments, the aneroid which was a large one proving very serviceable, as it was mistaken for a gigantic watch and was valued accordingly.

The proof of the existence of a great snowy range to the north of the Brahmaputra is interesting, the Himalayan system even at that distance, say 160 miles from its base in the plains of India showing no signs of getting lower. The Lāmas of the Nam lake described the country to the north as being very much the same as that round the lake, and that it was only after advancing some 60 marches farther north-east that there were any signs of a more civilized country. Jāmaāta De (*de* means district) immediately north of the lake is not under the Lhāsa Government. It must be even more elevated than the country about Nam lake as the inhabitants are said to have great difficulty in keeping cattle, losing numbers every few years owing to heavy and continuous falls of snow. The Jāmaāta people are a lawless set and always try to make up for any such losses by robbing their neighbours about Nam lake, Sinjau, &c., and where cattle thrive better. Lob Nor was said to be  $2\frac{1}{2}$  to 3 months' journey north of Nam lake: it was not clear from the explorer's account whether this was the Koko Nor lake or some other lake more to the west. The route ran north from the east end of the Nam lake, leaving at a camping place called Dam Niargan. From this point Nākehukha is distant 10 days' journey and has a very bad reputation as to robbers. From Nākehukha it is  $1\frac{1}{2}$  months' journey to Sokpohuil over a most barren country infested by robbers, but owning no regular inhabitants of any kind. Sokpohuil district is said to be not very far from Lob Nor, near which is the town of Kharka, the residence of a great Lāma called Jipchun Ring-bo-cho who rules over the Sokpohuil country. Kharka is said to be above 15 days' journey from Jiling or Sining-fu, the large city near the north-western end of the great wall of China. Jiling is well known to the people about Nam lake who admit that it is larger even than Lhāsa itself.

The great northern road called the *Janglam*, which runs far north of the course of the upper Brahmaputra river, passes by the Nam or Tengri Nor lake and from thence by Shellifuk lake to Rudok on the Pangong lake east of Leh the capital of Ladakh. The route followed by the explorer from Dam Niargan to Lhāsa is the route by which Messrs. Huc and Gabet must have approached that city. The explorer thought he would have been able to make his way along it by the Koko Nor and thence through Sining-fu to China if he had the necessary funds. Another attempt will if possible be made to do this, as even the slight amount of information gained respecting it is encouraging and it would be a great thing to get a route-survey between Lhāsa and Sining-fu, so as to connect our Indian Trans-Himalayan Explorations with a place that has been fixed by the regular survey operations of the French Jesuit Missionaries.

The route-survey extends over 320 miles of what has hitherto been veritable *terra incognita*. Latitude observations were taken at 10 places, and heights by observations of the boiling point and of the aneroid at 24 places. The geography of an area of about 12,000 square miles has been elucidated and one northern tributary of the upper Brahmaputra has been thoroughly explored, thus giving us some idea as to how far back the northern watershed of this great river lies.

The Nam is evidently the lake referred to in old maps as the Tengri Nor. The explorer actually went round it and found that it had no outlet though fed by two large and a number of minor streams.

The length of the explorer's pace has as usual been computed by means of the differences of observed latitude, &c., and was found to be very fairly accordant on different sections.

The difference of longitude between Shigātse and Lhāsa as determined by this route-survey is nine minutes less than that deduced from the Chief Pandit's survey. The latter was however a much more direct line and the value therefore has been retained. The difference being say 9 miles in 320 miles or about 3 per cent is a satisfactory proof of general accuracy.

The heights by observations of the boiling point were satisfactory, but those by the aneroid show that the index must have shifted very much; for although agreeing closely with an ordinary mercurial barometer up to 7,000 or 8,000 feet above the sea, yet in the neighbourhood of Shigātse (at Peting), which was previously known to be about 11,000 feet above the sea, the aneroid observation indicated an altitude of nearly 4,800 feet higher. The aneroid observations on the average give altitudes 4,631 feet higher than those by boiling the thermometer, a most disappointing result, the aneroid being one that was carefully tested under an air pump at Kew when it was found to agree at every inch of pressure from the normal height down to 11 inches.

A similar difference was given by another aneroid that was sent up to the Thok Jälung gold-fields; this was supposed to have arisen from some accidental fault.

Captain Basevi when employed in the elevated ground in the south and north-east of Ladakh was supplied with a similar aneroid and noted in his memoranda that the observations taken with it were quite unreliable at great altitudes, as he found that even by gentle tapping on the case the index varied its reading and was always moveable in that way no matter how long he remained at a point.

The only conclusion that can be come to, from the three trials referred to, is that in their present shape aneroid barometers cannot be relied on alone at great elevations until they have actually been tested, and they should always be at any rate supplemented with either occasional observations of an ordinary mercurial barometer or of a boiling thermometer, at any rate until some satisfactory proof of their reliability has been given, the errors apparently not showing when the aneroid was at rest and kept at much the same temperature.

It will be noticed that the explorer actually went along a small portion of the great Brahmaputra river below Shigātse, thus adding to our knowledge of its actual course; no iron suspension bridge was however seen there such as Turner supposed to exist near Shigātse. The explorer was much struck with the magnificent glaciers to the south of the Nam or Tengri Nor lake and they will no doubt prove to be very extensive, as the man is a good judge of their size being well acquainted with Himalayan glaciers near India.

Altogether the explorer has done very good service, and in this first altogether independent expedition has shown a large amount of skill, observation, and determination. I trust hereafter he will still farther distinguish himself.

*Report of Hari Ram's journey from Pithoragarh in Kumaun via Jumla to Tra-dom and back along the Kali Gandak to British Territory 1873.*

After receiving my instructions and the necessary instruments I left Dehra for my home in Kumaun. While there cholera broke out in the village and attacked me and several members of my family, of whom my wife and 3 others died and I was prostrated for 2 months.

On the 1st July I started with my survey from Pithoragarh and on the 3rd day reached Askot. At Askot there resides a man named Puskar Singh Rajwar whose people are frequently passing into Nepāl and I went to consult him as to which would be the best place to cross the river Kāli, telling him I was a physician on my way to Jumla. I learnt from him that as the rains had set in the ropes by which the river is crossed were put away to keep them from rotting, but that if I went to Rāthi which was higher up the river I might there have a chance of crossing. I accordingly did so and reached Rāthi on the 6th. As there was only a rope by which the river is crossed and men suspend themselves by their hands and feet and bear such loads as are to be carried over on their chests, I had no nerve for it, so had a sling made for myself and was drawn across in it and stopped at Bargāon in the Don *patti*, in Nepāl on the 7th. Bargāon has 50 houses and is about the largest sized village in the *patti*.

On the 8th, I travelled through a tract but little inhabited and along a difficult road and halted for the night without provisions at a deserted sheep fold.

On the 9th after another yet more difficult journey I arrived at Maikholi (2 houses).

On the 10th I reached Shipti village (30 houses) having crossed the Kotidhar pass 5,793 feet above the sea, and the river Tatigār on the way. Although Shipti is in the Don *patti*, on account of its size and importance it is usual to include the villages in its neighbourhood in a *patti* which is called after it.

On the 11th I went to Shiri in the Marma *patti*. The villages of this *patti* are all in the valley of the Chamlia river. Cultivation is extensively carried on in it. The villages are situated where the hills have gentle slopes and the land which is terraced is irrigated by small channels from the Chamlia. Fish which abound in the river, are caught, dried and stored by the villagers in large quantities, for home consumption; they are eaten by all castes. I here intended crossing the river, but found the ropes broken: I went a couple of miles further up and found crossing ropes and passed over. The road for the 2 miles up the river and back to the main road on the opposite side was so difficult that it took me half the day to go over it. Halted at Matiāl; formerly a road from Doti to Taglakhar led along the Chamlia through this *patti* and by a pass across the Marma snowy range. It was given up a long time back owing to a dispute with the Taglakhar people. The snowy range is not more than 14 or 15 miles N. E. of the river.

On the 13th, I marched to Karala in the Būngnang *patti*. This march consists of a difficult ascent to the Machaunia pass, during which no water is to be had, and of a descent. At the summit of the pass the birch and juniper grow, and lower down oak and *ringāl* (hill bamboo) and *pangar* (horse chestnut). The lands of the villages in this *patti* are well cultivated. I halted at Karala 5,326 feet above sea-level on the 14th owing to rain. On the 15th, I started, crossing and recrossing the Karalagār till it joins the Sangār, a larger river which comes from the snow but which is called Karalagār below the junction. I crossed the Sangār stream by a wooden bridge and continued along the left till I came opposite to Batushera which is on the right bank of the Karalagār at its junction with the Nabliagār. A road from these parts to Bias goes along the left bank of the Sangār and crosses the snowy range by a high pass.

I procured a pass to Bhajangaya from the *Thānādar* of Batushera and by midday on the 15th I got to the Kālāgār river which joins the Karalagār, and is crossed by the people of the country by ropes, but slings were at hand for those who, like myself, had no nerves for the ordinary way of crossing. I stopped for the night at Bipur on the other side of the river. From Karala the road lies through villages and cultivated land but no forests.

On the 17th, I crossed the Karha pass, and reached Jakhora village. On the ascent to the pass there are two villages Ranlekh and Kālākāna.

On the 18th, I crossed the Kansia pass and put up for the night at Sain village in the Bhajangaya *patti*. The road was good, not fit for riding but very fair for walking.

On the onward journey and a little short of a mile from Sain is a temple of masonry on a well cultivated and irrigated spot at the junction of the Saingār and Khatiyarigār both small streams, the former coming from a north-westerly, and the latter from a northerly direction. On the road about  $\frac{1}{2}$  a mile further on is Pujāri, a small village of 5 or 6 houses inhabited by Brāhmins, the priests of the temple. Crossing Khatiyarigār and another smaller stream of same name I at midday reached Biasi, a village consisting of 10 or 12 houses to the north of Bhajangaya about  $\frac{1}{4}$  mile. Bhajangaya is an old fort out of repair. Biasi is 5,490 feet above sea-level and on a level with Bhajangaya fort.

The fort was formerly of a circular form and about  $\frac{1}{4}$  of a mile in circumference. It consists of dry stone walls about 10 feet high with two brick and mud three-storied houses, with sloping roofs, formerly the residence of the Rāja and members of his family, built within the enclosure. There are about 16 houses with mud walls and thatched roofs built on the outside of the walls inhabited by the Rāja's slaves: a small spring to S. and E. of fort about 500 feet below and another to west and a short distance supply drinking water.

Slavery exists here and throughout Nepāl all castes being sold into slavery, the father having power to sell his children; but on being sold individuals lose their caste. It is reported however that Jang Bahādur has intentions of suppressing this practice. On the 22nd, I left Bhaungaya and at midday came up to the Bargujāl Ghāt on the Seti river and about  $4\frac{1}{2}$  miles from the former place. The road from Taglakhar to Sil Garhi and Doti which follows the course of the Seti crosses at this place from the right to the left bank by a rope bridge 180 feet long and about 20 feet above water. The river comes winding from a northerly direction to this place, and from the snowy mountains distant about 3 days' march. Between this and the snows is Humla *patti* from which hawks, black *minas* and musk pods are brought for sale to Baramdeo Mandi and Gola Ghāt Mandi.

From the ghāt my road lay along the left bank for about  $2\frac{1}{2}$  miles, and to where the Chanakhola, a river formed by spring water, joins it and then followed up the latter, crossing and recrossing it occasionally. I halted for the night at Majh one of the five villages of Chana *patti* which includes the valley drained by the Chanakhola.

On the 23rd, about midday I left the Chanakhola where it is met by the Jhalaraḡār, crossed a pass over the Than ridge which was covered with oak and chestnut and entered Bājru *patti* and remained at Dogra. Bājru fort, where the Rāja lives is on the summit of a hill about 5 miles from this in a south-easterly direction and on the same side of the Dograḡār. It is smaller than Bhaungaya fort being about 500 paces in circumference and contains one house and is surrounded by oak trees; no cultivation was to be seen about it. There was a good deal of excitement in this place, caused by an order of Jang Bahādur for raising troops. Places which formerly supplied 100 soldiers were now required to give 150 and such as were not formerly required to furnish them were now to raise men according to the revenue paid in by them to the Government. Four hundred men used to be quartered at each of the 3 places Dandolidhura, Sil Garhi and Dullu Daelekh; there are now 600 men at each place, that is half as many again, and at Sil Garhi arms are now being manufactured.

On the 24th, I crossed a ridge coming from the Than ridge. Before leaving its summit I came upon a deep round hollow filled with water, about  $\frac{1}{2}$  a mile in circumference. The water is blue and is said to contain fish though I did not see any: there is no visible supply of water to the tank. To the east and at the edge of the water is a small temple of masonry, called *Thābur Debi*. In the month of August at the time of full moon the temple is visited by people of the neighbourhood. The hills about here are covered with oak and rhododendron. About midday, having descended to the Kunraḡār, passed through the village of Māitoli about 4 miles from the temple and tank, and followed the stream I sighted Kunraḡarhi on the wooden summit of the ridge to the south of the Kunraḡār; although called *garhi* there is no fort and all that can be seen are two stone walled, thatched roofed houses where the Rāja resides. The hill is rugged and covered with oak and rhododendron trees and about 1,200 feet above the stream. The so called Rāja is rather a *zamindār* who collects the revenue of the *Kunra patti* I stopped for the night at Sudap in the *Kunra patti*, the road kept to the left bank of the Kunraḡār to this place. This *patti* has a few villages far removed from each other, there being only one on the road between Māitoli and this. The road was difficult.

On the 25th, I left the Kunraḡār, which flows eastwards into the Bariganga also called Bhaunera about 3 miles and crossed the Pinalekh ridge, the boundary between the Kunra and Jugarā *pattis*, and came into the village of that name in the latter *patti* (25 houses) 5,781 feet above sea-level. I left this on the 3rd August, and descended to the Bhaunera or Bariganga river about  $2\frac{1}{2}$  miles below. This comes from the snowy mountains which are seen to the north-east about 16 miles distant. The river at this time of the year is about 150 feet wide, and 8 or 10 feet deep, with a rapid current. It is crossed at this place by means of a rope, a road following the course of the Bhaunera, goes to Sānpia Ghāt on the river lower down. To the south of the place where I crossed the river is a high peak on a snowy ridge under which at the height of the ridge is *Malka Debi* temple, well known and visited by pilgrims from Kumaun and Garhwāl as well as from Nepāl, during the time of full moon in August. There are approaches to the temple from all sides. From the river I crossed a spur about 1,000 feet high and encountered the Mārtorigār a tributary of the Bhaunera a little lower down. This stream though not containing any of the drainage from the snows has deep water and is crossed by wood being thrown across it. About  $6\frac{1}{2}$  miles further up the stream is Jili consisting of 10 or 12 houses where I remained for the night. The village which gives its name to the stream

consists of 100 houses and is about a mile from the stream on the opposite side at the place where I descended into the valley. On the 4th I followed up the Märtorigär and halted at Räjtolli. There were no villages on the way; Räjtolli consisting of 10 or 12 houses is situated at the junction of two streams which make up the Märtorigär one of them is called the Rajtlogigär and the other the Parkhiagär which takes its rise at the Parkhialekh hill. On the 15th I followed up the Parkhiagär to its source and crossed the Parkhialekh (about 8,095 feet above the sea) which is on the boundary between the Räjru *zila* on one side and Jumla on the other, and halted for the night at Kälapora village (50 or 60 houses) in the Kurakhola *patti*. On the 8th I followed the Kurakhola to its junction with the Balarigär about 3 miles from Kälapora about 6,071 feet above the sea and crossed the latter, a river which does not take its rise in the snows, but is during the rains too deep, and rapid to be forded. The bridge by which I crossed is wooden and between 40 and 50 feet in length; the depth of the water is about 5 feet. Balarigär below its junction with the Kurakhola is called by the latter name. The slopes on either side of the stream are cultivated and there are several villages. I kept to the left bank to its junction with the Karnäli river. Hereabouts there are more villages and cultivation on the left bank of the Karnäli than on the right bank. Higher up the river, about  $1\frac{1}{2}$  miles above Banda village I crossed the Karnäli at Jira Ghät by a rope bridge about 200 feet in length and 60 feet above water. On the 7th after going north along the river for a short distance I turned up the Khätirkholagär at its junction with the Karnäli and kept along the stream, crossing and recrossing by small wooden bridges occasionally and halted for the night at a deserted cow shed. About  $2\frac{3}{4}$  miles above this a small stream, the Kanwankholgär, coming from a S. E. direction joins the Khätirkhola; my road lay along the former. There is also a road along the latter which comes from a N. E. direction to this junction, leading to Mungu Bhot. I left the Kanwankhola about  $2\frac{1}{4}$  miles above the junction and ascended the hill to the village of Kälakhata (50 or 60 houses) about  $1\frac{1}{2}$  miles above the stream, where I remained for the night, it is 12,484 feet above the sea. On the 9th, I crossed the Kälakhata ridge—very high (about 14,528 feet)—on which the birch and juniper grow and entering a ravine arrived at Lurkon village on the Jawa (Sinjakhola or Himawati), a river coming from the snows distant about 13 miles, and entering the Tila river. I halted at Lurkon on the 10th. The Sinjakhola *patti* is considered the most productive in these parts. Rice is the only crop, raised by means of irrigation. Ponies are bred in great numbers in this *patti*. On the 11th, I crossed the Jawa a little less than a mile above the village of Lurkon by a wooden bridge 2 feet wide, 200 feet in length and 15 or 20 feet above water. The current is very rapid and 7 or 8 feet deep. The road then ascends by a ravine a high ridge, (about 13,000 feet) with birch and juniper growing on its summit, which it crosses. On the 12th, I descended into a ravine which joins the Tila river below Chaughan (Jumla) and along which the road runs, and arrived at Chaughan situated on the banks of the Tila river and about 8,016 feet above sea-level. Chaughan consists of a collection of mud houses forming a street occupied by 5 or 6 *banias*, 2 or 3 cloth merchants from Doti, 40 or 50 priests of the *Chandan Näth Mahadeo* temple; a few paces to the east of the street are located the custom-house people, 300 sepoy, 3 *sūbahdārs* and a captain, Debi Mānsing Basaniath, who is also head man in the Jumla *zila*. To the south-west of the street are the stores of guns, ammunition and provisions within an enclosing wall 600 feet east and west, and 400 feet north and south with a gate to the north, these are also of mud. Chaughan is situated in a plain running north-east and south-west about 3 or 4 miles and about  $1\frac{1}{2}$  miles in breadth, surrounded by high mountains about 12,000 feet above the sea. The whole valley is cultivated and there are numbers of village scattered over it. A road from Taglalhar passes through Chaughan and Dullu Daelekh and goes on to Lucknow. Having got a pass and letter of introduction to the Loh Mantang Rāja I left Chaughan (Jumla) on the 18th.

On the 20th, I left the Tila river and crossed the ridge to the south by a pass, the Mōrpāni Lekh, about 12,458 feet above the sea, descended into the Laikhola valley in the Tibrikot *zila*, passed through Bhotia (7 or 8 houses) and halted for the night at a temple between 2 or 3 miles further on and a mile from the Laikhola river. A road goes from these parts to Lāngu Bhot, distant 8 or 10 marches, by the Laikhola. Next day I crossed the Balangur pass, lower than the Mōrpāni pass, on which oak and rhododendron grow and reached Tibrikot. Tibrikot is situated on the right bank of the river Birehi where it is joined by a small stream from the snows to the north and about 7,226 feet above sea-level. To the south of the village about 200 yards, on a hillock about 200 feet high, is a fort (*kol*) which encloses a temple and 3 or 4 houses. I was here shown the Civil and Criminal Code of Nepāl, which is taken partly from the *Shāstras* and partly from the Indian Code of Civil and Criminal Procedure. It is in the Nepālī language. Having obtained another pass from the *Thānadār* of this place I left Tibrikot on the 27th.

From Tibrikot I followed the course of the Birehi river and reached Charka on the 4th September having passed some *Lāmasarais* on the road. One of them, called Barphang *Gom-pa* contains 40 or 50 *Lāmas*. Near another, named Kanigang *Gom-pa*, the river has high



perpendicular, rocky banks, and the people have made a tunnel 54 paces in length through the rock. There was originally a crevice and the rock on either side of it was cut away sufficiently to allow of a man with a load to pass through with a squeezing, the height of the tunnel not being sufficient in all parts to admit of his going through standing. Charka is the last village on the river Bheri. On the opposite side of the river is a *Gom-pa* to which the first-born male of every family in the village, as is the practice among the Buddhists generally, is dedicated as a Lāma. I left Charka on the 5th, and ascended the Diji pass about 16,879 feet above sea-level, called by Gurkhas Bātali-Pātan, by a gentle incline. On either side of the pass there are snow covered ridges. The pass is broad and there is a cairn on it at the watershed. From Diji pass I descended to the junction of two streams, one coming from a northerly and the other from a westerly direction, which together take an easterly direction and form the Kingi Chu. On the 7th, I reached Kagbeni crossing the Kali Gandak by a wooden bridge. Kagbeni is situated at the junction of a stream from Muktināth, with the Kali Gandak, and is about 8,953 feet above sea-level. It consists of about 100 houses and is inhabited by Bhots.

From Charka there is also a direct road to Labrang Koja, near Tra-dom from which after crossing a high snow-covered pass, distant about 20 or 25 miles from Charka, another road branches off to Loh Mantang. Laden sheep, goats and horses are taken over these roads.

From Kagbeni I made a trip to Muktināth, about 11,284 feet above the sea, for a day, to see the temple and the country about it. About a hundred feet to east of the temple is a spring with a sulphurous smell which enters a cistern from which the water runs out from 108 spouts, under each of which every devotee passes. The water collecting in a trough below passes out in two streams which flowing to north and south of the temple meet to the west, thus encircling the temple with water. About 600 or 700 feet from the temple, to the south, is a small mound with a little still water at its base, having a sulphurous smell. From a crevice in this mound at the water's edge, rises a flame about a span above the surface. The people of the place told me that the water sometimes increases in quantity sufficiently to flow into the crevice, the flames then disappear for a while and there is a gurgling noise, a report, and the flames burst up and show again. This spot is called Chume Giarsa by the Bhots. To the north-west of the temple, about 350 yards, is a *Gom-pa* with about 30 or 40 resident Lāmas. To the east and south-east of Muktināth, about 2 miles, are lofty snowy mountains extending in a north-east and south-west direction from which the stream takes its rise which flows by Muktināth to the north, takes in the temple water and joins the Kali Gandak river at Kagbeni.

On the 9th, I returned to Kagbeni, and on the 10th started with my party, following up the river Kali Gandak. About 6 miles from Kagbeni I crossed a small stream coming from Damudarkund, along which the Loh Mantang boundary runs to the east, and from the junction with the Kali Gandak follows up the latter in a northerly direction. I here left the river which above this flows through a very confined valley. To the west about 2 miles is a snowy range. There are forests of cedar below the snows: no other trees are to be found. On the 11th, I went to Khambasumbha village. The road which keeps to the hill side, is broad and there is a great deal of traffic on it.

On the 12th, I went to Changrang village crossing the Chungi pass, about 11,000 feet above the sea, on a spur from the snows. Changrang consists of 30 houses and a fort, the winter residence of the Loh Mantang Rāja. A road, chiefly used by pilgrims, from Muktināth by Damudarkund, crosses the Kali Gandak by a ford about 2 miles east of this and joins the other from Kagbeni to Loh Mantang here. It can be ridden over on horse back; the ground over which it passes is not rugged nor high, but there is a scarcity of water and no habitations are met with.

On the 13th after a march of  $7\frac{1}{2}$  miles, I reached Loh Mantang. Loh Mantang is situated in the centre of a plain, about 11,905 feet above sea-level, between two small streams which meet a little before entering the Kali Gandak, distant about 2 miles: the plain is irrigated by channels. Loh Mantang is enclosed by a wall of white earth and small stones, about 6 feet thick and 14 feet high, forming a square with a side of  $\frac{1}{4}$  mile in length, and having an entrance by means of a gate to the east. In the centre is the Rāja's palace consisting of 4 stories, about 40 feet in height, and the only building to be seen from the outside. In the N.E. corner of the enclosure is a *gom-pa* containing copper gilt figures and 250 Lāmas. There are about 60 other houses, two-storied, and about 14 feet in height, forming streets and lanes. Drinking water is brought in by means of a canal, and this overflowing makes the interior slushy; and since there is always an accumulation of filth the smell is very offensive. Since no census is taken I cannot say how many people there are in the place, but they appeared to be numerous.

Besides the permanent residents there are always numbers of traders from Tibet and Nepāl, who either exchange their goods here or take them to dispose of at Lhūsa or Nepāl. The trade in salt and grain does not extend very far north. Trade is chiefly carried on by Thāklis

a class of traders of mixed origin, who have the privilege of going to Lhāsa and they even go to Calcutta for the purchase of goods. The Rāja, who is a Bhot, collects a revenue from all sources of about 10,000 or 12,000 rupees a year, out of which he pays about 2,000 or 3,000 yearly to Nepāl from the land revenue, and 10 per cent of the taxes levied on goods brought from across the northern frontier, to the Lhāsa Government.

The Rāja was very much averse to my proceeding further, the orders of Jang Bahādur that no one should cross the frontier being very stringent; however I was determined to proceed at all hazards and succeeded at last in procuring a pass.

I may here mention a custom which prevails in this part of Nepāl. On a death occurring the head Lāma at the *Gom-pa* is consulted as to the disposal of the corpse. On being informed of the day on which the death occurred he consults his writings, and gives orders according to the directions therein contained. The corpse either must be buried as it died, or be cut up and thrown to the birds, or the arms and legs being cut off and thrown out of the town, to north, south, east and west, the body must be buried, or lastly the body must be burnt in a sitting posture.

Leaving Loh Mantang on the 19th, I crossed the Photu pass on the 20th, the boundary between Debajūng in Lhāsa and the Nepāl possessions. The pass is about 15,080 feet above the sea. There is a descent of about 250 feet from the pass on to the plain below. I passed thousands of wild horses grazing on the plain; they were in herds of about 100 each, and are not at all shy. On the 21st I encamped at Chumikgiakdong, a sheepfold on the stream which flows to the west of the plain. Leaving my things at Chumikgiakdong, I went to Labrang Kōja an encampment, distant 9 miles. The river is here about 250 feet wide and has a very gentle current. It is crossed by boats made of yak's hides which are sewn at the ends and are attached to sticks at the sides; they are kept dry and thus retain their shapes. After 2 or 3 crossings they are drawn on shore to dry. They are propelled by 2 or 4 oars and 2 or 3 men can cross in each. Next morning, the 23rd, I started for Loh Mantang, and crossed the Chāchu Tsāngpo 2 miles above its junction with the Brahmaputra. This stream is about 3 feet in depth and 60 feet wide, and comes from a snowy ridge about 14 or 16 miles north of Mantang; I forded it and going  $\frac{1}{2}$  mile further on arrived at Tra-dom.

Tra-dom consists of 12 houses and a *Lamasarai* situated at the foot of spurs coming from the snows to the north. The former are occupied by men whose duty it is to forward property or letters for the Lhāsa Government, or such as they may receive orders to forward. For this purpose they have ponies, yaks, goats and sheep, and their beat lies 2 or 3 marches either way. They are not remunerated directly for their trouble, but escape taxes, the head man of each station, Ta-sam, only receiving a small percentage on the taxes. The *Gom-pa* only contains 10 or 12 Lamas. The day following my arrival the head man, *Gopa*, sent for me and questioned me as to the object of my travels. I told him I was a physician on my way to Lhāsa and shewed him my passes. He however refused to allow me to proceed as it would be at the peril of his own life. I was then locked up for the night. Next morning I made an ineffectual attempt to see the *Gopa* and my messenger returned with a *sowār* who had orders to see me across the frontier. On the second day after my arrival I began, with great reluctance and under threats of personal violence, my return journey and reached Loh Mantang on the 28th.

I reached Kagbeni on the 1st of October and on the 2nd started south following the course of the Kali Gandak. The road first keeps along the bank of the river for about  $7\frac{1}{2}$  miles and then crosses by a wooden bridge 55 feet long and 10 feet above water, depth of water  $\frac{1}{2}$  feet, and goes to the village of Marmāli (100 houses) about  $3\frac{1}{2}$  miles further on where I remained for the night.

On the 3rd, following the right bank of the river, I passed through the village of Tukja, consisting of about 100 houses, at which there is a custom-house and having crossed the river by a wooden bridge about 70 feet long, I recrossed the river to Lidi village where I remained for the night. On advancing from the first crossing of the river about 2 miles, I came opposite a large village situated on the right bank of the river, called Thak, consisting of about 150 houses. Lidi is a small village of 4 or 5 houses; the inhabitants of which are traders and do little in the way of cultivation. On the 4th about  $\frac{1}{2}$  mile from Lidi, I passed another village of the same name, consisting of about 25 houses, and at midday reached Ghas where there is a custom-house. I stopped at Dan Bausār which also owns a custom-house.

On the 5th no villages were met with during the march and the road passed through jungle the whole distance, crossing several small streams running into the Kali Gandak. I passed the night in the jungle.

On the morning of the 6th I crossed the river about 1 mile below the last halting place.  $2\frac{1}{2}$  miles further down on the right bank is the Rāni Powā *Dharmśila* (rest-house), above which on the hill side and to the west is a large village. A further walk of  $1\frac{1}{2}$  miles brought me to the

Rangār river, which comes from a westerly direction from the snows and joins the Kali Gandak. I crossed it at the junction by an iron suspension bridge, constructed at the expense of the Rāni who built the rest house. The bridge is about 175 feet long, about 15 or 16 feet above the water. The bridge consists of two thick chains to which the roadway of planks is suspended by iron rods, but as these are of equal length roadway has the same curve as the chains. Nearly 2 miles further, on the same side of the Kali Gandak, is Beni, a village of about 200 houses. There is another village with shops, on the opposite side of the Kali Gandak, called by the same name. There is communication between the two villages by a rope bridge; and a road not fit for horses goes to Pokhra. To the west of the village on the hill side is a copper mine which is worked, and the copper is either sold and taken to Pokhra, or it is converted into vessels in the village, or coined.

On the 7th I crossed the river Maidi by an iron bridge similar to the one over the Rangār, and marched to the village of Baglung situated in the Baglung *patti*. It consists of 50 or 60 houses and 15 or 16 shops. There are copper mines on the hill sides. A captain is stationed here to look after the coining of pice at this place and at Beni and the revenues from all sources.

On the 8th I crossed the Kali Gandak  $\frac{1}{2}$  mile to the east of this by boat, the current being so gentle as to admit of it without risk. The river is about 250 feet wide; the water at this time of the year is not clear and fills the channel. I remained the night at the Rāja's residence at Pauglang which is 1 mile from the river. I halted on the 9th and on the 10th started, and arrived at Kusumchaur at the junction of the Moti river with the Kali Gandak. This village which gives its name to the *patti* to the north of the Moti and east of the Kali Gandak, consists of about 100 houses scattered over a plain about 2 miles long and about  $\frac{1}{4}$  mile broad. There are copper mines along the hills on the opposite side, but none on this side. The Moti river rises in the snows to the north-east and flows in a south-westerly direction, carrying into the Kali Gandak about  $\frac{1}{3}$  the quantity of water the latter contains above the junction. It is crossed  $1\frac{1}{2}$  miles above the junction by an iron suspension bridge 135 feet long and about 12 or 14 feet above the water which is about 7 or 8 feet deep, similar to those over the Rangār and Maidi. A road to Pokhra fit to ride over starts along the left bank of the Moti from the bridge: horses have to ford the river.

On the 11th I passed through a large village, Damar, well cultivated, containing about 100 houses, on the left bank.

On the 12th I went to Purthi Ghāt on the river's edge about 2,036 feet above sea-level. Purthi Ghāt contains about 50 houses and 15 shops and is in the Gūlmi *patti*. To the west of this about 2 miles on the hill side are copper mines which are being worked in 50 places, and it is said there is abundance of the ore along the hills to the right of the Kali Gandak between Baglung and this. I remained at Purthi Ghāt 14 days with the intention of spending the winter there and then making another start for the north to carry out the orders I received, but changed my mind and determined on going to Dehra, in order to submit what I had succeeded in doing, as my time would thus be employed and I should besides avoid the risk of losing my notes in case of discovery, to which suspicion on the part of the authorities might lead. I left Purthi Ghāt on the 26th and reached Lunthigāon that night. Next day I passed Aslewa Phedi or Aslewa Tār, a village consisting of 25 houses, in the Gūlmi *patti*, situated on a plain and about  $\frac{1}{4}$  mile from the Kali Gandak, crossed the Badyar at Badyar Ghāt, where the river is about 125 feet wide and 5 or 6 feet deep, and staid for the night at Ridi *bāzār*, about 1,305 feet above sea-level, at the junction of the *Ridi Khola* with the Kali Gandak. Ridi *bāzār* contains 50 shops kept by Newārs, a mint where pice are coined, and a custom-house. The pice, called Gorakhpuri pice, are forwarded from this for circulation in the Gorakhpur district, where they are current amongst the people though not received at the Government Treasuries. The only copper coin current in Nepāl is a mixture of iron and copper made at Kātmāndu, 48 Kātmāndu pice go to the Nepāl *Mohur* and 2 *Mohurs* and 2 annas of the Indian coinage go to the Indian rupee. Two great roads cross here, one coming from Sil Garhi Dulhi Dnelekh and Sallyāna and going to Pokhra and Kātmāndu, and the other from Muktināth and Loh Mantang in the north to Gorakhpur in the south: there are postal arrangements along these high roads, the runners being Brāhmins who have this work made over to them in consideration of their caste, no other calls for work being made on them. There are stations along the roads at the distance of 3 *kos* or 6 British miles.

On the 20th I halted at Tānsen, which is about 4,668 feet above sea-level, and gives its name to the *patti*. At Tānsen there is a fort, a gun foundry and manufactory of small arms, 40 or 50 shops and numbers of huts in which the sepoys quartered here live. The fort is a square building about  $\frac{1}{4}$  mile in circumference, the walls are about 12 feet high and made of brick and mortar with an entrance to the north. Inside are two-storied houses of brick and mortar which are used as the Magazine, Court-house and Treasury, and to the west is the residence of General Badri Nursing, Governor of the district, with an exit from the fort by a

small door to the west, through which the members of the household go to the temple, about 80 feet from the fort. Formerly 1,100 men used to be stationed here, but now there are 1,600, who are drilled daily by 2 discharged *sūbahdārs* of the Indian Native Army: there are no barracks, or lines for the men and they are accommodated in huts. Guns as well as small arms are manufactured in a small brick and mortar building to the south of the fort. To the south-west is the parade ground. During winter the place is deserted, the general and troops going to Batoli, distant 15 miles, the other inhabitants also moving to warmer quarters.

On the 14th November I came to Pihua village, which gives its name to the *patti* and the next night to Ratamati village in the Rūmpūr *patti*. The valley here opens out for some distance to the west, and there are numbers of villages of average size on either side of the river; on the hill sides are forests of *pipal*, *sāl*, *bar* and other tropical forest trees. On the 15th I followed the course of the Kali Gandak on the right bank, and 2½ miles from Ratamati came upon the roads from Batoli and Deonigarh which join here, cross the Kali Gandak at Kilri Ghāt, and go onward to Kātmāndu, joining the road from Pokhra to Kātmāndu at Chorkatiatar near Gorkha Darwar, from which another branches off and following up the Buria Gandak communicates by Nubr with Tibet. I remained for the night at Thalitār. On the 16th, still, keeping to the right bank, I arrived at Kūmalgāon or Ghumari, consisting of 25 houses inhabited entirely by *Kūmhārs*, who besides cultivating the land make baked earthen pots which they dispose of in the surrounding villages. On the 17th I remained for the night at Tārigāon which is distant from the river about 1,000 feet on the slope and about 600 or 700 feet above it. On the 18th I reached Naokot by a gradual ascent of nearly a mile along the hill side. From Naokot the road goes to Arkholi village, distant about ¾ mile, containing about 15 houses, and thence to Bishartar village (36 houses) where I remained for the night. The Kali Gandak is about 1 mile distant, and about 7 miles lower down is joined by the united waters of the Trisulganga and Buria Gandak rivers. The junction is called Deo Ghāt and is held in veneration by the Hindus, a temple being built there. Below the junction, the river is called the Naraini and has a south-easterly direction. On the 19th, I remained for the night at the village of Mūkundpur. None of the villages I passed through on the march had any cultivation in their neighbourhood, but were merely summer residences of the people who during the winter months take all their belongings to the plains to the south, where they have their rice fields. My next halting place was Kunjoli. To the west of Kunjoli about 6 miles is Nawalpur where there is a *Thāna* with a captain and 25 sepoy whose duty it is to look after the timber floated down the Gandak or Naraini. On the 21st I went to Lināwar village, containing 100 houses, distant 10¼ miles, where I remained for the night. On the 22nd I intended crossing the river at Kūlhūa Ghāt 6½ miles lower down but finding no boatmen I remained at Kūlhūa village for the night and crossed the next morning.

I remained for the night at the junction of the Naraini and a small stream called the Panchperna and Saonmukhi where there is a brick and mortar temple and rest-house (*Dharmśāla*) and 4 or 5 huts belonging to the customs officials, I crossed the river by boat next morning the 24th. The river at the place of crossing is about 600 feet, at the ferry on the right are some huts to which the captain and 25 sepoy employed in the floating timber business come during winter. I went on to Gidhagāon distant about 9½ miles in the south-westerly direction. About 3 miles from this in the same direction I came upon Bhojāgāon, a frontier village of Nepāl, where there is a custom-house and passes are shown and luggage examined. A little beyond Bhojāgāon I crossed the boundary, and though disappointed at my want of success in Tibet, I felt thankful that I had been able to return to British territory with such information as I had got together.



*Account of P. Kishen Singh's Explorations in Western Tibet made in connection with the Mission to Yärkand and Kāshgar, 1873-74, drawn up by Captain H. Trotter B.E., G. T. Survey of India.*

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When the mission was leaving Yärkand for Kāshgar, it was arranged for P. Kishen Singh to return to India *viä* Khotan, a journey he accomplished most successfully and the mission secured the most important geographical results of this road.

The only previous account of this road is one derived from native information supplied by Mr. R. B. Shaw, and which was published in the proceedings of the Royal Geographical Society No. 111 of 1872. This account agrees remarkably well with that given by the Pandit.

Prior to leaving the country Pandit Kishen Singh paid a visit to the Surghāk gold-fields in latitude 36° 39' 51" north, longitude 82° 42' east of Greenwich, about 160 miles (by road) to the east of Khotan. Returning thence to Keriya he found his way back to India by Polur, Noh, and the Pangong lake, a route running from one and a half to two degrees to the east of the most easterly route we have hitherto possessed *viz.* that traversed in 1865 by Mr. W. H. Johnson in his journey to Khotan.

A traveller from Leh to Khotan might follow the route by the Pangong lake, along which the Pandit travelled, but he would more probably take a short cut from Lukung to the Mangtza lake, following the ordinary Chang Chenmo route to Yärkand as far as the point where that road leaves the Chang Chenmo valley. Passing up the latter, he would make his way eastward to its head, where an easy pass is known to exist leading on to the high table-land beyond. By adopting this road he would save forty miles over the more circuitous road by Noh. From Mangtza the road lies over a series of high plateaux varying from 16,000 to 17,000 feet in height, crossed here and there by low ridges which rise somewhat irregularly from the surface of the plain which contains numerous lakes, most of them brackish. In latitude 35° 7' north the Pandit crossed at a height of but little more than 17,000 feet the water-shed of a snowy range, which may perhaps be the true eastern continuation of the Kuen Lun. From the north of the pass the Keriya stream takes its rise; the road follows down it as far as Arash or Baba Hatim (16,000 feet), but again ascends to the Ghubolik plain, which (17,000 feet above the sea) connects the snowy range just alluded to with another somewhat lower range to the north. This last ridge is a buttress of the vast Tibetan plateau. In descending the Polur stream from the Ghubolik, from Diwan\* (17,500 feet) to Polur, a distance of 23 miles (including windings), there is a fall of about 9,000 feet. Polur is a small village in the Khotan district and from it Khotan (Ilahi) city may be reached either by the direct road (by Chihar Imām) which skirts the feet of spurs from the elevated plateau above, or the traveller may proceed down the stream to Keriya by the route followed by the Pandit.

Throughout the whole of the road from Khotan to Leh, traversed by the Pandit, fuel was abundant everywhere, and there was only one stage where there was not a good supply of grass. These facts would indicate the line as one well adapted for the native merchant, to whom time is of no great value. As far as I can learn however from enquiry it never has been used as a trade route on a large scale, the chief reason I believe being fear of the *Changpas*† or *Tughliks* wandering tribes of Tartars, nominally subject to the Chinese officials at Gar-tok and Rudok but probably practically only so far subject to them that they would abstain from committing violent aggression on parties travelling under the protection of those authorities. Habibulla, who was elected King of Khotan when the Chinese were turned out of the country, sent messengers to try and open up this route in 1864. They were seized by the *Changpas* and compelled to return to Khotan with the threat that any subsequent explorers would be put to death. The inhabitants of Keriya and Polur go as far south as Ghubolik to procure sulphur. They also go west of this towards the head of the Yurung-küsh (Ilchi) river where they search for gold and jade, but it would appear that although the Khotanese claim the country up to the Yeshil lake the head of the Keriya river, as their boundary, yet practically from fear of the *Changpas*

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\* Or "Sulphur Horse Pass" so called from its being used by the Polur people when bringing sulphur to Khotan. Sulphur is excavated in large quantities from the ground near the lake in the Ghubolik plain.

† *Changpa* in Tibetan means *Northmen* while the Turki name for the same people is *Tughlik*, i. e. *Mountaineer*.

they never go quite so far to the south. On the other hand the *Changpas* who probably have equal reason to fear the Turks from the plains, would appear not to wander further north than Rikong Chumik, the ridge to the north of which separates their grazing grounds from plains on the north, through which flows a considerable stream, passed by the Pandit, asserted by his guide to be the head of the Yurung-kāsh river.\* It would thus appear that owing to the mutual hostility of the two races there is a large tract of neutral ground which is never occupied by one or the other, extending from Rikong Chumik to Ghubolik; here the Pandit saw large herds of yak, antelope, and jungle sheep (*oves ammon*), which had apparently never been scared by the sight of man. Near Rikong Chumik were the remains of numerous huts; others were frequently seen along the road, but fortunately for the Pandit, he did not meet or see a single human being between Ghubolik and Noh, a distance of 244 miles, a circumstance which enabled him to complete his route-survey up to Noh without interruption.

The newly acquired knowledge of this road may perhaps lead to important practical results, but not until our relations with the Chinese Empire, and their too independent subordinates in Tibet, are placed on a more satisfactory footing than they are at present. It is apparent by combining the results of this survey with other information collected by the Survey Pandits during the past few years, that a road exists between the plains of Hindustān and Turkistān which entirely avoids the territories of the Maharaja of Kashmīr, and which in the summer months may be traversed without once crossing snow, or without encountering one really difficult pass, such as we know to exist on the Karakoram and Chang Chenmo routes. Leaving the plains of India at the ancient city of Najibābād (between Hardwār and Morādābād), the starting point of the old Royal Road stated by Moorcroft to have crossed these same mountain systems, a good road about 210 miles in length, and only crossing one low pass, † leads to the Niti pass, 16,676 feet high over the main Himalayan range. Descending from the Niti pass, due north into the Sutlej valley, and crossing that river at Totling (Tu-ling) 12,200 feet by the iron suspension bridge still existing said according to local tradition to have been constructed by Alexander the Great, and crossing by the Fugeo pass 19,210 feet into the Indus valley at Gar-tok 14,240 feet, the road would then follow that river to Demchok.‡ Thence it would go over the Jara pass due north to Rudok and Noh, and by the newly surveyed route to Polur and Khotan.

Estimating the distance from Najibābād to the Niti pass at 210 miles thence to Noh at 275, and from Noh to Khotan *via* Keriya 446 miles, we have a total distance of 931 miles between Najibābād and Khotan, and this even might be considerably shortened by taking the direct road from Polur to Khotan.

[The ancient Royal Road probably followed the above to the suspension bridge at Totling, and thence to Rudok and Noh, whence a road now exists which passes *via* the head of the Chang Chenmo valley and Nischu into the Lingzi-Tāng plains, down the Kara-kāsh river and over the Sanju pass to Sanju || which is half way between Yārkan and Khotan.]

\* In the map which has been prepared for submission with this report I have not shown this stream as flowing into Yurung-kāsh, but I think it not at all improbable that it may find its way through a gap which I have left in the Kuen Lun. I would have inserted it, but it hardly appears consistent with Mr. Johnson's statements as to what he saw when ascending these Kuen Lun peaks in 1865, although, on the other hand, the fact that the river he crossed at Karangolok was a very large and rapid stream would indicate that it probably came from a considerable distance; knowing also as a fact how the Kara-kāsh cuts through the same range at Shahidulla and how extremely difficult it is to form an accurate idea of any mountain range when viewed from a single point, I am inclined to regret that I did not show this stream in my map as the head waters of the Yurung-kāsh or River of Khotan.

† From Noh he tried to get to Rudok, but was not permitted to do so; in fact the inhabitants tried to compel him to return by the way he had come, and it was with great difficulty that he at last got permission to go to Leh direct. Anticipating a search by the first people he should encounter, he had, when nearing the village of Noh, concealed his instruments and papers in a bush. He was duly searched, but of course nothing was found, and he afterwards succeeded in again getting possession of his valuables. In Tibet the great difficulty encountered by persons entering in disguise is always on the frontier, where the examination is very strict. When once allowed to pass into the interior of the country there is little to fear.

‡ The Lungar pass 6,500 foot high which is on the 3rd day's march from the plains.

§ A more direct route exists from Totling *via* Dun-kar to Demchok.

|| The three points that have indicated this as the line of Royal Road are:—

1st.—Moorcroft's statement that the road started from Najibābād and emerged in the Turkistān plains at Barikia (which I identify with Sanju) half way between Yārkan and Khotan.

2nd.—The existence of an iron suspension bridge at Totling said to have been constructed by Alexander the Great (*vide* Major Montgomerie's Report on Trans-Himalayan explorations made during 1867-1868, page 80).

3rd.—The statement made by Muhammad Amin, "Punjab Trade Report, Appendix IVA" that—"the old route taken by Mughal conquerors from Tashkent towards China passed through the Aksai Chin. Traces of it are still seen."

Summarizing our knowledge of the length of the various physically practicable routes from Hindustān to Turkistān we find that the distances are:—

	Miles
From Amritsar to Leh <i>viâ</i> Rāwālpindi and Srinagar ... ..	685
„ „ to „ <i>viâ</i> Kāngra ... ..	522
„ „ to „ <i>viâ</i> Siākot and Kasbmir ... ..	575
From Leh to Yārkan <i>viâ</i> Lingzi-Tāng and Kara-kūsh river ... ..	584
„ „ „ <i>viâ</i> Chang Chenmo and Kara-tāgh ... ..	527
„ „ „ <i>viâ</i> Karakoram pass and Sanju (summer route) ... ..	445
„ „ „ <i>viâ</i> Karakoram and Kōk-yār (winter route) ... ..	472½
„ „ „ <i>viâ</i> Noh, Polur and Khotan ... ..	639
„ „ „ Khotan <i>viâ</i> Karakoram and Sanju ... ..	416
„ „ „ <i>viâ</i> Lingzi-Tāng and Ichi pass (Mr. Johnson's route) ... ..	437
„ „ „ <i>viâ</i> Noh, Polur and Keriya ... ..	687
„ Amritsar to Yārkan by the road followed by the Mission, <i>i.e.</i> , <i>viâ</i> Rāwālpindi, Srinagar, Leh and the summer Karakoram route ... ..	1,080
„ Najībābād to Khotan <i>viâ</i> the Niti pass and Western Tibet ... ..	931

At some distant day it is not impossible that the last named road may form the highway to Turkistān, but as long as Europeans are rigorously excluded from Western Tibet we cannot hope that this consummation will be realized.

In determining the position of Khotan I have made use of Pāndit Kishen Singh's route from Karghalik to Khotan, and thence *viâ* Keriya back to Ladākḥ. As a result of this route-survey our previously accepted value of the longitude of Khotan has been altered by more than thirty miles. It may appear bold to make this extensive change in the position of a place that has been visited by a European explorer (Mr. Johnson), but the route-survey executed by this Pāndit is so consistent, and the plotted results agree so closely with the observed latitudes throughout the whole of his work, that I have no hesitation in accepting it as correct. I may further add that I have been in communication with Mr. Johnson on the subject, and that he freely admits the possibility of a large error in his longitude of Khotan. He states that in commencing his reconnaissance from the Kuen Lun mountains (which he carried on with the plane-table only), one of the three trigonometrically fixed points on which his work was based, turned out subsequently to have been incorrectly projected on his board. This, together with the doubt that must always exist when rapidly passing through an unknown country as to the identity of the different peaks visible from the line of march, is quite sufficient to account for the discrepancy. In my preliminary map I have assigned to Khotan a longitude of  $79^{\circ} 59'$  instead of  $79^{\circ} 26'$ , the position it has recently occupied on our maps. About its latitude there can be no doubt. Mr. Johnson took several observations there with a 14-inch theodolite and obtained a mean result of  $37^{\circ} 7' 35''$ , whilst from Kishen Singh's observations with a sextant extending over nearly a month we have a mean result of  $37^{\circ} 7' 36''$ . The points east of Khotan, *i.e.*, Keriya and the Surghāk gold-fields, are derived from Kishen Singh's route-survey, combined with his latitude observations. We also have from the same source a complete survey for the first time of the road *viâ* Polur to Noh, and thence to Leh. As a specimen of the accuracy of this Pāndit's work I may mention that when the road from Karghalik to Pāl, a distance of 630 miles, was plotted out on the scale of 2,000 paces to the mile, without any correction or adjustment whatever (although  $4\frac{1}{2}^{\circ}$  were added to each magnetic bearing in order to allow for magnetic variation) starting from my own value of Karghalik, the plot closed at Pāl (fixed by the Great Trigonometrical Survey) almost absolutely correct in latitude and only eight minutes out in longitude, and in no single portion of the whole route, which passes over elevations exceeding 17,000 feet in height, did the plotted value differ by as much as three miles from his own observed astronomical latitude. Of this discrepancy of eight minutes in longitude it is possible that a portion may be due to error of position in the starting point (Karghalik), but it may be noted that the amount is no more than would be accounted for by an error of  $1\frac{1}{2}^{\circ}$  in the assumed value of magnetic variation. It is not to be supposed that such accuracy is generally attainable, but in the present case, although the surveyor laboured under certain disadvantages from the absence of inhabitants, yet there were the compensating advantages that he was under no necessity for concealment; he was therefore able to take and record bearings when and where he pleased.



*Abstract of Observations for Latitudes on road from Leh to Yarkand via Noh, Polur, and Khotan*  
by Pandit Kishen Singh with Sextant No. 8.

Astronomical date.	Place of Observation.	Object observed.	Double Altitude corrected for index error.	ELEMENTS USED IN COMPUTATION OF REFRACTION.		DEDUCED LATITUDES.			REMARKS.
				Baro- meter.	Ther. Fahr.	By stars north of zenith.	By sun or stars south of zenith.	Final lati- tudes north.	
			° ' "	Inches	Degrees	° ' "	° ' "	° ' "	
1874									
July 28	Angche Churitan, bank of Naichu river	α Scorpii (Antares)	60 20 40	17.6	42	33 41 23	33 41 54		
" 29	"	β Ceti	75 15 50	17.6	42	33 42 24			
" 26	Sumzi Ling camp	α Aquilæ (Altair)	129 2 10	17.1	42	34 1 26			
" 27	"	α Piscis Australis (Fomalhaut)	51 26 0	17.1	42	34 1 1			
" "	"	β Ceti	74 37 50	17.1	42	34 1 26	34 1 16		
" 23	Chumik Lakmo camp	α Scorpii (Antares)	58 59 10	16.3	41	34 22 36			
" "	"	α Aquilæ (Altair)	128 18 0	16.3	41	34 23 31			
" 24	"	Saturn	75 5 10	16.3	41	34 21 6			
" "	"	α Piscis Australis (Fomalhaut)	50 42 50	16.3	41	34 22 37	34 22 29		
" 22	Tashlik Kōl, bank of	Saturn	74 36 0	16.4	40	34 38 19			
" "	"	α Piscis Australis (Fomalhaut)	50 9 0	16.4	40	34 39 29	34 38 54		
" 14	Ameh camp (Baba Hatim), on right	α Scorpii (Antares)	56 44 0	16.0	38	35 29 49			
" 15	bank of Koriya river.	α Piscis Australis (Fomalhaut)	48 28 40	16.8	38	35 29 40			
" "	"	α Scorpii (Antares)	56 43 30	16.8	38	35 30 3	35 29 54		
" 12	Ghubolik camp, bank of Uliugh Kōl	α Aquilæ (Altair)	125 41 40	16.8	40	35 41 40			
" 13	"	Saturn	72 53 20	17.3	40	35 40 10	35 40 55		
" 2	Polur village	α Scorpii (Antares)	55 20 40	21.8	65	36 11 42			
" 4	"	α Aquilæ (Altair)	124 39 40	23.0	65	36 12 43			
" 7	"	Saturn	72 16 50	23.0	65	36 10 18			
" 8	"	α Aquilæ (Altair)	124 39 30	22.1	65	36 12 49			
" 7	"	α Scorpii (Antares)	55 20 50	22.0	65	36 11 37			
" 9	"	"	55 21 0	21.9	65	36 11 32			
" "	"	α Aquilæ (Altair)	124 39 20	21.9	65	36 12 53	36 11 56		

Date	Time	Object	Altitude	Right Ascension	Declination	Magnitude	Position Angle	Remarks
June 18	...	β Ursa Minoris	104 24 30	25° 0'	69	36 51 57	36 51 26	
" 26	...	α Aquilae (Altair)	129 22 0	25° 0'	69	36 51 35		
" 27	...	Saturn	71 11 40	26° 1'	69	36 52 8		
" 28	...	β Ursa Minoris	104 24 50	25° 0'	69	36 51 35		
" 29	...	α Aquilae (Altair)	122 22 0	25° 2'	69	36 49 37		
" "	...	Saturn	71 9 10	25° 2'	69			
" 22	...	β Ursa Minoris	104 0 40	22° 9'	66	36 40 5	36 39 51	
" 28	...	α Aquilae (Altair)	123 45 50	22° 9'	66			
" "	...	α Virginis (Spica)	85 1 20	25° 4'	69	36 59 49		
" 11	...	β Ursa Minoris	104 41 40	25° 4'	69	37 0 30		
" 12	...	α Aquilae (Altair)	123 3 50	25° 4'	69	37 0 37		
" 13	...	β Ursa Minoris	104 41 50	25° 4'	69	37 0 36		
" 14	...	α Aquilae (Altair)	123 4 0	25° 4'	69	37 0 32	37 0 26	
" 19	...	α Virginis (Spica)	84 47 0	25° 2'	70	37 6 59		
" 20	...	β Ursa Minoris (Polaris)	71 35 0	25° 2'	70	37 8 20		
" 20	...	β Ursa Minoris	104 56 40	25° 2'	70	37 7 55		
" 21	...	α Virginis (Spica)	84 46 50	25° 2'	70	37 7 3		
" 21	...	α Ursa Minoris (Polaris)	71 34 40	25° 2'	70	37 8 10		
" 21	...	β Ursa Minoris	104 56 50	25° 2'	70	37 8 0		
" 21	...	α Scorpii (Antares)	53 29 40	25° 2'	70	37 7 29		
" 21	...	α Virginis (Spica)	84 47 10	25° 2'	70	37 6 53		
" 21	...	β Ursa Minoris (Polaris)	71 34 40	25° 2'	70	37 8 10		
" 22	...	β Ursa Minoris	104 56 40	25° 2'	70	37 7 55		
" 26	...	α Ursa Minoris (Polaris)	71 34 50	25° 5'	70	37 6 16		
" 27	...	β Ursa Minoris	104 56 30	25° 5'	70	37 7 51		
" 27	...	α Aquilae (Altair)	122 50 50	25° 5'	70	37 7 4		
" 28	...	α Scorpii (Antares)	53 29 10	25° 5'	70	37 7 43		
" 28	...	α Aquilae (Altair)	122 50 40	25° 5'	70	37 7 9		
" 28	...	β Ursa Minoris	104 56 30	25° 5'	70	37 7 51		
" 28	...	α Virginis (Spica)	122 50 40	25° 5'	70	37 7 10		
" 30	...	α Aquilae (Altair)	84 46 40	25° 5'	70	37 7 8		
" 30	...	β Ursa Minoris (Polaris)	71 34 10	25° 5'	70	37 7 59		
" 3	...	β Ursa Minoris	104 56 20	25° 5'	70	37 7 48		
" 3	...	α Virginis (Spica)	84 46 40	25° 5'	70	37 7 9		
" 4	...	α Aquilae (Altair)	122 50 20	25° 5'	70	37 7 22		
" 4	...	α Virginis (Spica)	84 46 30	25° 5'	70	37 7 14		
" 5	...	α Ursa Minoris (Polaris)	71 34 10	25° 5'	70	37 7 59		
" 6	...	β Ursa Minoris	104 56 30	25° 5'	70	37 7 55	37 7 36	
" 6	...	α Aquilae (Altair)	122 50 30	25° 5'	70	37 7 17		
May 23	...	α Virginis (Spica)	84 28 0	25° 7'	70	37 15 59		
" 24	...	α Virginis (Spica)	84 28 30	25° 7'	70	37 16 14		
" "	...	α Ursa Minoris (Polaris)	71 34 0	25° 7'	70	37 17 49		
" "	...	β Ursa Minoris	105 16 0	25° 7'	70	37 17 5	37 16 47	
" 12	...	Jupiter	113 52 30	25° 6'	69	37 37 31	37 37 31	

1874

KHOTAN CITY. Observations taken in Shamsi Begh in nearly the same latitude as the centre of the city.

*Observations on road from Yarkand to Leh via Khotan, Polor and Noh*  
by *P. Kishen Singh.*

Number in Alphabetical List.	Place of Observation.	Date.	AT STATION OF OBSERVATION.				AT BAR STATION LEH.				REMARKS.
			Reading of boiling point thermometer corrected for index error.	Temperature of air (Fahrenheit).	Corrected reading of barometer reduced to 32°.	Temperature of air (Fahrenheit).	Inches	Degrees	Degrees	Feet	
1	Güna village	1874	203 51(6)	75.3	19.509	51.4	4.340				
2	Moji village	May 12 and 13	204. 0(1)	72.5	19.465	53.6	4.250				
3	ZOTO Kungshan	" 14	203.28(1)	70.0	19.465	53.6	4.430				
4	KHOTAN City	" 18	203.24(6)	72.6	19.406	51.9	4.500 a				a Mean height = 4,490 feet.
5	Ditto. "	" 19	203.03(3)	76.6	19.496	51.9	4.500 a				
6	Ditto. "	" 31	203.10(3)	80.2	19.530	60.0	4.480 a				
7	Kara-kash town	" 23	203.78(1)	82.0	19.481	62.4	4.010				
8	Borezen Yarkhan village	" 29	203.40(3)	84.9	19.502	62.5	4.240				
9	KHOTAN City	June 7	203.50(3)	77.8	19.586	60.0	4.380 a				
10	Yurung-kash town	" 8	203.30(3)	67.3	19.451	60.1	4.370				
11	Dol Langar village	" 9	203.00(1)	68.0	19.388	64.8	4.420				
12	Chim village	" 11	203.38(3)	75.9	19.451	60.1	4.260				Mean height = 4,220 feet.
13	Ditto.	" 13	203.45(3)	81.2	19.451	60.1	4.180				
14	Keriyas town	" 18	202.57(3)	67.0	19.460	57.9	4.830 b				
15	Surgakht Khung Shahi Bazar	" 22	198.42(3)	77.2	19.413	66.6	7.000				b Mean height = 4,575 feet.
16	Keriyas town	" 20	202.32(3)	90.8	19.413	66.6	4.320 b				
17	Fohur village	" 8	196.53(3)	70.0	19.477	65.4	6.130				
18	Ghubolik camp, bank of Dugh Köi	July 12 and 13	182. 1(2)	45.0	19.477	65.4	16.960				
19	Arash camp (Baba Hatim), bank of Keriyas river	" 15	183.32(3)	59.7	19.533	68.5	16.020				
20	Keriyas river at Bas Köi	" 16	182.25(1)	47.0	19.454	70.7	16.880				
21	Yeshit lake	" 18 and 19	183.58(2)	54.3	19.494	71.1	16.160				
22	Tushlak Köi (bank of)	" 22	182.67(4)	40.0	19.463	65.8	16.620				
23	Chumit Lhakmo camp	" 23 and 24	182.63(2)	41.3	19.463	65.8	16.000				
24	Sumzi Lung camp	" 26	184.50(1)	73.0	19.428	68.1	15.570				

Note.—The numbers in brackets following the figures in column (4) indicate the number of sets of observations, the corrected mean of which has been employed in determining the height.

*Alphabetical List of Latitudes, Longitudes and Heights.*

Number	NAME OF PLACE	Latitude	Longitude	Height
1	Angehe Churtan ... ..	33 41 54	° ' " .....	<i>feet</i>
2	Arash camp (Baba Hatim), bank of Keriya river	35 29 64	.....	16,020
3	Borezen Yotkan village ... ..	.....	.....	4,240
4	Chira village ... ..	87 0 26	.....	4,220
5	Chumik Lhakmo camp ... ..	34 22 28	.....	16,600
6	Dol Langar village ... ..	.....	.....	4,420
7	Ghubolik camp ... ..	35 40 55	.....	16,960
8	Gūma village ... ..	37 37 31	.....	4,340
9	Kara-kāsh town ... ..	37 16 47	.....	4,010
10	Keriya river at Bas Kōl ... ..	.....	.....	16,880
11	Keriya town ... ..	36 51 26	.....	4,575
12	KHOTAN (City, centre of) ... ..	37 7 36	79 59 0	4,490
13	Moji village ... ..	.....	.....	4,280
14	Polur village ... ..	36 11 56	.....	8,430
15	Sumzi Ling camp ... ..	34 1 18	.....	15,570
16	Surgāk Ebiang Shahi Bāzār ... ..	36 39 61	.....	7,060
17	Tashliak Kōl (bank of) ... ..	34 38 64	.....	16,620
18	Yeshil lake ... ..	.....	.....	16,160
19	Yurung-kāsh town ... ..	.....	.....	4,370
20	Zawa Kurghan ... ..	.....	.....	4,430

## Route-Survey from Karghalik to Tankse viâ Khotan, Polur and Noh.

Number of stage.	Name of stage.	Country or district.	Distance in miles.	REMARKS.
1	Karghalik to Yakin Langar.	Karghalik ...	13	A small village of four or five houses only, country well cultivated. At four miles is the village of Bosharik, and at eight miles Lob village. Cart road all the way. Yakin is a halting-place for traders. Water, fuel, and supplies plentiful.
2	Ohulâk Langar ...	Gûma ...	20	A small village of 10 houses. At four miles is Khush Langar, and is the boundary between Karghalik and Gûma. Country up to Khush Langar is cultivated, the rest of the journey is over a sandy desert, and no water except in a reservoir at Dubzokum brought daily from Chulâk Langar. Supplies plentiful.
3	Gûma (height 4,340 feet).	Ditto ...	23	A small town and district with about 1,000 houses and a bazar of shops. A <i>Dâdkhwâk</i> or Governor and 200 sepoy are posted here. Two <i>Langars</i> or rest-houses are built on the road, viz., Silak Langar at 9½ miles, and Hajif Langar at 14 miles. The Kiliân river is crossed near Gûma. Road runs over a sandy plain the whole way.
4	Moji village (height 4,290 feet).	Ditto ...	24	A large village with a bazar. Road through a level cultivated country. At three miles the dry bed of a branch of the Kiliân river, about 200 paces broad; is crossed. Süpi Khajum village is 9 miles, Cholo village of 50 houses 10 miles; Mukhila Langar at 11 miles; and the large village of Chudda at 13 miles. Road over a sandy plain. Fuel and pasture plentiful.
5	Pialma ...	Ditto ...	35½	A large village and bazar. At 2½ miles is Kosho Langar; at 10½ miles Kondla Langar; at 14 miles Zanguya, a large place with a fort. The road from Sanju to Khotan joins at Zanguya. The entire journey is over a sandy plain without habitation between Zanguya and Pialma. Water, fuel, and pasture plentiful.
6	Jawar Zawa Kurghan (height 4,430 feet).	Khotan ...	25	Road over sand hills all the way. Water scarce, to be had only at Ak Robat at 15 miles, from a deep <i>pakka</i> well; again at Imam Salar's tomb and at Zawa Kurghan, a large village and bazar. Supplies plentiful.
7	Khotan city (Ichi Shahr) (height 4,490 feet).	Ditto ...	20	Road over a cultivated country thickly inhabited throughout. The Kara-kâsh river, about half a mile wide with several channels, is crossed at 14 miles. Khotan is a large town, where a Governor and several hundred sepoy are posted. Numerous canals from the Kara-kâsh river intersect a large area of country around Khotan. At a distance of 15 miles north-west is the large commercial town of Kara-kâsh.
8	Yurung-kâsh (height 4,370 feet).	Ditto ...	3½	A large place of 500 shops. At 2½ miles the river Yurung-kâsh, (the same size as the Kara-kâsh) in two channels is crossed. The road for several weeks is flooded in hot weather. Jade and gold are found up the stream. Road good, and rich cultivation all round.
9	Dol Langar (height 4,420 feet).	Ditto ...	13	A large village of 150 houses. Excellent road, thickly inhabited, and rich cultivation all through the journey. At 10½ miles is Lop village and bazar of 50 shops.
10	Chira (height 4,220 feet).	Ditto ...	36	A town on the banks of a small stream with a bazar of 150 shops. Road as far as Ak Langar. The first 6 miles over a sandy plain covered with jungle. Elman Bazar 10 miles; Bâstogbrak Langar at 15 miles; Eshme Langar at 28 miles; Akin Langar at 30 miles: all these places have rest-houses for travellers, with water and supplies. No cultivation except at Chira.
11	Kara-kir Langar ...	Ditto ...	25	A small village of 10 houses. Road over an open country. At 10½ miles is the village and bazar of Gulakhma; at 16½ miles Domoko village; from thence the country is covered with high forest. Supplies plentiful.

## Route-Survey from Karghalik to Tankse via Khotan, Polur and Noh.—(Continued).

Number of stage.	Name of stage.	Country or district.	Distance in miles.	REMARKS.
12	Keriya Bazar (height 4,580 feet).	Khotan	27½	A large town and bazar of 600 shops; at 5 miles is Ya Langar; at 9½ miles Sisagol; at 14½ miles Yaka Langar; at 22 miles Pondru village of about 100 houses. From Yaka Langar to Keriya country thickly populated and extensive cultivation. Felt is manufactured at Keriya. A branch road goes from Keriya to Surghak gold-fields as follows:—1st March, Toghrak (height 5,700 feet), 15 miles, a village of 50 houses, road over sand hills. No habitation except at Oi Toghrak. Keriya river 600 paces wide (with several channels), crossed near Keriya. 2nd March, 15 miles, a rest-house with scanty cultivation round it. Road open and over sand hills. 3rd March, Surghak (height 7,060 feet), 3½ miles, a place famed for its gold-fields: these fields are worked all round the year by men from Keriya, who with their wives and families sleep in temporary huts. One-fifth of the produce is paid as a tax to the ruler of Kashgar, who also purchases the remaining produce at the fixed rate.
13	Toghrak Langar	Ditto	23	A small village of 5 houses. Road through cultivation at 15 miles, the rest-house of Bughuz, to east of which, at 200 yards, is the Keriya canal here called Toghrak-ustang.
14	Polur village (height 8,430 feet).	Ditto	32	A village of 50 houses with scanty cultivation. Road runs alongside the river over a plain for 8 miles to where the river issues from a mountain gorge, up which the road passes to within 2 miles of Polur, when the river turns off to south-east. Road good.
15	Khiakde camp	Ditto	17	Road, stony and bad, runs along the valley of the Korup Darya or Polur river to Khiakde. A little fuel and grass. Gold dust is found in the stream here.
16	Ghubolik camp (height 16,960 feet).	Ditto	25½	Camp near Ulugh Kól. A lake with sulphur mines in its neighbourhood. For 6 miles from Khiakde the road runs along the Polur stream through a narrow gorge between hills called Tangitar, then ascends the Ghubolik. At Diwan pass, difficult for laden ponies. A gradual descent from thence for 14 miles to Ghubolik. Road bad at the pass. Grass, fuel, and water plentiful.
17	Aksu camp	Ditto	19½	Camp on grassy plain between two small streams. At 12 miles a small pass crossed. Road good. Fuel and grass plentiful.
18	Arash camp (Baba Hatim) (height 16,020 feet).	Ditto	12	Camp on northern bank of the Keriya river. At 8 miles the Kizil Dawan (pass) is crossed. Road good, but stony at the pass. Grass and fuel plentiful.
19	Keriya Darya-i-bash Kól (height 16,880 feet).	Ditto	15½	Camp on small lake, the source of the Keriya river. Road stony and bad, slightly ascending to the lake. Grass scarce, and fuel plentiful.
20	Camp	Rudok	22	Camp near a small stream. Grass and wood plentiful. At 16½ miles a pass is crossed forming boundary between Kashgar and Tibet.
21	Rikong Chumik	Ditto	17½	Camp on an extensive plain, with grass and fuel at hand. A mile from camp a pass is crossed. At 10 miles road runs along the west bank of the Yesul lake (height 16,160 feet). Grass and wood plentiful. Water scarce. Road good the whole way.
22	Daknak camp	Ditto	25	Camp on an extensive plain. Grass and wood plentiful. Road along the banks of a dry water-course.
23	Tashliak Kól (height 16,620 feet).	Ditto	26½	Camp on the northern edge of a fresh water lake. Two small passes are crossed, one at 10 miles and the other at 25 miles. Road good. Grass and wood plentiful.
24	Chumik Lakno (height 16,600 feet).	Ditto	27½	Camp at the base of low hills. At 9½ miles the road runs along the eastern edge of the Mangchaka or Mangtza lake. At 13 miles ascends a low range of hills. At 19 miles passes a small lake. Road good. Water from a neighbouring spring. Wood and grass plentiful.

## Route-Survey from Karghalik to Tankse via Khotan, Polur and Noh.—(Continued).

Number of stage.	Name of stage.	Country or district.	Distance in miles.	REMARKS.
25	Lugrang camp ...	Rudok ...	19	Camp between a range of hills. A pass crossed at about a couple of miles from Chumik Lakmo, from thence the road to Lugrang along bed of a partially dry stream. Water scarce. Wood and grass plentiful.
26	Sumzi Ling* (height 15,570 feet).	Ditto ...	17	Camp on left bank of the Rudok river. At 4 miles the Kiang pass is crossed, from thence along the Rudok stream to Sumzi Ling. Road stony. Fuel and grass plentiful.
27	Angehe Churtan ...	Ditto ...	31	Camp on right bank of the Naichu river. Road for 8 miles good, at 10 miles ascend a pass, from thence along the river to camp. Wood and grass plentiful.
28	Noh village ...	Ditto ...	10	A small village of 25 houses on the Naichu river. Sparse cultivation. Road good and along the stream, Rudok lies about one long day's journey (by a circuitous route) to the south.
29	Päl ...	Ditto ...	20	Camp on the upper or east end of the Pangong lake called here Chomo Ngala Ring Cho. Road in a westerly direction and along the banks of the lake but very stony. Water good. Wood and grass plentiful.
30	Dal ...	Ditto ...	21	Camp on the Pangong lake. Road stony, along the edge of the lake. Water good. Fuel and grass plentiful.
31	Aot ...	Ditto ...	12	Camp on south side of the Pangong. Road crosses the lake by a shallow ford near encampment. About 2 or 3 miles north-west is ruined fort of Khurnak. Water, fuel and grass plentiful.
32	Takkung ...	Ladakh ...	29	Camp on south side of the lake near a mountain stream which falls into it. Scarcity of fresh water. Road stony and along banks of the lake. Wood and grass plentiful.
33	Shushal ...	Ditto ...	8½	A village of 30 or 40 houses, with sparse cultivation. Road good, and supplies plentiful.
34	Lung Barma ...	Ditto ...	31	Good camping ground in the Lungchu valley. At 4½ miles from Shushal cross Kouga La (pass) from thence along river bank. Road stony. Fuel and grass plentiful.
35	Tankse (height 12,900 feet).	Ditto ...	24	A village of 50 or 60 houses, with some cultivation. Road stony and along Lungchu stream. Fuel and grass plentiful.
		Total distance ...	752	

\* The Pandit's thermometers were broken here.





*Account of Pandit Nain Singh's journey from Leh in Ladākḥ to Lhāsa,  
and of his return to India viā Assam 1873-74-75 drawn up by  
Captain (afterwards Sir Henry) Trotter, R.E.*

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Pandit Nain Singh, the explorer who undertook this journey, is the Chief Pandit whose journey to Lhāsa in 1865 from Kātmāndu, the capital of Nepāl, was described at length by Colonel T. G. Montgomerie, R.E., in the Trigonometrical Survey Reports for 1866-67. The Pandit had been in the service of the brothers Schlagintweit while they were carrying on magnetic and other scientific observations in Ladākḥ and Kashmīr in 1856 and 1857; he was subsequently appointed Head Master in a Government Vernacular School in his native village of Milam in Almora District, and remained in the Education Department until 1863, when, at the instance of Colonel J. T. Walker, R.E., the Superintendent of the Great Trigonometrical Survey, he was entertained for employment as a Trans-frontier explorer and duly trained. From that time to the present he has been constantly engaged either in carrying on explorations himself or in training other Indians to follow in his footsteps. In 1865-66 he made the famous journey alluded to above from Kātmāndu to Lhāsa, and thence to the Manasarowar lake and back to India. This exploration earned for him the present of a gold watch from the Royal Geographical Society of London, which unfortunately was subsequently stolen from him by one of his own pupils. In 1867 he went in charge of a party of Indians and did excellent service in exploring and surveying the head-waters of the Sutlej and the Indus rivers\*. In 1870 he was deputed to accompany Mr. (now Sir Douglas) Forsyth's first mission to Yārkaṇḍ, but shortly after the mission left Leh he was sent back to India, as it was thought that his presence might compromise the mission. In 1873, he was sent under my own orders with Sir Douglas Forsyth's second mission to Yārkaṇḍ, in connection with which he did much good service. In July 1874, while I was at Leh, after the return of the mission, the Pandit having volunteered to make a fresh exploration, I was authorized by Colonel Walker, to despatch him on the journey to Lhāsa now to be described. His instructions were to proceed by a much more northerly route than the one he had previously followed. From Lhāsa he was to endeavour to get attached to the caravan which proceeds thence every three years to Pekin†. If he failed in accomplishing this he was to endeavour to return to India by an easterly route from Lhāsa, down the course of the Brahmaputra, if possible.

It had originally been proposed that another Pandit (P. Kishen Singh) should accompany him on the journey but the exposure this man had been subjected to while returning from Yārkaṇḍ had laid him up and incapacitated him for the time being for any further exertion.

As Pandit Nain Singh had on his former visit made a stay of several months in Lhāsa, and had also of late years been frequently in Leh, and was there known to be in the employment of the British Government, it was by no means easy to make the necessary arrangements for smuggling him safely across the Tibetan frontier; thanks, however, to the active assistance of Mr. W. H. Johnson,‡ the *Wazīr* or Governor of Ladākḥ, under the Maharāja of Kashmīr, all difficulties were surmounted. The *Kārdār* or headman of the district and village of Tankse—the latter a place of some importance, five days' march to the east of Leh, and near the frontier of Tibet—was summoned to our council at Leh, where it was arranged that the *Kārdār* should return to his village and collect a number of sheep for the Pandit and party, who were to follow in a few days' time, ostensibly with the object of going to Yārkaṇḍ viā the Chang Chenmo route, which passes through Tankse. The Pandit was to be accompanied by four attendants, two of whom were natives of Tibet, who had accompanied him on former explorations; the third man was a native of Leh; and the fourth, Kunchu Dunduk by name, belonged to the village of Chushul in the Tankso district, and was a nominee of the *Kārdār*.

It was arranged that the Pandit and three of his servants should enter Tibet as Lāmas going on a pilgrimage to a temple near Rudok, while Kunchu Dunduk, who was well known in the frontier districts, would purchase wool as an agent of the *Kārdār*.

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\* *Vide* Great Trigonometrical Survey Reports for 1867-68. (Also pages 79-107 of this book).

† I provided the Pandit with a letter of introduction to our Minister at Pekin, containing a request that should the letter ever be presented by the Pandit in person, arrangements might be made for sending him by sea to Calcutta.

‡ Well known for his adventurous journey to Khotan in 1864. He is the only European who has visited Khotan in modern times.

Provision was thus made for the first great difficulty which might be expected to be encountered, *viâ* the crossing the frontier; once well in Western Tibet the Pandit would have to trust to his own devices to enable him to reach Lhâsa. To enable him, however, to take a journey thence to Peking, it was indispensable that he should be well provided with funds at Lhâsa to enable him to make the necessary arrangements. It was clearly impossible for him to carry a large sum of money, or even valuable merchandise, through the tribes of wandering robbers that he expected to meet with *en route*. His life would certainly have paid forfeit had such an attempt been made.

It happened that just about the time the Pandit was making his preparations to start from Leh, the usual triennial mission,\* half mercantile, half political, was being despatched to Lhâsa under the command of the Kahlôn, a high official at Leh. With the aid of Mr. Johnson, this officer was prevailed on to take a considerable sum of money in charge, on the understanding that an equivalent amount was to be paid by him to Nain Singh in Lhâsa, whenever he should make personal application for it. It was thus hoped that want of money would not stand in the way of further exploration after arrival at Lhâsa. Most unfortunately the Kahlôn died on the journey, and, as will subsequently appear, the Pandit did suffer at Lhâsa for want of funds, and had to return to India by a direct route.

#### *Leh to Noh.*

These preliminary arrangements having been made, suits of Lâmas' clothing were secretly made up in Leh and carefully packed so as to be available when occasion required. On the 15th July 1873, the Pandit and his companions left Leh in their ordinary costume, giving out that they were going to Yârkaud. On the 21st they reached Tankse, where they remained for two days in the house of the *Kârdâr*, who accompanied them to Chugra, three marches further on: at Chugra they found a summer encampment of shepherds, the last inhabited spot on the road to Yârkaud. At night under cover of darkness the Pandit and his three men cast off their old garments and donned their Lâmas' clothes. Before morning they were all well on the road.

For the first day they followed the Chung Chenmo route to Yârkaud, halting at the foot of the Lankar or Marsmik pass. On the following day they crossed the pass (18,420 feet high) and then quitted the Yârkaud road, and turned off to the east,—crossed the Kiu pass still higher than the Marsmik, and encamped for the night at Pûngur Gongma after a march of nine miles.

The Pandit was obliged to travel slowly, as the whole of his worldly possessions, including tent, bedding, and commissariat for the whole party, had to be carried on the backs of sheep. It is astonishing what admirable beasts of burden these animals make in a pastoral country. The Pandit started with twenty-six sheep from Tankse. Of these some were eaten on the road, some became ill and were exchanged for fresh ones, but four or five of the original lot reached Lhâsa, having in less than four months carried loads of from 20 to 25 lbs. each, over a distance of more than a thousand miles. Throughout the journey they never received a single ounce of food beyond what they could pick up for themselves on the road and at the camping grounds.

On the 28th July the party descended the stream from the Kiu pass to Ningri,† a camp which takes its name from a large heart-shaped mountain which overhangs it. On the following day after descending the same stream to Mandal they reached its point of junction with the Niagzu stream, up which they proceeded as far as Niagzu (Kawang), encountering *en route* a large party of Tankse villagers returning from Rudok with wool and salt. Our Lâmas, somewhat

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\* It appears that ever since the conquest of Ladâkh some 150 years ago by the Sokpo Gyalpo Galdân Chang, the Râja of Lhâsa, it has been customary for a large caravan to leave Leh for Lhâsa once in every three years. The leader has the honorary title of Lopchak,\* and is generally one of the leading officials of Ladâkh. The party leaves Leh in July and August and proceeds *viâ* Gar-tok, Manasarovar, Shigatsé, and Tra-dom to Lhâsa, where they generally arrive the following January. Lengthened halts are made on the journey at the above-mentioned places for the sake of trade. The caravan remains at Lhâsa till June or July, and then returns by the same route to Leh, which place they reach in December, *i.e.*, after an absence of one and a half years.

While in Tibetan territory the districts through which they march are bound to furnish gratuitously three hundred yaks for the carriage of merchandise, as well as supplies and food for the travellers. As the quantity of merchandise sent with the caravan rarely attains the full amount for which carriage is sanctioned, the Lopchak in charge receives from the villages he passes *en route* some equivalent for the balance of carriage not required. As the Lopchak thus has his goods carried gratis, and receives in addition considerable payment in lieu of carriage, he is naturally well able to make a large profit on his venture. He is provided by the Kashmir authorities before starting with fifteen thousand rupees' worth of goods, chiefly silks, shawls, and saffron. On his return he is expected to pay into the treasury double the amount of the advances that was made to him. This he does from the proceeds of the tea, wool, turquoises, and silver bullion which he obtains from Tibet in exchange for the wares taken from Ladâkh.

† *Ning*, heart; and *ri*, mountain.

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\* The Tibetan official, who heads a similar caravan which goes every three years from Lhâsa to Ladâkh, is termed *Jang Chôngpo* or *Cha-ôô*.

nervous lest their identity should be discovered, concealed themselves in a jungle of willow trees, while Kunchu and a companion in charge of the sheep met the traders, and narrated how they were travelling alone to Noh to purchase wool for the *Kārdār*. This anxiety removed, they again had their nerves somewhat unstrung on arrival at camp at finding some half-dozen natives of Rudok collecting saltpetre. The travellers were somewhat reassured, however, at finding that there were no suspicions raised as to their being anything else than *Lāmas*.

The men who were collecting saltpetre stated that the Jongpon or Governor of Rudok had ordered them to pay their taxes for the current year in that article. It is obtained by digging up the soil, which is placed in brass vessels; hot water is poured over it; the water dissolves the saltpetre and is then decanted off into another vessel; after a time the water cools and the saltpetre is precipitated. One man can manufacture a sheep-load or about 20 lbs. weight of saltpetre in the same number of days.

At Niagzu is the boundary between Tibet and Ladākḥ;\* the right bank of the stream belongs to the latter and the left bank to the former. The Pandit's companion, Kunchu Dunduk, appears to have successfully interdicted the Rudokis from taking saltpetre from the left bank of the stream. A day's halt was made here to rest the sheep, and the Pandit made an excursion a few miles up the Rawang stream to Kawang Yokma, a winter encampment belonging to the men of Tankse, in the neighbourhood of a favourite grazing ground, where, in addition to abundant supplies of grass, there is also—a rare thing in Ladākḥ—a large supply of jungle wood.†

From Niagzu six short marches brought our travellers to Noh. The country through which they passed was almost uninhabited; a few solitary tents belonging to Noh shepherds, and a single hut at Guunu Chauki, occupied by a small frontier guard, were the only habitations passed *en route*.

[As an itinerary is given, describing at considerable length each day's march throughout the whole of the journey from Leh to Lhāsa and thence on to India, it is unnecessary here to describe the road in detail. Maps of the country about the Pangong lake up to within a few miles of Noh have already been published by the Great Trigonometrical Survey of India; the Pandit's route from that point is shown on the maps which have been drawn to accompany this narrative, which have been carefully constructed from the Pandit's route-survey, based on his astronomical observations for latitude and his hypsometric observations for height above sea-level.]

Noh is a small village in the Rudok district, containing about twenty huts, built of stones cemented by mud. It has small permanent population, which is increased largely in the winter months by numerous shepherds, who during the summer are scattered in tents in twos and threes in whatever parts of the district grass and water are to be found in sufficient abundance for their numerous flocks of sheep and goats. The chief man of Noh, Changkep by name, whose official title is *Lhāmba*, was at the time of the Pandit's visit at a camp called Pāngda, about three days' journey north-west from Noh. Kunchu Dunduk had been despatched to him while *en route* to Noh for the purpose of obtaining the requisite *Lhāmik* ‡ or passport and permission to proceed. The *Lhāmba* of Noh and the *Kārdār* of Tankse occupy similar positions on their respective frontiers, and appear to mutually respect each other, even to the extent of remitting taxation on all goods exported or imported by either party. The Pandit thus not only obtained his passport without difficulty, but also escaped the usual impost duty of 10 per cent. which would otherwise have been levied upon the valuables he had with him.

The *Lhāmba* is under the immediate orders of the Jongpon or Governor of Rudok, whose jurisdiction extends over that portion of North-Western Tibet which lies to the north of the Singh-gi branch of the Indus as far east as the Thok Jalung gold-fields.

\* According to the Indian survey maps the boundary line between Ladākḥ and Tibet is a good deal to the west of the line as given by the Pandit. The latter states that the stream of the Niagzu valley which flows southwards near the meridian of 79° from Mandal to the Khurnak Fort is the true boundary. The one given on the survey map, viz., the watershed to the west of the above-mentioned stream, is derived from Major Godwin-Austen's plane-table survey of the country to the north of the Pangong lake in 1863. This survey extends to within a few miles of Noh, and the details of it generally agree most satisfactorily with the Pandit's route-survey from Lukung to Noh, although there is this discrepancy in the position of the boundary line.

I find on a reference to Mr. Walker's map of the Punjab and Western Himalaya which accompanies General Cunningham's well-known work on Ladākḥ that Niagzu is there also given as the boundary between the two countries, but that south of Niagzu the watershed to the east of the Niagzu or Chang Parma river is shown as the boundary. The Ruang or Rawang stream which enters the main valley north of Niagzu is there shown as belonging to Tibet, but it appears from the text of the Pandit's narrative that he ascended the Rawang stream and found there huts and a grazing ground belonging to the people of Tankse.

† The wood is of three kinds; *changma*, willow; *shukpa*, pencil cedar; *womphu*,? tamarisk.

‡ *Lhāmik* would appear to be the literal Tibetan equivalent for the Persian *Rāhdāri*, which is much the same as our English word passport.

The Jongpon of Rudok is in his turn subordinate to the Garpon of Gar-tok, who has also under his orders the Jongpons of the large districts of Guge (Duba) and Purang, as well as other independent Pons or Râjas of Western Tibet. The Garpon is under the immediate order of the Gyalbo or Râja of Lhâsa. The office of Garpon is only tenable for three years and is always held by a native of Lhâsa who is appointed by the Gyalbo. The Jongpons are also generally changed every three or four years.

The province of Western Tibet is frequently termed Ngari Khorsum. The inhabitants of the northern portion, *i.e.*, the district through which the Pandit travelled, are called by the settled population to the south *Champas* or *Changpas*, *i.e.*, literally *Northmen*. By the inhabitants of Turkistân they are called *Tughliks* or mountaineers. The *Champas* encountered by the Pandit were, contrary to the generally received opinion of them, quite inoffensive people, of the same class as the people of Rudok and the more civilised districts farther south.\* They are all Buddhists, but religious edifices are scarce in their country. On the Pandit's route through this portion of Tibet he came across no *Gom-pa* or monastery, although he occasionally encountered *Manis* and *Churtans*.†

The road near Noh skirts the Pangong lake, which at Noh is joined by a stream from the north-east, up which goes a good road to Khotan *viâ* Polur and Keriya.

The distance to Khotan by this road is about 450 miles. For a distance of 40 miles from Noh it gradually rises up to a height of 15,500 feet, and then for about 160 miles as the crow flies, crosses, in a north-easterly direction, a series of elevated plains and ridges before it descends somewhat suddenly, to the plains of Eastern Turkistân. The average height above sea-level of the halting places on the elevated plain to the north of Noh is 16,500 feet.‡ This vast highly-elevated plateau over which the road passes is the eastern continuation of the Lingzi-tang and Aksai Chin plains, which lie at a similar, or in places even a higher, elevation in a north-westerly direction from Noh, between the Chang Chenmo river and the Kuen Lun range, and have to be crossed by the traveller who adopts the eastern or Chang Chenmo route between Leh and Yârkan. To the north of the Kuen Lun there is a rapid fall into the plains of Eastern Turkistân.

This Tibetan plateau extends eastward, as we shall see in the course of this narrative, as far as the head waters of the great rivers which water China—up in fact for a distance, as the crow flies, of more than eight hundred miles, to the Burkhan Buddha mountains (south-west of the Koko Nor lake on the road between Lhâsa and Pekin), where we still find, according to the Abbé Huc and the still more recent researches of the Russian Captain Prjezviski, a table-land rising from 14,000 to 15,000 feet above sea-level, above which tower gigantic snow-covered mountains.

Seven miles to the east of Noh is the eastern termination of the series of lakes known to us as the Pangong, but better known to the Tibetans as the *Chomo Gna Laring Cho*, which, being literally interpreted, means "female narrow very long lake." Its extreme length from the west end at Lukung is exactly 100 miles, while its breadth probably nowhere exceeds six or seven.§

At its eastern extremity it is entered by a small stream 3 paces broad and  $1\frac{1}{2}$  feet deep. Although the greater portion of this lake has been previously surveyed and described, its eastern limit has now been determined for the first time. It is a curious fact that the water at the eastern extremity is sweet and good to drink, while that at the west end is very brackish. It has been conclusively shown by Major Godwin-Austen that this lake once upon a time drained into the Shyok, but at present it forms the most western of a numerous series of inland lakes with no outlets, which we shall find stretch for a considerable distance across the elevated plateau of Central Tibet.

#### *Noh to Thok Daurâkpa.*

From Noh the Pandit toiled on for many weary marches over this Tibetan plateau; his road lay eastward along a wide open grassy valley varying in width from six to ten miles, bounded on the north and south by low grass-covered hills, through which occasional openings

\* I have myself encountered *Champas* in the Rupshu district, Ladâkh to the west of Chinese Tibet. The habits and customs of these people appear to be just the same as those of the same class who live over the border.

† A *churtan* or *chhartan* is defined by Cunningham as a "holy receptacle" or "offering repository." It is a pyramidal-shaped building erected in honor of some of the holy Buddhas. A *mani* is an oblong dyke or pile of stones 4 or 5 feet high and from 10 to 12 feet broad, varying in length from 20 feet to nearly a mile. They are entirely composed of stones said to be deposited one by one by travellers passing by. On each surface stone is generally inscribed the well-known Buddhist formula, "*Om mani padmi hom.*"

‡ For details of this road see Route XIV of Section G of Geographical Appendix to the Report on the Survey Operations in connection with the Mission to Yârkan and Kâshgar in 1873-74; also pages 156-158 of this book.

§ The depth of the Pangong lake at its west end was found by soundings that I made in 1873 to be nowhere greater than 136 feet.

gave a view of extensive plains stretching away as far as the eye could reach. Beyond the hills sometimes appeared snow-capped mountains, while an occasional shepherd's tent in the foreground, and the frequent appearance of large herds of wild asses, antelope, and gigantic wild sheep,\* helped to relieve the monotony of the journey. In almost every day's march large sheets of water were passed, generally salt but occasionally fed by fresh-water springs. At the latter, the Pandit and his companions would fill their water skins,† as they rarely knew from day to day whether or no they would be able to obtain a fresh supply on the road. More than once their supply of this precious fluid was exhausted, and on one occasion the whole party were for more than 20 hours without fresh water. For fuel, also a traveller's necessary, they were better off; the *argols* or dung of the numerous flocks of wild animals were a never-failing source of supply, while occasionally, but rarely, firewood was obtained in considerable quantities. At Thachap Cho, a fresh-water lake and the 27th halting place from Leh, a large stream flowing from some snow-covered hills to the north-east of the lake was found to be covered on both banks with a dense forest of willow tamarisk, and other trees and shrubs.‡ For the first thirty marches from Noh the heights of the camping grounds varied between 13,700 and 15,000 feet, and for the rest of the journey to Nam lake the ground was somewhat higher, but there was no considerable rise or fall throughout this portion of the Pandit's route. The large, flat, open valleys traversed by the Pandit, locally termed *Sangs*, appear to be much of the same nature as the Pämirs between Eastern and Western Turkistän and the *Jilgas* § of Northern Ladäkh. These *Sangs* of Tibet, however, would seem to have more of plain and less of precipitous mountains than either the Pämirs or the *Jilgas*.

The road for the first ten marches from Noh passes through the Rawang Changma or Northern Rawang district, and is nearly parallel to, and north of, at a distance in places of only a few miles from, the route followed by another Pandit (P. Kalian Singh) on a former occasion while on his way from Rudok to Thok Jalung through Rawang Shoma or the Southern Rawang district, which is separated from the northern one by a low range of hills.

The Pandit passed *en-route* the salt marshes of Khai Chäka and Dakdong lakes from which the people of the surrounding country collect large quantities of salt, which they carry for sale to Ladäkh. He states that the salt forms a crust lying like a sheet of ice on the surface of the mud. The salt-seekers sink through this crust up to their loins in mud and water, and remove the salt, which they subsequently wash, clean, and dry in the sun.

At Chabuk *Zinga* or village (14,400 feet above sea-level) were two huts built of wood, and in the neighbourhood some twenty tents of shepherds, were visible. Here there were a few fields where barley is grown, the first signs of cultivation that had been seen since leaving Noh. The Pandit is of opinion that were the country more thickly populated, there would be no difficulty in finding plenty of ground fit for cultivation. The *Champa* inhabitants appear, however, to care but little for grain, and live almost entirely on meat, milk, butter, and cheese, the produce of their numerous flocks and herds. One sheep-load, *i.e.*, 20 lbs. of flour, affords an ample supply for the consumption of eight or ten men for a couple of months. At their permanent camps they had large cauldrons, generally made of stone; in these they used to make a very weak soup, into which they threw a handful of flour. This constituted the dinner for a large party. At their moveable camps they cook in smaller vessels made of stone or copper (both of which are imported from Ladäkh). All articles of copper or iron are very much valued, and a small axe of the Pandit's, which he kept for the purpose of breaking up ice, he might at any time have exchanged for two or three sheep.

The only articles that these people themselves manufacture are tents and very coarse woollen clothing. The former are black, and are made from yak's hair, and the latter from the fleeces of their sheep, which also produce the material for making the bags in which they take salt for sale in Ladäkh.

Their wealth consists of their horses, flocks, and herds, from the products of which they are mainly supported; also in salt which they carry for sale to Ladäkh, and in return for which they obtain flour, copper, stone vessels, and hardware. Most families possess a matchlock, generally of Nepäl manufacture, and the men of the Rudok district seldom move about without either a gun or a bow and arrows, in the use of which latter they are very expert. Like the inhabitants of other parts of Central Asia, they fire their guns while lying at full length on the ground, the muzzle being supported by a prong about a foot long, generally made of antelope horns. Each gun has a piece of white bunting attached to the barrel, which is thus converted into a flag. Gunpowder is very scarce, and is generally preserved for special occasions.

\* The *Ovis Ammon*.

† Made from sheep's stomachs; two of them would be slung across the back of a sheep.

‡ Termed *Pena Birha*, and *Däma* (furze).

§ *Jilga* is the Turki word for a broad open valley.

The Pandit states that on a former journey, when he visited a large fair at Gar-tok, the young men, who are all expert horsemen, used to practise very successfully at a mark while going at full speed on horseback.\* Each competitor carried two guns and a bow and arrows, and having fired off his gun used to discharge his arrows.

The *Champas* are keen in the pursuit of game, which they kill in large quantities, partly with firearms and bows and arrows, but chiefly with a kind of trap called *Redokh Chum*,† very similar in principle to an English rat-trap. It consists of a ring made of rope, to whose inner surface are attached elastic sharp-pointed slips of wood converging towards the centre of the ring, where a space is left sufficiently large to allow the passage through it of an animal's foot. Small holes are dug in the ground near the water which the wild animals are known to frequent. These traps are placed at the top, hidden from view by a covering of earth, and attached by a strong rope, also concealed from view, to a stout peg which is driven into the ground at a considerable distance off. The animals on their way to the water pass over the holes, and the weight of the body drives the foot through the ring. Once through, it is impossible for the animal to free his foot from the trap, and he soon falls a victim to the sword and spear of the hunter, who lies concealed somewhere in the neighbourhood. Great numbers of wild horses, sheep, and antelope are killed in this manner.

For ten marches from Chabuk *Zinga* to Hissik lake the country was uninhabited; the road lay over a plain way similar to what had already been traversed between Noh and Chabuk. The *Champas* at the latter place had given our travellers general instructions as to the line of road to be followed; but it appears that the latter had diverged too much to the north, and missed the encampment of Gerge Thol, which the Pandit had been previously told lay on the route to Lhāsa, and which he had intended visiting, as one of his servants had a friend there through whose influence they hoped to receive assistance in prosecuting the onward journey. The Pandit had now entered the *Khāmpa* or *Kampa* district, renowned for the bad character of its population, and on arrival at Hissik lake (on the 25th August) was greatly disturbed in mind at seeing men approaching them from a distance with yaks and ponies. Not knowing what to expect, he immediately concealed in the earth his instruments, the greater part of his clothes, and a few bags of grain, and remained behind, while he sent on two of his men to reconnoitre and make enquiries.

The strangers fortunately turned out to be residents of Gerge Thol, the place the Pandit was aiming at reaching, and which lay about a day's march to the south-west of Hissik lake. On the following day (25th August) they travelled together to Gerge Thol, where they found a large encampment of *Khāmpas*, and had the great good fortune to encounter the man they had been looking for. It appears that in years gone by the Pandit's servant had struck up a great friendship in Ladākh with one Dingmo, a medical practitioner, who was now a man of great influence amongst the *Khāmpas*. It was in order to find him that the Pandit had turned back to Gerge Thol. Dingmo did not deny his old friend, but, on the contrary, was of the greatest assistance, as he gave letters to the Pandit for Chiring Dunduk, the *Gombo*‡ or headman of Garche Thol, another *Khāmpa* district several marches further east.

The *Khāmpas* who inhabit these two districts of Gerge Thol and Garche Thol must not be confounded with the *Changpas* or *Champas*, an entirely different race. The *Khāmpas* originally came from the country of Khām, which lies to the north-east and east of Lhāsa§. They number in Gerge Thol about seventy tents, with a population of 600 or 700 souls. In Garche Thol there are about a hundred tents.

These *Khāmpas* had migrated from their own country (near Jiling|| to the east of the Koko Nor lake) about twenty-five years prior to the Pandit's visit. They travelled *via* Lhāsa and the Manasarowar lake, near which place they plundered a caravan, and fled with their booty to their present camping grounds, which, prior to that time, were uninhabited. Soon after settling there, they were called on by the Garpon of Gar-tok to pay tribute, which they now do annually to the extent of 5,000 *Nik-tang* or *Tankas*, *i. e.*, about two thousand rupees (£200), or its equivalent in gold, *ghi* ¶, horses and cattle. This tribute is paid in Gar-tok, and a punctual payment doubtless secures a certain immunity from their peccadilloes being enquired into. They possess

\* This is an amusement I have often myself seen in Eastern Turkistān.

† Literally animal catcher.

‡ *Gombo* is the Tibetan term for headman, and corresponds to the Ladākhī *Goda*. The equivalent word in Ngari Khorsum is *Gadpu* or *Ganpu*.

§ Mr. Cooper, the traveller, in his attempt to ascend the Brahmaputra river came across a tribe called *Khāmtis*, who were said to have formerly emigrated from the country about the head waters of the Irrawaddy. It is, I should think, not impossible that *Khāmpas* and *Khāmtis* both come of the same stock.

|| According to the Abbū Huc, the capital of the Khām district is Tsiamdo or Chlāmdo, a well-known place on the road between Lhāsa and Pa or Ba-tang. Jiling is the Tibetan pronunciation of Sining-fu, a Chinese town in Kansu.

¶ Clarified butter.

large herds of cattle, &c., each tent possessing from ten to sixty horses and from 500 to 2,000 sheep. They despatch annually to a fair at Gya-ni-ma near Mannsarowar, large quantities of sheep and goats' wool, salt and gold, and according to their own account, when they have finished their mercantile transactions, they send back the cloths, &c., that they have purchased, under the escort of the older and less active members of the tribe, while the young men start on some marauding excursion, the victims of which are generally travellers and strangers to the country. The *Khāmpas* are well armed with guns and swords, which latter are constantly worn even by boys. The scabbards are often handsomely ornamented with gold, turquoises, and coral.

The men are fine, large, broad-shouldered fellows. They wear both in summer and winter *postins* made of sheep-skins, the hair being turned inside. These coats are worn short, extending to the knees only, and are fastened round the waist by a woollen girdle, above which the coat is roomy and capacious, affording ample space for the storage of their goods and chattels when on a journey. They have felt hats, resembling in shape a broad-brimmed English *wide-awake*, and leather boots with woollen tops and curved pointed toes. They have no hair on the face, and that of the head is plaited, Chinese fashion, into pigtails. The women dress very much as the men, but their *postins* are longer and less roomy. They wear round leather caps and very long hair, to the plaits of which are fastened long pendants nearly reaching the ground, profusely ornamented, chiefly with silver coins, of which the favourite is the British rupee. Both men and women are always in the saddle; they ride large, powerful horses; and both sexes are skilful riders. They are great sportsmen, and kill large quantities of game, chiefly wild horses, sheep, and antelope. They either employ fire-arms or kill their prey with swords and spears when caught in the *Redokh Chum* trap before described. Their capacity for eating meat appears to be unbounded, and they are apparently naturally somewhat bloodthirsty, as the Pandit states that on several occasions when an animal had been killed, he saw the *Khāmpa* boys kneel down and lick the blood off the ground. This fondness for blood would appear to be derived from a still earlier age, as the food given to infants when their mothers can no longer support them, consists, in the entire absence of grain in the country, of pounded cheese mixed up with butter and blood. They are of the Buddhist religion, but their language is quite different to that of other Tibetans,\* and only one man of the Pandit's party, who had resided some years at Sining-fu (to the east of the Koko Nor) was able to understand it and to make himself understood.

Between Gerge Thol and the *Champa* district of Shankhor on the south is a place called Gegha, where a large fair is annually held in July and August.

On the 29th of August the Pandit returned to Hissik lake, where he saw a large herd of *kiungs*, fully 200 in number. He continued his route over uninhabited level plains, till the 1st September, when, at a camp called Huma lake, he met on the road the *Gombo* of Garche Thol a gentleman who was distinguishable from his followers, in that he wore a pair of golden ear-rings of such length as to rest on his shoulders. The presentation of the letter of introduction from their medical friend at Gerge Thol secured our party a civil reception.

The following night there was a sharp frost, the first sign of the approach of winter.

On the 3rd September they reached the village of Mango, the head-quarters of the *Gombo*, who had gone on ahead of the travellers. The Pandit paid him a formal visit in his tent,—a large one made of yak's hair,—and made him a small present of sandal-wood. The Pandit was kindly treated, and on intimating to the *Gombo* that he was on his way to visit a celebrated monastery near the Nam lake, Chiring Dunduk (the *Gombo*) said he was himself about to move his camp several days' march in that direction, and proposed that they should perform the journey together. The Pandit gratefully acquiesced. On returning to his little tent, he found it besieged by a host of curious *Khāmpas*, who were all most anxious to become possessors of the various little articles of hardware he had with him, but he resolutely refused to part with anything.

Among other visitors was an old man named Sonām Darka, about eighty years of age, a native of a country near Lhāsa who had been living as a servant amongst the *Khāmpas* for several years, and had gradually accumulated a good deal of property. The Pandit, when he found that this man could speak good Tibetan, succeeded in securing his friendship by the present of a couple of common sewing needles, and obtained from him the following information about the neighbouring countries:—

The district to the north of Gerge and Garche Thol is a large uninhabited plain, called Jung Phāyil Puyil, meaning literally "the desert country in which the father and son have

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\* According to the Pandit many words are identical, but the affixes and prefixes are entirely different to those of Tibet. The only point he could recollect is that the suffix *Mu* is the sign of the interrogative. This curiously is identical with the interrogative in the Turki language as spoken in Kāshgar, and may perhaps indicate a common origin for the two languages.

wandered." so called from a tradition that two men of the Shankhor country had, many years previously, entered this desert track for the sake of hunting, but after wandering about for a lengthened period they both died there from want of water.\* Some thirty or forty years before the Pandit's visit, and prior to the occupation of Garche Thol by the *Khāmpa* tribes who now dwell there, there used to be considerable traffic between the inhabitants of Nakchang (a district to the east of Garche Thol) and a place called Nāri Thāru, some twenty days' journey to the north north-west of Thok Daurākpa (the 49th march from Leh). To Nāri Thāru merchants used to come from Nurla, a place eight or ten days' journey off in the Yärkin country, and the Tibetans used there to barter gold for grain and cotton cloths. The traders from Nurla were a people who used to shave their heads (on which they wore large folded cloths), and who used to cut the throats of sheep instead of strangling them, as is done in Northern Tibet. Sonām Darka also recollected a few words of their language which the Pandit, who had only recently returned from Yärkand, at once recognised as Turki. The road from Thok Daurākpa is said to traverse for twenty days' journey extensive plains, and then crosses a snowy range, at the foot of which lies Nāri Thāru, where a considerable stream, the only one encountered on the journey, flows from east to west†. Sonām had in his youth made the journey several times, but the road had now been closed for at least thirty years; the reason given being that since the discovery of borax, or rather since borax has become a considerable article of trade between Tibet and Hindustān, the inhabitants of Nakchang now find a good market for it in the Ngari Khorsum district, from which place they derive their supplies of grain instead of, as formerly, from Turkistān.‡

Sonām Darka had also on one occasion, some thirty years ago, made a journey from Thok Daurākpa to Ājan, a country about two months' journey in a north-easterly direction. The road lay throughout over an extensive plain, no large mountains being seen, or streams encountered *en route*. Drinking water was obtained from a succession of small fresh-water lakes, mostly supplied from rain water. Shortly before reaching the Ājan country, the road traverses a bare rocky range of mountains. Ājan itself was inhabited by the *Sokpo Kalmucks*, a nomadic pastoral people who obtained grain (rice and flour) from the neighbourhood of Kharka, a large monastery said to be ten or twelve days' journey beyond the southern frontier of the Ājan country. Near Kharka is a large city called Kokod, the residence of the Sokpo Gyalbo, the ruler of the *Sokpo* districts, while Kharka itself contains several monasteries, one of which is the residence of the Jipchun Thāmba (Ring-bo-che), the spiritual head of the *Sokpo Kalmucks*. The road just described is never now made use of, probably for the same reason which has led to the abandonment of the before-mentioned route to Nāri Thāru, as well as on account of the difficulty of ensuring a certain supply of water *en route*; no one would venture to travel by it unless after an unusually heavy rainy season. Wood and grass are said to be plentiful throughout.

Kharka || is a name about which I have for some time past been endeavouring to obtain authentic information, but I can hardly venture to claim any great success in the attempt. It is first mentioned, as far as I am aware, by Major Montgomerie, R. E., in his discussion of the work of the Pandit who explored the Nam lake in 1872. On the present occasion the Pandit had been specially instructed to make enquiries about it. He saw in Lhāsa some men who were pointed out to him as from Kharka, tall, copper-complexioned, fine-looking men, but unfortunately he could not understand their language, and his stay in Lhāsa was so short that he was unable to learn anything authentic about them.

As far as I can gather from enquiries made at Yärkand, and from the information collected by the Pandits, Kharka is situated about one and a half months' journey to the north-west of Nāg Chu Kha, a large village situated on a river of the same name a few marches to the north-east of the Tengri Nor or Nam lake. At this village it is said that two roads diverge, one to

\* Curiously enough another Pandit on a former exploration (1868) brought intelligence of the existence of an *inhabited* country called Jung Phāyil Puyil (Jung Phaiyu-Pooyu) in the direction now indicated; the name he had got correct, but it now appears to represent a desert tract, as the name itself proves.

† It is clear that Yärkin stands for Yärkand, and it is nearly equally certain that Nurla is a place called Nūra in my map of Eastern Turkistān, on the direct road between Khotan and Polur. I find in a manuscript note in my possession that Sai Neurla, a place about one march to the east of Ganjulāgh, and which is probably identical with Nūra, is known as a place of export of grain towards Tibet.

‡ From Sonām's description of the road, and the knowledge that in clear weather a snowy range is said to be continuously visible along the road from Kerija to Charchan, I infer that Nāri Thāru occupies a position at the foot of the northern bounding ridge of the Great Tibetan plateau, somewhat similar to that held by Polur and Surghāk, and probably lies approximately in latitude 36° by longitude 84°. The stream mentioned probably flows into the Great Desert, and may possibly be the same that passes by Charchan.

The Pandit mentions that amongst the sheep in Northern Tibet were some with large tails said to have been bred from some that had been brought many years before from Nāri Thāru. The large-tailed sheep, or *Lumba* is the universal breed in Yärkand.

§ Grain is, as may be imagined, not over-plentiful. A sheep's load of flour, say 20 lbs., is about the equivalent in value of a large sheep.

|| Kharka was the name of one of the metropolitan sees of the Nestorian Church. Is it possibly the same place as the modern Kharka or Karkha? See page 244 of Colonel Yule's preliminary essay to "Cathay and the way thither."



Kharka, passing in a north-westerly direction, and the other to Koko Nor and Pekin in a north-easterly direction. The position of Kharka thus obtained would agree approximately with an account I heard of a *Kalmuck* in Kāshgar, which located Kharka at about a fortnight's journey to the south-east of Lob Nor lake. It probably lies somewhere between Lob Nor and Koko Nor lakes and I think it not improbable that the country of Ājan to the south of it may be the same as the country of Anj Si which is mentioned by Uspenski in the Russian *Investigia* as a country lying in a westerly direction from the Zaidan plain, which is to the west of Koko Nor.\*

On the 4th September the Pandit left Mango, in company with Sonām Darka, and the *Gombo* Chiring Dunduk, the headman of Garche together with their flocks and herds; there were about six days of nomads in all. For four days they kept company, advancing slowly at the rate of about eight miles a day. It is the habit of these people, when they have exhausted the pasturage near any one camp, to shift bodily to fresh ground; they were now on one of their customary moves. On the fourth day they reached Kezing, in the neighbourhood of which place are very extensive pastures sufficient for the subsistence of the *Gombo's* large flocks for a couple of months.

Some idea of the wealth of this people may be inferred from the fact that *Gombo* Chiring was himself the fortunate proprietor of 500 horses, 400 yaks, and 2,000 sheep. Other members of his tribe were said to be even more wealthy than him.

These Garche *Khāmpas*, numbering in all about 100 tents, had only been settled in the country for about fourteen years. They are under the jurisdiction of the Gyalbo of Lhāsa and are very much better off than their neighbours the Gerge *Khāmpas* (who are under Rudok), as they only pay what must be to them an almost nominal tribute (in gold) of the value of about £20. This gold is obtained at Thok Daurākpa to the east of Garche Thol in exchange for the produce of their flocks, and for borax, extensive fields of which exist at Noring lake which were passed by the Pandit *en route* to Kezing.

The Pandit appears to have ingratiated himself most successfully with the *Gombo* Chiring, for that chief very kindly made arrangements that he should travel onwards with two other men, servants of a merchant from the neighbourhood of Shigātse, who were travelling with some spare yaks in advance of their master from Thok Jalung to Shigātse; these men for their own sakes were only too happy to travel in company with the Pandit and his party.

From Kezing eastward for a distance of eighty miles, up to Thok Daurākpa, the country was uninhabited when the Pandit passed through it; but it is occupied by the *Khāmpas* of Garche at certain seasons of the year. There is capital grazing and an abundant supply of water and fuel (*argols*) throughout. The road lies the whole way in one of the broad open *sangs* before described, lying between ranges of hills running east and west. South of the Tashi Bhup lake, the southern range runs off in a south-east direction, rising rapidly in height and forming a massive group of snow-covered peaks known as the Shyalchi Kāng Jāng, the positions of several of which were fixed by the Pandit although at a distance of from thirty to forty miles south of his road.

From this snowy group flows northwards a very considerable stream, the Shyal river which was crossed by the Pandit in three separate branches, which, although nowhere more than a foot in depth, are said to be passable only with very great difficulty during the floods caused by the melting of the snow in the summer months. This stream flows into the Tashi Bhup lake, whose southern shore is about two miles to the north of the Pandit's road. From the eastern end of the lake a stream issues whose waters are said ultimately to drain into the Chargot lake, from which they emerge under the name of the Nāg Chu Kha river and flow eastward to the village of the same name which lies on the northern road between Lhāsa and Pekin. At the point where the Shyal river was passed by the Pandit, his road was crossed by another track going from Manasarowar to Nāg Chu Kha which passes south of the Tashi Bhup lake, and then follows throughout its course the stream which emerges from the east end of the lake and flows to the Chargot lake and Nāg Chu Kha. This road is said to be perfectly easy and abounds with grass and water, but the country it passes through is uninhabited throughout.

The Pandit, who had been forewarned that the neighbourhood of the crossing of the two lines of road was a notorious place for robbers, took the precaution of pitching his camp two

\* I at one time thought that Kharka might be merely a corruption of the word Kalka, and that the *Jipchus* *Thāmba* (Ring-bo-che) of Kharka might be the same individual as the Kalka *Yezun Dampa* (of Shaw), the *Guison Tamba* (of Huo), and the *Kutuchta Gyen* of Urga (of Uspenski), the chief Lūma of the Kalka country which lies on the southern confines of Siberia. It appears, however, from a study of Mr. Uspenski's notes in the *Investigia* that Urga is 3,250 versts (more than 2,000 miles) from Lhāsa, the road from which place passes by Nāg Chu Kha, Koko Nor, and Sining-fu. The last-mentioned place is four long marches east of Koko Nor and forty-four long marches south of Urga. These bearings and distances place it, I think, beyond a doubt that Kharka and Kalka are not identical.

miles off the road. It is said that the custom of the *Khampa* robbers who infest this country is to cut at night the ropes supporting the tent of the traveller, whom they fall upon and cut down while attempting to escape from the folds of his tent.

While under the immediate protection of the *Gombo* Chiring the Pandit had felt pretty safe, but he appears, not without good reason, to have passed several sleepless nights before he again reached inhabited country.

Travelling as a *Lūmp* he had affected great poverty, and throughout the journey he kept his rupees concealed here and there in the most out-of-the-way places imaginable. His chief repository was a very old and ragged pad carried on the back of a donkey that had accompanied him from the west, and which animal, in consequence of the riches he bore, obtained amongst our travellers the *soubriquet* of *Sarkari Khazānki*, or Government Treasurer.

The Pandit reached the gold-fields at Thok Daurākpa on the 17th September, having taken on the latter part of the journey a somewhat difficult road over hills in order to avoid the easier road to the south, which passes round the foot of the hills, but where he thought he was more likely to meet with robbers. He had now quitted the *Khampa* country and had entered the Nāktsāng Pontod district, in which he passed two or three abandoned gold-mines before reaching Thok Daurākpa.

The Pandit found that the gold-fields in this portion of Tibet were of much less importance than those he had visited at Thok Jalung in Western Tibet on a former exploration. At Thok Daurākpa the diggers mostly dwell in caves excavated in the earth. These habitations, which are locally termed *phūkpa*, are thirty-two in number, and contain populations varying from 5 to 25 in each, according to the wealth of the proprietors, who do not appear to select these buildings from choice, but rather from necessity caused by the proximity of the *Khampa* robbers, whose habit of cutting down first the tents and then the owners has been already mentioned. These underground caves are naturally far more secure than tents would be, and one man well armed could defend one of them against a large number of assailants. Besides these caves there were also some seven or eight tents belonging to travelling merchants and recent arrivals. The diggers were mostly *Champas* from the Nāktsāng district to the east and south-east of the gold-fields; but there were also others from Western Tibet and from Janglāche, a large town on the Brahmaputra, five or six days west of Shigāise.

The proprietors of each *phūkpa* have also their own gold-pit,\* in which they work (in the day-time only). One or two men are generally employed in quarrying the stone in which the gold is found. The pieces of stone are lifted up in baskets to the brink of the pit, and are there pounded into small fragments which are deposited on a cloth which is arranged on a slight slope and kept down by a number of stones so as to make the surface uneven. Water is then poured over it, and carries away the lighter portion of the soil, leaving the gold in the uneven receptacles that have been made for it. The largest piece of gold seen by the Pandit at Daurākpa was about one ounce in weight.

Unfortunately for the diggers, water is not found within a mile of the gold-fields, and has to be brought that distance in skins on donkeys which are specially kept for the purpose. These donkeys were the only animals of the kind seen by the Pandit between Ladāk and Lhāsa. It appears that they do not stand the cold well, and although their bodies were covered in profusion with the *pashm* or wool which grows under the hair of nearly all animals in these very cold and highly elevated regions, it was always found necessary at night to allow them to take refuge in the *phūkpas* inhabited by their masters.

Gold-finding does not appear to be a very lucrative occupation, and although the tax paid by the diggers to the Sarpon or Gold Commissioner of Lhāsa *viz.*, one *sarshoo* (one-fifth of an ounce) per man per annum, is decidedly small, yet the profits appear to be but little more than is necessary to keep body and soul together. According to the Pandit, the pastoral population are far more prosperous than the gold-diggers, and lead a much freer, pleasanter, and more independent life.

The gold of Thok Daurākpa is said to be whiter and of better quality than what is found farther west. It is, however, more difficult to obtain, both on account of the soil or rather rock in which it is found being much more difficult to break up than the softer soil of Thok Jalung, and on account of the distance from which water has to be brought. At Jalung a stream runs through the gold-fields. The Pandit believes that there are enormous tracts of land where gold is to be obtained by digging, but where the absence of water would render the working of them unremunerative.

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\* At Thok Jalung the arrangement is different; there the whole of the diggers work in one large excavation.

The Thok Daurākpa and Thok Jalung gold-fields are under the same Sarpon who makes the round of all the Tibetan gold-fields once a year to collect the taxes.

It would appear that the importance and value of the Tibetan gold-fields have been considerably overrated. The Pandit states that besides the half-dozen places where gold-digging is now carried on in the neighbourhood of Thok Jalung, the only other gold-fields now being worked in Northern Tibet are at Thok Daurākpa and two other places of even less importance at Tang-yung and Sarka Shyār, both of which are about six days' journey farther east. He believes that nearly the whole of the gold collected in Western Tibet finds its way to Gar-tok, and ultimately through the Kumauni merchants to Hindustān. He estimates the value of gold brought annually into Gar-tok at about eighty thousand rupees (about eight thousand pounds sterling).

The gold-diggers at Daurākpa dispose of most of their gold either to the *Khāmpas* of Garche Thol on the west, or the *Chāmpas* of Nāktsāng Pontod on the east, in exchange for the products of their herds and flocks. The rest of the gold is taken by merchants who bring tea from Lhāsa and from China.

A brick (*parka*) of tea which weighs about five pounds and in Lhāsa is worth say seven shillings and in Ladākḥ twelve shillings (or more, according to quality), sells at Daurākpa for one *sarshoo* of gold (one-fifth of an ounce).\*

#### *Thok Daurākpa to Lhāsa.*

The Pandit only halted one day at the gold-fields and continued his journey on the 19th September. His route lay over precisely the same kind of country that he had previously traversed; it crossed several streams, all flowing to the north, and ultimately finding their way into the Nāg Chu Kha river. For the first three marches the country was uninhabited, but after leaving Lhung Nakdo numbers of *Champa* tents were almost daily seen from the line of march.

Although the plain he was now traversing was more than 16,000 feet above the level of the sea, the Pandit does not appear to have suffered very much from the great elevation; the weather was mild, and he speaks of the whole of the journey over the plains of Tibet as a delightful pleasure excursion, when compared with his experiences over the Karakoram and other passes on the road from Leh to Yārkand. The sheets of velvet turf covered with countless herds of antelope must indeed have formed a pleasant contrast after the equally elevated but bleak and uninhabited bare plains of Lingzi-Tāng and Dapsang, in Northern Ladākḥ. The Pandit (who is fond of statistics) asserts that on one occasion he actually counted two thousand antelopes (*cho* and *gwa*) which resembled in appearance a regiment of soldiers, with their horns glistening in the sun like bayonets. The horns frequently found lying on the ground served him in lieu of tent-pegs.

In the Nāktsāng Pontod (Northern and Southern) district, which extends for several marches east of Thok Daurākpa, there are altogether about a hundred and fifty families of nomads, all wealthy in horses, yaks, sheep and goats. Throughout Nāktsāng the sheep are very large and strong, and are almost all black—a peculiarity of this district alone, those in Western Tibet and in Lhāsa being nearly all white. Yaks are used almost exclusively as beasts of burden, and on one occasion the Pandit met a caravan with two hundred of these animals carrying tea towards the west.

Nāktsāng Pontod is under an official, a native of the country, the Garpon Durje Puntchok, whose dignity is hereditary. He collects the tribute for the Lhāsa authorities and remits it to Senja Dzong (fort), farther east. The tribute paid is almost entirely *ghi* (clarified butter).

The *Chāmpas* of Nāktsāng, who are also promiscuously termed *Horpas* and *Dokpas*, speak a language which differs but little from that of Lhāsa, and the Pandit had no difficulty in carrying on conversation with them.

In the 8th march from Thok Daurākpa the Pandit encountered a lofty range of mountains which was crossed by a high but easy pass called Kilong, 18,170 feet above sea-level. This range runs southward and culminates in some enormous peaks known by the name of Tārgot La, from which extends eastwards a snowy range, numerous peaks in which were fixed by the Pandit, along a length of 180 miles, up to where the range terminates in a mass of peaks called Gyākharma, which also lie to the south of and very near the Pandit's road. The highest of these Gyākharma peaks was ascertained by measurement† to be 22,800 feet above sea level, and the Pandit

\* At Thok Jalung on a former occasion the Pandit purchased one tola of gold =  $\frac{1}{12}$  of an ounce (avoirdupois) for eleven rupees, i.e., the modern equivalent for an English sovereign. At Thok Daurākpa the price of an equivalent amount of gold would have been about fourteen rupees.

† By double altitudes taken with a sextant from points whose altitudes have been determined by hypometrical measurements.

estimates that the highest of the Tārgot peaks (which lay too far off the road for vertical measurement with a sextant) is at least 2,500 feet higher than the highest of the Gyākharna group. Tārgot La was seen from the Chapta pass at a distance of over one hundred miles, and is believed by the Pandit to have been the highest mountain seen by him on his journey.

This range is probably not the watershed between the basin of the Brahmaputra and the lake country of Hor,\* for the Pandit was informed that to the south of the range, running parallel to it, is a large river, Dumphu or Hota Tsang-po, which ultimately changes its course and flows northwards into the Kyaring lake.

The highest peak of the Tārgot La group is called Tārgot Yap or father, while an enormous lake which lies at the foot of its northern slope is called Dangra Yum or mother; these two, according to local tradition, are the progenitors of the whole world.† The circuit round the mountain and lake combined is a common pilgrimage not only for the people of the Hor country, but for their more distinguished co-religionists from Lhāsa. Similar circuits are made round the sacred mountain of Kailas, near the Manasarowar lake.

The circuit round the lake alone occupies from eight to twelve days, the distance being about 200 miles, but the complete circuit of lake and mountain takes up nearly a month. The country people believe that if they make the complete circuit (termed locally *Kara*) once, they will be absolved from ordinary sin; for a man to be cleansed from murder requires two *Karas*; but if the round is completed thrice, even the murder of a father or mother will be atoned for. The Pandit did not feel much comforted on learning that this is all implicitly believed by the country people.

The district surrounding the Dangra lake and another smaller lake to the north of the road is called Nāktsāng Ombo. It is surrounded on all four sides by snowy mountains, and contains several villages,—Nāktsāng, Tang-yung, K̄isum, Ombo, Sāsik, and Chāk̄sa; each village contains twenty or thirty houses, built of stone, and surrounded by richly cultivated fields which produce a profusion of barley. The harvest was not quite gathered in on the 28th of September, the date of the Pandit's arrival at Ombo, the chief village of the district.

The existence of this cultivated Ombo plain enclosed by mountains, which in their turn are surrounded by boundless extents of pasture land, is a very curious feature.

The Pandit had not seen a single field of grain of any description since leaving Chabuk Zinga, thirty-five marches to the west, nor did he again meet with cultivation until reaching Tulung Dinga village, near Lhāsa, thirty-nine marches beyond Ombo. The height of the plain (15,240 feet above sea-level) is not less than that of the surrounding country, and although somewhat protected from wind, it is no better off in this respect than the district of Nāktsāng Gomnāk which borders it on the east, which is also well watered and has apparently a richer soil, but is nevertheless totally devoid of cultivation.

According to local tradition the Ombo country was once upon a time thickly propulated and covered with villages. Two thousand years ago it is said to have been ruled over by a very powerful Rāja, the Limūr Gyalbo, who resided in a fort called Kiung Dzong, on the banks of the lake (close by Thungru), the ruins of which were pointed out to the Pandit. The Gyalbo Limūr was the ruler over the whole of the Hor country, and his wealth was said to be boundless. Amongst other riches he was the possessor of a golden saddle and a turquoise as large as a goat's liver. He was overcome in battle by Digung Chanbo, the Gyalbo of Lhāsa, who however, failed to possess himself of the saddle and turquoise, which were cast into the middle of the lake, where they are said to remain at the present day.

The Pandit is of opinion that the Dangra Yum lake and the smaller lake of Tang-yung to the north, were formerly connected together in one vast expanse of water. The Dangra lake is even now so large, and the wind sometimes raises such violent waves, that the Pandit compares it to the ocean. The inhabitants of the Ombo or Pembo country, as it is sometimes called, although speaking the same language as the other *Champas* or *Dokpas* who live in other parts of Hor, curiously enough have considerable differences in their religious ceremonies. Instead of the usual well-known Buddhistic formula, "*Om mani padmi hom,*" they inscribe in their prayer-wheels and on their *manis* the words "*Om mite moye sūlendo.*" They moreover twist their prayer-wheels in the reverse direction to what all other Buddhists do, and in making circuits round religious edifices they travel from right to left instead of from left to right, as is the invariable custom amongst all other sects. Others of their peculiar sect are said to reside in the Khūm country east of Lhāsa.

\* The general name of the district through which the Pandit had been travelling.

† The group of Shyalchi Kāng Jāng mountains to the west is said to be one of the daughters of this union.

The origin of the custom arose thiswise. When Sākya Muni\* the great founder of Buddhism in Tibet, first came to the country, he was residing near the famous sacred mountain *Knilas*. Nāru PUNCHUK, a native of Khām, having heard rumours of his arrival, went on a pilgrimage to see him. Having arrived there he found that the devout Sākya was constantly passing his time in circumambulating the sacred mount, and this at such a pace that his would-be disciple was unable to overtake him, although he followed him round and round for several circuits. As Sākya Muni followed the orthodox course (moving like the hands of a watch), the brilliant idea at last struck Nāru PUNCHUK that if he were to go round in the reverse direction he would soon meet him. This he did, and secured an interview, and subsequently becoming a favourite disciple, he received in commemoration of this event permission to found the sect who are now known as *Pembos* who make their religious circuits and twist their prayer-wheels in the opposite direction to that adopted by the orthodox Buddhists.

Near the ruins previously alluded to on the banks of the lake is a large natural cavern, containing the impress of the palm of Nāru PUNCHUK'S hand. It is an object of worship to the people of the country.

Thus far on his journey the Pandit states that a cart might be driven all the way from Noh without any repairs being made to the road, but in crossing the range which bounds on the east the Pembo country, the path was steep and difficult. There is an alternative road, however, lying to the north, by which it is said a cart (supposing there to be such a thing in the country) might easily travel from Thok Daurākpa to the Nam lake without meeting a single obstacle *en route*.

The country to the east of the Pembo district is of a precisely similar nature to what the Pandit had already passed through on the west. It is inhabited as far as the Nam lake by pastoral *Champa* nomads, who live mostly on the produce of their flocks and herds. No grain whatever is grown, but large quantities are imported from the Shigātse and Lhāsa districts to the south. The inhabitants are well off, as, in addition to the produce of their flocks, they sell to the merchants of the south large quantities of salt, which is obtained from numerous *chākas* or salt lakes which lie at from eight to twelve days' journey to the north of the Pandit's road.

The country is sub-divided into districts designated successively from west to east Nāktsāng Gonnāk, Nāktsāng Doba, Yākpa Ngocho, Yākpa Jāgro, De Cherek, Tabāra, and Taklung De which latter lies immediately to the north of the Nam lake. Each of these, as well as the district of Nāktsāng Ombo, before described, has its own ruler or *Pon*, who decides the disputes of his subjects and collects the revenue from them. The whole are subordinate to the two Jongpons (Dzongpons) of Senja Dzong (fort), a place of considerable importance lying to the east of the Nāktsāng Doba district and containing from 80 to 100 houses. These Jongpons are officials appointed from Lhāsa, and are changed every two or three years. Their chief business appears to be to collect the revenue and remit it to Lhāsa, and to act as a sort of court of appeal against the decisions of the hereditary *Pons* who rule over the smaller divisions. They do not seem to have a very difficult task, as their executive and administrative functions are carried out with the assistance of two or three writers only, and a couple of dozen guards sent from the Gyalbo's forces in Lhāsa. The revenue sent to Lhāsa consists entirely of *ghā*.

One of the most influential of the local *Pons* is the Garpon Changba Gyalbo, who resides at Katmar in Nāktsāng Gonnāk; he appears to exercise considerable influence in the neighbouring districts, both east and west, and when the Pandit was passing through had collected a considerable force of *Champus* armed with guns and bows and arrows, with the object of settling a dispute (which was, however, subsequently diplomatically arranged) with another chief who lived some distance to the east of the Nam lake.

A detailed account of the route followed appears in the itinerary which accompanies this chapter, but a better idea of the nature of the country will perhaps be obtained from the map. The height of the plateau traversed appears to vary but little between 15,000 and 16,000 feet above the sea-level. The plain is, as a rule, confined between mountains which run parallel to the direction of the road, but a few transverse ridges of considerable elevation are crossed *en route*. The drainage all tends to the north, the streams from the snowy range to the south finding their way into numerous large lakes which either lie in the *sangs* traversed by the Pandit or are enclosed in similar *sangs* to the north. These lakes are the characteristic features of the country, and the Pandit may well be proud of the discovery and survey of such a numerous and extensive system. Of the whole series extending from Noh to Lhāsa and stretching across the map, the only one that has hitherto been known to geographers is the Nam or Tengri Nor lake to the extreme east, which, although its position with regard to Lhāsa was approxi-

\* It is believed that Sākya Muni (Buddha) himself never went to Tibet, which was converted to the faith by later missionaries. The above and subsequent traditions must refer to some of these.

mately known, and was marked on the old Chinese maps, yet it is only within the last few years that its position and extent have been determined with anything like accuracy; this was done by another Pandit (P. Kishan Singh), a pupil of the veteran explorer whose discoveries are now given to the public.

The largest of these newly discovered lakes, the Dangra Yum lake, is about forty-five miles in length by twenty-five in breadth at its widest part; another large lake, Kyaring lake, is forty miles in length and from eight to twelve across. The waters of the former are slightly brackish, but those of the Kyaring and nearly all the lakes to the east are beautifully fresh, and, as well as the streams which feed them from the south, contain abundance of fish and are covered by myriads of wild-fowl. Unfortunately for themselves, the *Champas* have a prejudice against killing and eating either fish or fowl.

On the occasion of the former explorations of the Nam lake it was frozen over, and although the Pandit (P. Kishan Singh) made the complete circuit of the lake he was unable to discover any stream flowing from it. On the present occasion, however, Pandit Nain Singh, having visited it in the autumn, before its waters were frozen, distinctly traced a stream issuing from its north-western extremity and flowing in a westerly direction. Although, at the time he saw it, the stream was not more than a few feet in which the water-course was broad and deep, in the summer months it must give exit to a large river.

It appears that the drainage from nearly all these lakes finds its way either into the Chargot lake, a large lake said to be twice the size of any with which we are yet acquainted in these parts, or into the Nāg Chu Kha, or Hota Tsang-po, a large river which issues from the Chargot lake and flows eastward. The southern banks of this river are said to be inhabited at certain times of the year by shepherds from the De Namra district (north of De Cherik). The country to the north of the Nāg Chu Kha is believed to be uninhabited.

The largest river crossed by the Pandit in this section of his travels was the Dumphu or Hota Tsang-po, which receives the drainage of the southern slopes of the Tārgot-Gyākharma range of mountains, and flows into the Kyaring lake, forming one of the numerous sources of the Nāg Chu Kha.

The subsequent course of this last river, of which some of the head-waters have now been traced, must, I fear, remain a mystery. The account which was given to the Pandit is inconsistent with the existing ideas of the geography of the country. It is to the effect that after passing the village of Nāg Chu Kha (Napt Chu of the Abbé Hue), which is on the road between Lhāsa and the Koko Nor lake, the river flows in a south-east direction to Chiamdo or Tsiamdo a well-known place on the road from Lhāsa to Ba-tang (Pa) and Peking. Thence it is said to flow south-east and east through Amdo to China, under the names of Mā-chu and Konkong. If this statement were reliable it would prove the Nāg Chu Kha to be a branch of the famous Yang-tze; but after a very careful examination of the whole of the data I possess bearing on the subject, I have come to the conclusion that the evidence in its favour is not sufficiently strong to justify my entering into the subject at length.

It appears on the whole not improbable that the first part of the Pandit's statement may be correct, *viz.* that the Nāg Chu Kha river flows to Chiamdo; if so, it bears successively the names of La-chu, Lo-chu, and Lantsang-Kiang, which, according to most modern authorities, is afterwards known as the Kamboja or Mekong river.

If, however, Klapproth's well-known map is to be relied on (but we know that in one important instance at least, *viz.*, the identity of the great river south of Lhāsa with the Irrawaddy, modern geographers entirely disagree with him), the Nāg Chu Kha (whose Mongol equivalent, Khara-ussu, is shown in Klapproth's map) does not flow to Chiamdo, but forms the headwaters of the Nu or Lu Kiāng, which modern geographers identify with the Salween river, which empties itself into the ocean at Moulmein.

To show the deficiency of correct data about these subjects, I may note that the map accompanying the French edition of Hue's book shows the Napt Chu river as flowing west into a large lake, while Chiamdo is not shown as on a river at all; but on the other hand from Hue's own letterpress we learn that \* "Chiamdo is protected by two rivers, the Dza-chu and On-chu, which, after flowing one to the east and one to the west of the town, unite on the south, and form the Yalung-Kiang,† which traverses from north to south the province of Yunnan and Cochin China, and finally throws itself into the China Sea." On looking at other maps for a further confirmation of Hue's account, I was much surprised at finding that Keith Johnston in his map of China in his "Handy Royal Atlas" of 1871 makes the mistake of placing Chiamdo on the head-waters of the Brahmaputra.

\* Page 461, Vol. II.

† Hue appears to have made a mistake about the name.

The general features of the ground between Lhāsa and Ba-tang, as shown on Klaproth's map are fairly consistent with the account given by Hue of his journey between those places.

One piece of collateral geography brought back by the Pandit appears to agree so well with Klaproth's map that it seems desirable to reproduce it.

The Pandit states, "A road passes from the Nāg Chu Kha village for six days' journey in a north-eastern and thirteen days' in an eastern direction through the Ho-suk\* country to Jākānak Sumdo, where it crosses the Jhāchu† river, which is 300 paces across, and which is said to join the Nāg Chu Kha river at Chiamdo; from Jākā the road passes east for ten days through the Khāwa country, and for fourteen days through the Cheki country, where the road crosses a river flowing south, the Di Chu,‡ which is said to be larger than the Brahmaputra river near Lhāsa, or then the Ganges at Hardwār; it is crossed in boats; after sixteen days in an easterly direction another large river flowing south is crossed, also called the Jhāchu,§ twenty days' journey more in a south-east direction, passing by Chang-thang, brings the traveller to the Amdo country to a place called Chering Chitshum on the banks of the Mā-chu river, which afterwards flows to China.

It is this Mā-chu river which the Pandit believes, erroneously I think, to be the same as the Nāg Chu Kha.

The Pandit took the same route along the northern shore of the Nam lake which was followed by his predecessor in 1872, and was described by Major Montgomerie in the survey reports for 1873-74. From the east end of the lake to Lhāsa the routes are identical down to the village of Dam. From Dam, Nain Singh followed the river of the same name in a south-west direction, instead of striking across the hills to the south-east, the direct route which was followed by the other Pandit.

It was not till the 12th November that the Pandit quitted the higher table-lands of Tibet, and after crossing the Bākñāk pass, 18,000 feet above sea-level, descended into the bed of the To-lung, an affluent of the river of Lhāsa, where for the first time for several months he found himself at the comparatively low elevation of 13,000 feet, from which a steady descent for five short marches brought him to Lhāsa, at an elevation of 11,910 feet. His pleasure was great on reaching the To-lung valley, where he found cultivated fields replacing pastures, and grain in abundance, vegetables, *chang*,|| and other luxuries to which he had long been a stranger. Ordinary cattle and donkeys now took the place of yaks as milk suppliers and beasts of burden. Fowls and pigs were seen for the first time since leaving Ladāk. The more civilised *Bodhpas* replaced the *Champas*, and the Pandit was looking forward to a pleasant stay in Lhāsa.

But unfortunately for him the approach of civilisation brought him considerable anxiety. On nearing Lhāsa he heard a report that it was currently stated there that an English agent was on his way there from India, and that a *bonā fide* Chinaman who had recently arrived from India *viā* Nepāl had been arrested and kept in confinement until an interview with the Chinese Amban had enabled him to prove that he was not the man they were in search of.

The Pandit, on hearing this, halted a day at Lang-dong, and sent one of his own servants (Nendak, a native of Lhāsa) on ahead to engage a room in a traveller's *sarai*, and to enquire whether any news had been received of the Kahlōn of Ladāk and the caravan from Leh. The man returned and reported that nothing had been heard of the Kahlōn; the following day (the 18th November) the Pandit entered Lhāsa.

Most unfortunately one of the first men he met there was a Muhammadan merchant, an *Argün*¶ of Leh, whose acquaintance he had formerly made at that place. This man, Mahmūd by name, knew perfectly well who and what Nain Singh was and although at first he was very

\* In Klaproth's map the Sok-chu is shown as a northern tributary of the Nāg Chu Kha, falling into the latter river near Habdan temple. The position in latitude of the Nāg Chu Kha river agrees very nearly with the Pandit's estimate as shown on the map accompanying this report.

† In the map the Sā-chu, afterwards the Tea-chu, joins the Om-chu river at Chiamdo.

‡ The Dza-chu of Klaproth's map, afterwards the Mā-chu, afterwards the Yalung, and the Ta-tchung, one of the largest tributaries of the Yang-tze.

§ Called by Klaproth the Bri-chu, the veritable Yang-tze. This river where crossed higher up by Hue on his journey to Lhāsa was called Murni-usu or "tortuous waters." Its Mongol name being Bri-chu and its Tibetan name Polei-chu or "River of the Lord"; lower down in its course it is also known as the Kin-cha-kiung or "River with the golden sand"; still lower in the province of Sze-chuen it is the well-known Yang-tze or "Blue River". It is also known in China as the *Ta-kiang* or "Great River". It was in this Murni-usu that Hue found a herd of fifty yaks frozen hard in the ice. After a course of more than 3,000 miles, during which it receives two tributaries from the north, each more than 1,000 miles in length, it falls into the Yellow Sea.

|| A kind of beer brewed from barley.

¶ An *Argün* is a half-breed, the produce by a Kashmiri father of a woman of Ladāk. They are proverbially treacherous and untrustworthy.

friendly, he subsequently changed his manner, and the Pandit was in a great state of agitation and alarm lest he should be betrayed; thus instead of waiting there a couple of months, as he wished to do, until the arrival of the caravan, when he would have been supplied with ample funds and been enabled to continue his explorations elsewhere, he was forced on the spur of the moment to make other arrangements.

He determined to send back to Leh the two men he had brought with him, and accordingly gave them letters to deliver to the Kahlön, whom they might expect to meet *en route*. He also sent with them complete copies of the whole of his astronomical observations and route-survey, to be delivered to Captain Molloy, the British Joint Commissioner in Ladakh, who had promised to forward all such communications to me. These papers and the accompanying letter reached me safely in India in January 1875, and caused me some anxiety for the Pandit's welfare. Happily a few days after their arrival I was informed by telegram of his safe arrival in Assam.

#### *Lhāsa to Tawang.*

On the occasion of the Pandit's first visit to Lhāsa he remained there three months, and wrote a good description of the place. His present hasty visit of two days only has not added to our existing store of information. He left it on the 20th November accompanied by his two remaining servants. Prior to starting, thinking it probable that he might be betrayed, he collected the most bulky and least valuable articles of his property, tied them up in an old blanket, carefully sealed the parcel, and handed it over to the owner of his lodging-house, whom he informed that he was going on a pilgrimage to a monastery ten days' journey to the north of Lhāsa, whence he expected to be back in about a month to reclaim his goods. He started accordingly in the afternoon in a northerly direction, but as soon as evening came on he wheeled round and commenced his return journey to Hindustān.

The first night he halted at Kombo Thang, only two miles out of Lhāsa; the following day he reached De-chen, a flourishing town with a large monastery on the left bank of the Lhāssa river. His route for the first stage was along the high road to Peking.

From Lhāsa to Peking there are two roads; the one generally used, and which is believed to be open all the year round, goes at first nearly due east from Lhāsa to Chiamdo, the capital of the Khüm country; it then takes a southerly direction and passes through Pa or Ba-tang and the Chinese province of Sze-chuen, crossing *en route* numerous snow-covered passes across the ranges which divide the streams which rise in Tibet and flow southwards either into the sea or into the great Chin-sha-Chiang, afterwards the Yang-tze. From Lhāsa to Peking by this route is 136 caravan marches, and the distance about 2,500 miles.

The other or northern route, which is generally preferred by travellers in the hot season, is probably easier, and there is much less snow encountered *en route*. It goes by Nāg Chu Kha and crosses the head-waters of the Yang-tze, from which there are two alternative roads to the Koko Nor. Thence the road passes by Sining-fu (Siling) to Peking. It was followed by the Abbé Huc in his journey to Lhāsa, and he was fifteen days in reaching Lhāsa from Napt Chu (Nāg Chu Kha). Another account gives us Nāg Chu Kha as sixteen days' march from Lhāsa, each march averaging probably about twenty-three miles. The same itinerary\* gives thirty-four marches of similar length from Nāg Chu Kha to Koko Nor lake a place whose position is now known with tolerable accuracy, as it has been recently visited by a Russian officer, Captain Prejevalsky.

At De-chen the Pandit quitted the Peking road, and turning south crossed by the Gokhar pass (16,620 feet) the range that separates the Lhāsa river from the Brahmaputra. The pass was covered with fresh snow. From it he obtained a very extensive view embracing the Yala Shimbo snowy peaks sixty miles to the south-east, and the Ninchin-thang-la peaks at a still greater distance on the north-west.

On the 27th November he reached the Samaye Monastery, which lies on the right bank of small tributary of the Brahmaputra about two miles before it falls into the great river.

The Samaye Monastery (*Gom-pa*) is a very ancient, famous, and beautiful monastery and is said to have been built by the Great Sākya Muni himself. It is surrounded by a very high circular stone wall, one and a half miles in circumference, with gates facing the four points of the compass. On the top of this wall the Pandit counted one thousand and thirty *churtans†* made of burnt bricks. One very large *thakang* or temple occupies the centre of the enclosed space, and is surrounded by four smaller though still very large temples, which are placed half-way between each pair of doorways.

\* By M. Uspenski; originally published in the *Investigia*.

† See note to page 163.



The idols and images contained in these temples are many of them of pure gold richly ornamented with valuable clothes and jewels. The candlesticks and other ecclesiastical utensils are nearly all made of gold and silver. The interior of the (stone) walls of these temples were covered with very beautiful writing in enormous Hindi (Sanskrit) characters, which the Pandit was able to decipher, although he could not understand their meaning. These writings are supposed to be in the handwriting of Sākya Muni himself, and are objects of worship to all visitors to the monastery.

This monastery also contains the *Tanquir* and the *Kanquir* or sacred books of Buddha. The latter are a hundred and eight in number.

Tradition says that in the reign of Tajung Dundjak\* the Gyalbo of Lhāsa, the country was without religion and without gods. During his reign Sākya Muni was born in Hindustān and came to Tibet, and amongst his early converts were Gyalbo Sumzen the son and Biru the grandson of Tajung Dundjak. These two, in company with Sākya Muni, commenced to build the monastery at Samaye; but whatever was raised by day was thrown down by evil spirits at night. At last Sākya bethought him of summoning from Hindustān one of his spiritual pupils, Labban Padmi, who was very skilful in the management of evil spirits. He came and was presented to the Gyalbo, to whom, however, he refused to pay any marks of respect. The Gyalbo, somewhat angered, remonstrated with him, whereupon fire issued from Labban's nails and burned the Gyalbo's head-dress. The wicked demons were soon overcome and the monastery was completed. On the decease of the Gyalbo, his son Biru abdicated and went to Hindustān as a religious mendicant resigning his authority to Sākya Muni, who is still supposed to be alive in the person of the Gewa King-bo-che, or Grand Lama of Lhāsa†.

From Samaye the Pandit travelled down the course of the Brahmaputra for two marches, passing several small tributaries *en route*. He crossed the great river in a boat on the 30th November. In this portion of its course it is known either as Tsang-po or "the river," or by the name of Tamjan-Khamba. At this, now lowest known part of the course of the Brahmaputra in Great Tibet, the Pandit estimates the width of the river at five hundred yards. The stream was very sluggish, its current near the banks being no more than two-thirds of a mile per hour.‡ Its depth was nowhere more than twenty feet.§

The valley through which the river flows was here several miles across; on the left bank of the stream was a stretch of sand fully one and a half miles in breadth, the whole of which is said to be under water in the months of May, June, and July, during which season the river is much flooded, both on account of the increase of water from the then rapidly melting snows, as well as from the rain which falls in considerable quantities from April to June. The river is here no longer used for irrigation, as above Shigātse, but all the smaller streams which issue from the mountains on the north and south are thickly bordered with cultivated land.

The Pandit left the river near Tsetang, from which point he states that its general course is visible due east for a distance of thirty miles, after which it encounters a range of mountains which cause it to diverge in a south-easterly direction. By taking bearing to and fixing the positions of some peaks on this side of which the river was said to flow, he fixed the course of the river approximately for a very considerable distance below where he quitted it. The course of the river thus determined is very fairly accordant with that shown on Du Halde's map of Tibet. After leaving Gyāla, the approximate position of which is shown on the Pandit's map, the river is said to flow for fifteen days' journey through the rice-producing country of Lho-khālo, reputed to be under a ruler who is quite independent of the Lhāsa authorities. Its inhabitants are said to carry on trade with the people of the Kombo district which lies between it and Lhāsa, but they have no communication with the people on their south, the Shār Lhōba a wild race (probably the people who are known to us as the Mishmis) who inhabit the country through which the great river flows to Gya (Assam). In the Lho-khālo country the Brahmaputra is said to be joined by two large rivers from the north.

The Pandit has thus been able to throw a little more light on a lower course of the Tsang-po or the Great River of Tibet. It is unnecessary to follow Wilcox, Montgomerie, and

\* The son of Gyalbo Ramba, who was the son of Gyalbo Ghoja.

† The term "Dulci Lama," by which the Grand Lama of Lhāsa has always been known to us, from the writings of Turner, Hue, and others, is curiously enough absolutely unknown to the Pandit. Gewa Ring-bo-che, Galdan Phutong, Kwinggon Ring-bo-che, are the sole names by which, according to the Pandit, the Grand Lama is known in Tibet. Similarly the great Lama of Shigātse is known to the Pandit, as Fanchhen (or Panjan) Ring-bo-che instead of Teshu Lambu, the name by which he is more familiarly known to us.

‡ The Pandit found that a piece of wood which he threw in from the bank was carried along a distance of fifty yards in two minutes and forty seconds.

§ The poles which were exclusively used in punting the boats across were measured by the Pandit, and found to be twenty-four feet in length; from this he estimates a maximum depth of 16 or 20 feet.

others, who appear to have clearly proved that the Tsang-po must be the large river which under the name of Dihang enters Assam near Sadiya, where it is joined by the Brahmakund. We may, I think, safely admit that this is the case; and although the name Brahmputra is doubtless derived from the Brahmakund of the Assam valley, geographers have, in consideration of the wide-known celebrity of the name Brahmputra, bestowed it on the Tsang-po, the upper and most important source of the great river.

Tsetang is a large town on the right bank of the Yarlung Chu, a considerable affluent of the Brahmputra, on its right bank. It contains two large monasteries in which reside 700 Lamas. From Tsetang the Pandit's road lay up the Yarlung, through a rich and fertile valley, which contains numerous villages and monasteries scattered about on both sides of the stream. The country is very productive, and contains numerous fruit trees, principally apricots and pears; wheat and barley are abundant, as well as peas, and many other kinds of vegetables. There is good grazing on the mountains which border the valley, but the breed of sheep is very small.

From Tsetang to the Dülätang plain at the head of the valley is thirty-six miles. In addition to numerous scattered villages of 10 or 12 houses each, the large towns of Netong and Chukya Phutäng are passed *en route*. From the Dülätang La to the Karkang La the road traverses for 15 miles a grassy plateau between fifteen and sixteen thousand feet above sea-level, through which flows a stream which takes its rise in springs, and ultimately finds its way into the Brahmputra below Tsetang. On this elevated region, which extends from a considerable distance to the west, the Pandit again found himself amongst the *Dokpas* or nomad population. It is by the Karkang pass to the south of the plain that the main Himalayan watershed is crossed. On reaching it the Pandit states that a magnificent view presented itself. The whole of the foreground was occupied by gently undulating grassy plains, over which on the north-west at a distance of but a few miles rise the very conspicuous group of snowy peaks called Yala Shampa. Other snowy peaks beyond the Brahmputra appeared topping the plateau to the north, while east and west and south snowy peaks rose in every direction, but at great distances off.

From the watershed, which is 16,210 feet above sea-level, the road to the Kyakyen La, a pass about seventy miles further south, traverses a high undulating plateau which is bounded on its west by a well-marked snowy ridge which runs nearly due north and south and contains numerous glaciers. The drainage of this country is most irregular. The Pandit's road for the first twenty miles from the pass followed a stream which under the name of Sikung Chu flows for forty miles nearly due east, through the Chayul country, and ultimately turning south-east, runs nearly parallel to the upper course of the Brahmputra, which river it is said to join in Assam. After leaving the main stream the road ascends a branch valley for a distance of twenty miles to the Se La (15,300 feet), and thence descends into a stream which flows due south for forty miles, and subsequently under the name of Tawang Chu takes a westerly course, and flows round the southern extremity of the snowy range which has been mentioned as bounding the plateau on the west.

That portion of the plateau which contains the head-waters of the Sikung river is from 13,000 to 15,000 feet above sea-level. It is a very flourishing, well-cultivated country, covered with numerous small villages containing settled inhabitants, who are under the immediate rule of the Jongpon of Chayul, a district situated lower down the course of the Sikung river.

The road itself after leaving the Se La goes nearly due south, crossing in succession several spurs from the western range, and after reaching the Kyakyen pass rapidly descends into the Chukhang valley, which is separated from that of the Tawang by a very high ridge which is crossed by the Mila Katong La, a pass which was covered with fresh snow.

Between the Sikung district and Tsöna Dzong, the summer residence of the Tawang Jongpon, the country is uninhabited. Near the Se pass the Pandit passed a lake about six miles long by four broad, entirely frozen over, but the waters of which in the summer months doubtless help to feed the Tawang stream. South of this lake the road followed by the Pandit is joined by another which comes from the Hor country and Shigätse.

Tsöna Dzong is a place of considerable importance, and is a great exchange mart where salt, wool, and borax from the Hor country, and tea, fine silks, woollen cloths, leather boots and ponies from Lhāsa, are exchanged for rice, spices, dyes, fruits and coarse cloths\* from Assam. Of these articles rice is a monopoly of the Lhāsa Government, and at Tsöna Dzong there is a *De-Rang* (rice-house) in charge of a Lhāsa official, the *De-Rang-pa*, who purchases the whole of the rice that is imported from Assam, and at whose warehouses only can rice be purchased either wholesale or retail.

\* A kind of silk, according to the Pandit, termed *andi* in Assam and *dhw-ro* in Lhāsa. The Chinese silk is called in Lhāsa *go-chen*, or warm cloth.

This market must be one of considerable importance, and contains three or four hundred shops. The Pandit is of opinion that although the import and export trade is not nearly so valuable as that of Leh (the great exchange mart for India and Eastern Turkistān), yet the number of traders and animals and men employed in carrying loads is somewhat larger. The merchants who import the articles from Assam are mostly natives of Tawang, who are called *Mönbas*, but the goods imported from Hor are brought in by the *Dokpas* or *Champas*. The goods from Lhāsa are brought by merchants from that place.

There is free trade (with the exception of the rice monopoly before mentioned) between Hor, Lhāsa, and Tsōna Dzong, but on all goods to and from the south a duty of 10 per cent is levied at the *Chukhang* or custom-house, one long day's march to the south of Tsōna Dzong. Arrangements are made by the collector of taxes that merchants shall not have to pay both ways. The taxes go to the Jongpon and are remitted by him to Lhāsa.

The road from Tsōna Dzong to Tawang *Chukhang* is closed by snow from January to May or June. An alternative road lies down the Lhobra and up the Tawang rivers.

This *Chukhang* is not only a customs boundary, but separates the Bodhpa country on the north from the Mōnyul district to the south. The *Mönbas* who inhabit the Tawang district differ materially in language, dress, manners, and appearance from the inhabitants of Tibet, and resemble, according to the Pandit, in many respects the *Dokpas* of the Bhutān country on the west. Instead of allowing their hair to grow behind, and arranging it in plaits, as is done in Tibet, they cut it to an even length all round the head, so that their hair is arranged in shape like an inverted slop-basin. On the top of it they wear a small skull-cap made either of woollen cloth or felt. Instead of the long gown of Tibet, a short coat is worn which only reaches the knee. It is fastened by a woollen girdle, in which is invariably fastened a long straight knife.

With the exception of a very large and important monastery at Tawang, the whole of the villages in the Tawang valley are under the jurisdiction of the Jongpon of Tsōna Dzong.

This Tawang monastery is entirely independent of the Jongpon and of the Lhāsa Government. It contains six hundred Lamas, and although not owning much land in the immediate vicinity of the monastery, they are (with the single exception of the village of Senge dzong which is a *jagir* of the Tsōna Jongpon) the proprietors and rulers of the whole country to the south of the range of hills which separates the Tawang from the Dirang valley; their territory extends right up to the British frontier near Odalguri, which latter place is said, prior to its occupation by the British, to have formed a portion of the Tawang *jagir*, which now includes the Dirang and Phutang valleys.

The affairs of the Tawang district are managed by a sort of parliament termed *Kato* who assemble in public to manage business and to administer justice. The *Kato* is composed entirely of Lamas, the chief officials of the principal monastery. These comprise:—

- 1st.—The *Kanbu*, whose duty it is to punish and maintain discipline amongst the Lamas.
- 2nd.—The *Lab-ban*, or teacher, who is at the head of the educational establishment.
- 3rd.—The *Gelongs*, four or five in number, who look after the revenues and government of the country.
- 4th.—The *Nerbas* or *Nerpas*, also four or five in number; these assist the *Gelongs* in their various duties.

The whole of these, together with a few of the older Lamas, form the parliament and have the supreme direction of affairs. Claimants attending their court present their petitions folded up in *khutaks* or silk scarves, and prostrate themselves with great reverence.

These Tawang Lamas are an independent lot, and are well armed with guns, bows and arrows, &c. In Dirang and other places they keep a regular armed force of Lamas to enable them to cope not only with the independent *Daphla*, *Dajla*, or *Lhoba* tribes who inhabit the lower course of the Dirang valley, and with whom they have frequent feuds, but also with the neighbouring and more powerful country of Bhutān on the west, the various districts of which, when not (as is generally the case) engaged in internal hostilities, are always ready to pick a quarrel with the people of Tawang. The village of Lih, in the valley above Dirang, appears to owe a double allegiance to both Lamas and *Daphlas*. The Pandit on his march down the valley was overtaken by a party of fifteen or sixteen of these *Lhobas*, who were carrying away from Lih some cattle, sheep, and pigs which they had received as their share of the tribute, and which they were taking off to their own country two days' journey to the east of Dirang. The Pandit was much struck with the appearance of these men, and especially noticed the enormous development of their arms and the calves of their legs, which far exceeded in size any he had seen elsewhere. They wore cylindrical-shaped hats made of bamboos; their only garment was

a long blanket folded somewhat after the fashion of a Scotch plaid, and fastened round the waist by a cloth girdle which is used as a quiver for their arrows, which all carry, as well as a bow slung over the left shoulder. The greater part of their arms and legs were bare. They wore no boots, but ornamental rings made of rope were fastened very tightly both on their wrists and on their legs below the knee.\* They had high cheek-bones and Chinese-looking eyes, wore no hair on their faces, but allowed that on the head to grow to a great length; this was drawn together behind the head and then allowed to hang down.

The Pandit reached Tawang on the 24th December, and was detained there till the 17th February, having been unable to get permission to proceed to the south. It appears that some few years ago the Tawang Lamas had represented to the Lhāsa officials that their subjects suffered much in pocket from the Lhāsa merchants being allowed to trade direct with Assam, and they at last succeeded in getting an order from Lhāsa that traders from that place should not be permitted to proceed beyond the limit of the Tsōnn Jongpon's jurisdiction. Tawangpas have thus succeeded in keeping in their own hands nearly the whole of the trade with Assam, and they systematically prevent all strangers from passing through their country.

The Pandit had travelled all the way from the Samaye Monastery with a man of the name of Chiring, a native of Tawang, with whom he had struck up a great friendship, and in whose company he was enabled without any very great difficulty to reach Kyakyarong, near Tawang; but in spite of all the efforts of his friend, who was a man of considerable influence, it was nearly two months before the Pandit could get leave to depart, and then only by depositing nearly all his remaining property at Tawang as a pledge that he would return from Sinkri, a place of pilgrimage of some note beyond the frontier in British territory, to visit which was the reason he gave for wishing to cross the frontier. He reached Odalguri in British territory on the 1st of March, the road being often deep in snow, while four passes had to be crossed *en route*, of these the passage of the Se La and the Mandā La were somewhat difficult on account of snow. Details of the road are given in the Pandit's itinerary at the end.

At Odalguri the Pandit put himself in communication with the Assistant Commissioner of the Darrang District, who kindly made all the necessary arrangement for forwarding him to Gauhāti, whence he went by steamer to Calcutta, which place he reached on the 11th March 1875.

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Before closing this account it may be well to recapitulate the chief result of the Pandit's last exploration.

In addition to the general information acquired, which has been communicated in the narrative now being brought to a close, the Pandit has made a very careful and well-executed route-survey of the whole line of country traversed, *viz.*, 1,013 miles from Lukung (west end of Pangong lake) to Lhāsa, and 306 miles from Lhāsa to Odalguri. Of this total distance of 1,319 miles, throughout which his paces and bearings were carefully recorded, about 1,200 miles lie through country which has never previously been explored. Numerous lakes, some of enormous size, and some rivers, have been discovered; the existence of a vast snowy range lying parallel to and north of the Brahmaputra river has been clearly demonstrated, and the positions of several of its peaks have been laid down, and their heights approximately determined.

The Brahmaputra has been followed for a distance of thirty miles in a portion of its course, 50 miles lower down than the lowest point hitherto determined; and as its approximate course for another 100 miles has been laid down, the absolutely unknown portion of that mighty river's course now remaining has been very materially reduced. The route between Lhāsa and Assam *viā* Tawang, of which next to nothing has hitherto been known, has been carefully surveyed, and the daily marches described.

As a framework for the map, no less than 276 double altitudes of the sun and stars have been observed with a sextant for the determination of latitude, and the close accordance of the results *inter se* and with the mapping of the route by the paces and bearings prove incontestably the general accuracy of the work.

The temperature of boiling water has been observed on nearly every pass and at nearly every camping ground (497 observations in all), adding materially to the value of the maps.

Frequent observations of the temperature of the air and the direction of the wind have given us some further addition to the knowledge of the Tibetan climate.

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\* The people of Tawang have it that the wearing of the rope-rings is a punishment inflicted by Sākya Munt upon the *Lhobas* on account of their irreligion.

The Pandit suffered much in health during the latter portion of the journey, and his eye-sight has become seriously injured from exposure and hard work in most trying climates throughout a long series of years. He is now anxious to retire from active work, and will probably receive a grant of land in his native country; and thus, having happily survived the perils and dangers of the road, it is hoped he may spend the declining years of his life in comfort, and with a due appreciation of the liberality of the British Government.

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*The Pandit's Itinerary.\**

FROM Lék to Noh.—Distance 173 miles.

1. *Tikse*, 10 miles.—Good road up the Indus valley. The village of Tikse contains about 600 inhabitants.

2. *Chimre* (height 11,890 feet), 15 miles.—Up the Indus valley for 10 miles; road indifferent; after leaving the Indus the road goes up a well-cultivated branch valley to the north, to Chimre, a village with about 500 inhabitants. Bad camping ground.

3. *Zingral* (height 15,780 feet), 8 miles.—Up the valley for about 3 miles until it forks road then passes for 1½ miles up the eastward branch to the village of Sakti; beyond this the ascent to Zingral is steep; no village; good camping ground. At Zingral two roads separate, one going over the Chang pass and the other over the Ke pass, the road to Tankse by the latter route is shorter by 6 miles than by the former, but is more difficult for laden animals.

4. *Tsültak* (height 15,590 feet), 8 miles.—Up the most northerly of the two valleys. An easy but stony ascent of 2 miles to the top of the Chang pass (17,600 feet). A very gradual descent of 4 miles, after which the road turns abruptly to the east. At Tsültak is a small lake; no village; good camping ground. Though the road over the pass is not very steep, it is difficult for laden animals on account of the badness of the road, which is a mere track, winding through rocks and boulders.

5. *Tankse* (height 12,900 feet), 14 miles.—Down a valley for 6½ miles of easy road; cross the shoulder of a hill (into a valley which drains into the Shyok river) to Drugub, a small village in the Tankse valley; ascends the valley to the large village of Tankse; the residence of the headman of the district of the same name; supplies of all sorts procurable. Behind the village is a valley up which runs the road to the Ke pass.

6. *Chakar-talao*, 14 miles.—Valley above Tankse narrows for 6 miles, and then turns to the south and opens out; 2 miles further on is Mäglib, a very small village; for 3 miles the bottom of the valley is a grassy swamp, then narrows for 2 miles of gentle ascent among rocky boulders. At Chakar-talao is a small pond, sometimes dry in summer; coarse grass on farther side of it.

7. *Lukung* (height 14,130 feet), 7¼ miles.—Five miles up valley to north-west end of Pangong lake; water salt; 2 miles due north from end of the lake to Lukung, where is a small patch of cultivation with a stream running into the lake.

8. *Chugra* (height 14,130 feet), 8 miles.—A summer pasture ground of Tartars; one or two stone huts; grass plentiful, and fish in the stream.

9. *Churkong*, 6 miles.—A ruined rest-house at foot of the Lankar or Marsmik pass; road good up-stream all the way; grass and *bürtsi* at camp.

10. *Pangür Gongma* (height 17,670 feet), 9 miles.—The road crosses the range (which separates the Lukung lake drainage from that of the Chang Chenmo river) by the Marsmik pass (18,420 feet), and instead of following the Yärkand route to the Chang Chenmo valley, the road passes over elevated ground to the east of the pass into the head of another valley which drains into the Pangong lake; the road then crosses, by the Kiu pass, a high spur from the main range, and descends to camp. There was snow in July lying on the surrounding hills, but none on the pass itself.

11. *Ningri or Rongnak* (height 16,250 feet), 5 miles.—Road follows down a large stream which flows to Pangong lake, and in summer is difficult to cross; grass and *bürtsi* at camp.

12. *Niagzu or Rawang Yokma* (height 15,390 feet), 8 miles.—Road passes for 8 miles down stream to Mandal, and then turns up a branch valley (Tsokiok) containing abundance of grass and jungle wood. The camp is at the junction of three streams, and is on the frontier between Ladäkh and Tibet.

13. *Kaisarpo* (height 16,000 feet), 12 miles.—Good road along Tsokiok stream. Three tents of Noh shepherds at camp.

\* The description of the first eight days' marches, i.e., as far as Chugra, are taken from the routes published in the appendix to the Geographical Chapter in the volume of reports on Sir Douglas Forsyth's Mission to Yärkand and Kishgar, 1873-74.

14. *Gunnu*, 6 miles.—Road continues up valley near the head of which two passes (17,800 feet and 17,700 feet high respectively) have to be crossed; a frontier guard stationed here.

15. *Chuchan* (height 15,840 feet), 11 miles.—Road down valley which opens into a grassy plain. Several springs near camp from which a plentiful supply of good drinking water is obtained.

16. *Päl*, 15 miles.—Road down valley. Several springs near camp. Päl is on the northern bank of the Pangong lake, the water of which is brackish.

17. *Dobo Näkpo* (height 14,020 feet), 8 miles.—Road skirts the northern edge of two small lakes, the Cho Rum and the Cho Nyak, the water from which flows westward into the Pangong lake, through a deep channel not more than twenty paces wide. The water in these lakes is quite fresh, and is used for drinking.

18. *Gangra* (height 13,970 feet), 13 miles.—Good road over a flat plain, passing about  $1\frac{1}{2}$  miles to the north of the lake, which is here called Rudok Cho. At 9 miles passes the village of Noh, containing about fifteen houses. A stream from the north-east 40 paces wide and 3 feet deep here joins the Pangong lake. Up this stream is a road to Khotan *via* Polur and Keriya; camp beyond the river; abundance of grass. Yaks' dung in great quantities used as fuel; opposite Gangra a stream flows into the Pangong lake from Rudok.

*Noh to Thok Dauräkpa*.—Distance 377 miles.

19. *Zinga* (height 13,960 feet), 11 miles.—At  $4\frac{1}{2}$  miles from Gangra is the termination of the series of lakes known to us as Pangong and to the natives of the country as *Cho Mo Gna Laring Oho*, } a small stream 8 paces broad and  $1\frac{1}{2}$  feet deep enters Lake woman narrow very long Lake, } it at the east end. From this point to Zinga the road passes along a broad and nearly level plain about 6 miles in width and bounded on north and south by grass-covered mountains. At camp were four tents of shepherds.

20. *Khai Chäka* (height 13,960 feet), 6 miles.—Road continues along grassy valley (locally termed *Sang*) to camp, which is on the north side of a salt-water lake about 7 miles in circumference. Water from springs, and many wild *kiängs*. About 5 miles south-east of the lake is another salt lake, the Dakdong lake, to the north of which is a very conspicuous black stony mountain called Gyai I,\* which the Paudit was informed contains numerous caves, in which are blocks of crystal (*Silkär*) of the size of a man. These are objects of worship to the people of the neighbourhood. From this camp a large open valley extends in an easterly direction as far as the eye can reach.

21. *Lumadömo* (height 14,210 feet), 13 miles.—Road good and over level plain. To the south several small salt lakes are passed. Dung of cattle (*chio*) used for fuel here and throughout the rest of the journey to Lhāsa, except where otherwise specified. There are warm springs in the neighbourhood, said to possess medicinal properties, which are frequented in winter by the surrounding population.

22. *Bujung*, (height 14,290 feet), 14 miles.—Road continues along a level grassy valley varying from 6 to 10 miles in width, and bounded on the north and south by grassy hills. Camp on north edge of a fresh-water lake about 10 miles in circumference, and tenanted by numerous wild fowl. The banks of the lake are covered with shells. A stream enters the east end, and there is one outlet at the opposite end of the lake through which a stream passes to the salt-water lake on the west. A view of the Aling Kangri peaks was obtained from here.

23. *Chabuk Zinga* (height 14,400 feet), 16 miles.—Road continues along course of stream, which still runs in a broad open valley; at camp two small huts and four or five tents. Two miles to the north-west was another encampment of fifteen tents.

24. *Kängri Chumik* (height 15,300 feet), 14 miles.—At  $3\frac{1}{2}$  miles a road goes off in a south-east direction to Ting-che and Thok Jalung. No fresh water on this march or at camp, which was in the neighbourhood of an extensive salt marsh. North of the camp are some bare red-colored mountains, and the water and mud of the marsh was of the same color, as also is the salt which is extracted therefrom. Another view of the Aling Kangri peaks was obtained from here.

25. *Mindum lake* (height 14,860 feet), 20 miles.—Road as usual.

26. *Mindum lake*, east end of, 7 miles.

27. *Thachap Oho* (height 15,130 feet), 14 miles.—Came across fresh water about half-way to camp. The plain along which the road lies was covered with numerous large herds of *kiäng*

\* Gyai I = country of snow.

and antelope, which exhibited but little fear. Thachap Cho is a fresh-water lake, and into it flows a large stream which comes from a mass of snow-covered hills lying to the north-east of the lake. This stream is bordered on both sides by an extensive jungle containing willow, tamarisk, and other trees and shrubs. Many wild flowers seen in full bloom.

28. *Thachap, river bank, 10½ miles.*—Road along bank of river, the water of which occasionally disappears underground and re-appears lower down. This stream flows in a south-east direction.

29. *Chunik (height 14,690 feet), 12 miles.*—Several small lakes to east of road; east of the camp is a very extensive plain extending as far as the eye can reach. Good water at camp from springs. Fuel from dung of wild horses.

30. *Cho Dol (height 14,550 feet), 11½ miles.*—Camp on stream 24 paces wide and 2 feet deep, with sluggish current. Near it is the Purang-chäka salt lake, where the Pandit observed quantities of borax, which is locally termed *bul*.

31. *Purang-chäka (height 14,270 feet), 13 miles.*—Camp on north edge of lake; wood plentiful; grass scarce.

32. *Purang-chäka, 2nd camp, 6 miles.*—Camp at springs surrounded on all sides by *bul*,\* which lies in beds from 2 to 8 or 10 feet in depth, and which, being of a light, loose consistency, gives way under the weight of man or beast.

32a. *Pang Bhup (height 15,030 feet), 13 miles.*—No water on road, but abundance of grass. Springs at camp and Tibetan *Manis*; it is a favorite camping ground of the nomads in the cold weather, but was uninhabited at the period of the Pandit's visit. A large plain extends eastwards from this camping ground. Several snowy peaks visible towards the north.

33. *Hissik lake (height 14,310 feet), 12 miles.*—Small salt lake; road as usual over level ground.

34. *Hissik lake, 2nd, 7 miles.*

35. *Nimcho Chäka (height 14,000 feet), 17 miles.*—No drinking water on road, but many fresh water springs and abundance of firewood near camp; road perfectly level.

36. *Nimcho Chäka, 5 miles.*—Fuel, grass and water in abundance; south of camp, a snowy range is visible running east and west.

37. *Huma lake † (height 14,270 feet), 12 miles.*—Several Buddhist *Manis*, and two large fresh-water lakes; no mountains visible on the north, but an extensive level grassy plain studded with wild animals, extending as far as the eye could reach.

38. *Yugar (height 14,460 feet), 16 miles.*—Grass, fuel, and water from a tank which is supplied by rain-water only. This tank dries up at certain times of the year.

39. *Mango (height 14,230 feet), 8¼ miles.*—Six tents of Garche *Khämpas*; grass plentiful; cow-dung for fuel; water from a small stream.

40. *Noring lake, south bank of (height 13,750 feet), 10¼ miles.*—Twelve tents of *Khämpas*; water from springs; grass and fuel plentiful.

41. *Jakär or Yakär (height 13,770 feet), 8¼ miles.*—Camp on south bank of the Noring lake; 10 or 12 tents of *Khämpas*; water from springs; grass and fuel plentiful.

42. *Sakti (height 14,380 feet), 10¼ miles.*—Water from springs; grass and fuel plentiful.

43. *Kezing or Phalung Yakda (height 14,690 feet), 5 miles.*—Water, grass and fuel; 7 or 8 *Khämpa* tents.

44. *Kyang Dhui Chumik, ‡ (height 14,780 feet), 10 miles.*—Small tank; good water; grass and fuel plentiful.

45. *Jom Maru§ (height 15,700 feet), 11¼ miles.*—A small stream of water at camp; grass and fuel plentiful; an old gold mine at a distance of 5¼ miles.

46. *Tärnguk (height 14,810 feet), 13 miles.*—Pass at 5¼ miles at Thok Amär; an old gold mine with an area of about one square mile. Camp inhabited during the cold season only; a large salt lake, called Tong lake, lies to the north-east at a distance of 5 miles. Lofty mountains (black) visible on north, and a very high snowy peak called Shyalechi Käng Jäng visible towards the south-east; a large plain extends to the east.

\* In Kashmir called *Puli*. It is a kind of borax.

† i.e., Milky lake.

‡ Literally, lake dug by the wild horse.

§ Literally, horse's mane.



47. *Charing Golip* (height 14,230 feet), 16½ miles.—The road is here crossed by another track, which leads from Manasarowar to Nāg Chu Kha and the Khām country.

48. *Thok Mārshera* (height 14,830 feet), 18 miles.—Cross *en route* a large river which flows in three channels from a large mass of snowy peaks called Shyalehi Kūng Jāng, about 30 miles south of the road. This river is traversed with great difficulty in the summer months, although nowhere more than a foot deep at the time of the Pandit's visit; it flows into the Tashi Bhup lake, whose southern shore is about 2 miles north of the road. From the east end of the lake, a stream is said to issue towards Nāg Chu.\* The lake is about 13 miles in length by 8 miles in breadth.

49. *Thok Daurākpa* (height 15,280 feet), 12½ miles.—Road somewhat hilly; pass *en route* the deserted mine of Thok Dākchār. The direct road from Shyal river passes over a level plain, but the Pandit took a difficult and circuitous route over the hills, in order to avoid robbers. A long range of red-colored hills running east and west lies to the north of the camp.

Thok Daurākpa is a large gold-field, containing 32 houses and tents of diggers. *Champas* belonging to the Nāktsāng Pontod country; grass, fuel, and water scarce.

*Thok Daurākpa to Senja Dzong (Fort)*.—Distance 262 miles.

50. *Nale* (height 15,960 feet), 10 miles.—Road level; water, grass, fuel (*būrtsi* and dung).

51. *Diokar Karmo* (height 16,090 feet), 12 miles.—Cross a low pass, otherwise the road is level, as usual, passing over an extensive grass-covered plain.

52. *Beda Nākchuk* (height 16,330 feet), 14 miles.—Camp on left bank of Zān Tsang-po, a small river flowing east.

53. *Lhung Nakdo* (height 16,140 feet), 10 miles.—Passed several *Champa* tents *en route*. A high snowy peak called Munga Kangri visible over the plain to the north-east. A large encampment of shepherds (12 tents) and residence of a district official at Gobrang; 2 miles from camp a road is said to go from here to Nāg Chu Kha (north of Lhāsa), a distance of at least 600 miles, over a nearly level plain. The road keeps in the *Sang* of the same stream the whole way.

54. *Ragu* (height 15,970 feet), 8½ miles.—Passed several tents of shepherds; enormous herds of antelope were seen from the road.

55. *Gipu Khara* (height 15,840 feet), 16 miles.—Passed *en route* the Bog Chāng Tsang-po stream, 20 paces wide and one foot in depth, an affluent of the Zān Tsang-po.

56. *Gara Dongkung* (height 16,560 feet), 14½ miles.—Camp near the abandoned gold-field of Chigimili. Water, grass, and fuel in abundance.

57. *Nawa Chidmo* (height 15,720 feet), 12½ miles.—Road ascends with an easy slope for 7 miles to the Kilong pass (height 18,170 feet), after crossing which it follows a stream which subsequently flows northwards to the Tang-yung lake. There was no snow on the pass. Although much snow was lying on some peaks to the north, which rise to an average height of 20,000 feet,† and which forms a portion of a lofty range which extends in a southerly direction to the west of the Dangra Yum lake, and culminates in some enormous peaks known as the Tārgot La, from which, again, a snowy range extends eastward for a distance of 180 miles. The positions of many of the principal peaks in this latter range were fixed by the Pandit. The range comes to an end at the Gyākharma peaks at the east end of the Kyaring lake. The highest mountain in this eastern group was between 21,000 and 22,000 feet above sea-level, and the Pandit estimates the height of the highest of the Tārgot peaks at about 25,000 feet.

58. *Yomo Zinga* or *Ombo* (height 15,240 feet), 12½ miles.—A large village containing a monastery and 35 houses surrounded by cultivation. This was the first time the Pandit had seen signs of cultivation since leaving Chabuk *Zinga* (the 23rd halting place). Enormous lakes to north and south of the road.

59. *Thungru* (height 14,770 feet), 11 miles.—Here are the ruins of an old stone fort, said to have belonged centuries ago to the Rāja who at that time ruled over the whole of the Hor country. Road follows the northern border of the Dangra Yum lake.

60. *The Chiku Larcha*, 4½ miles.—The road ascends for 2 miles to the Naithung pass (15,710 feet) up a steepish incline; road good.

\* The Napt Chu of the Abbé Hue.

† The double altitudes of some of these peaks were measured by the Pandit with his sextant; their height has been roughly determined trigonometrically.

61. *Moboding* (height 16,160 feet), 6 miles.—Cross the Chuku pass (16530 feet). Ascent 2 miles; descent to plain  $1\frac{1}{2}$  miles. Several shepherds' tents scattered about the banks of the Dungele or Ngaugzi lake, which is 28 miles long by 10 broad.

62. *Ngorai* (height 15,360 feet), 12 miles.—Five tents of shepherds at camp, and several others passed *en route*; large flocks of sheep scattered over the plain, which extends as flat as a table from the Chuku pass (march 61) to the Chapta pass (68th halting place), a distance of over 60 miles. Its breadth from north to south at its widest part is little less than 30 miles. It is a beautiful pasture watered by numerous streams and fresh-water lakes.

63. *Gyārdo* (height 15,360 feet), 10 miles.—A good road goes from here to Shigātse. The first portion of the road is through the Doba country, inhabited by nomads. Between Doba and the Che-huil country is a lofty range which is crossed by a high pass, to the north of which is the Hota Tsang-po, which flows east and north-east, and was crossed by the Pandit in his march. Beyond the Dumphu or Hota Tsang-po is the Che country, which contains many villages, and where much barley and wheat are grown.

64. <i>Tükdong Nāma</i> (height 15,400 feet), 13 miles.	} Road passes over level plain, and crosses several streams. Many snowy peaks visible from the road.
65. <i>Jhiakta</i> (height 15,260 feet), $14\frac{1}{2}$ "	
66. <i>Katmar</i> (height 15,200 feet), $10\frac{1}{2}$ "	
67. <i>Loma Karma</i> (height 15,360 feet), 6 "	

68. *Kya Kya Rafka* (height 14,770 feet), 11 miles.—Cross *en route* by the Chapta pass (16,900 feet) a range which separates two streams which flow into the Chikut lake to the north of the road. Camp at west end of Kyaring lake. From this lake a river\* flows to the Chikut lake, 111 paces broad and over 3 feet deep, but with a slow current, the largest stream hitherto met with on the journey.

69. *Kyaring lake*, 10 miles.—Camp on south edge of lake.

70. *Denak* (height 15,480 feet), 12 miles.—Cross *en route* the Riku river, flowing from the south in three channels, each branch being about 40 paces in breadth and 1 foot in depth; 15 tents of the Nākt-sang\* Doba at camp, and a house belonging to the *Debon*, a high official in Shigātse.

71. *Ngobo Le* (height 15,330 feet,)  $11\frac{1}{2}$  miles.—Road lies along the south edge of the Kyaring lake. Camp on the borders of the lake.

72. *Dojam* (height 15,380 feet),  $11\frac{1}{2}$  miles.—Camp near the east end of the Kyaring lake.

73. *Senja Dzong (Fort)* (height 15,550 feet),  $8\frac{3}{4}$  miles.—The first considerable village met with since leaving Tankse in Ladāk. It contains 80 houses built of bricks and stones, and 100 tents. It is one of the largest places in the Hor province, and is the residence of two Jongpons from Lhāsa. The district is watered by the Dumphu or Hota Tsang-po which flows in three channels, the largest of which was 73 paces broad and  $1\frac{1}{2}$  feet deep. There is no cultivation, and the population, like the greater part of Hor, get their supplies of grain from the Shigātse and Lhāsa districts to the south. From Senja Dzong roads go to Shigātse and to Lhāsa (direct).

*Senja Dzong (Fort), to Lhāsa.*—Distance 283 miles.

74. *Chupgo* (height 15,680 feet), 5 miles.

75. <i>Kaisar or Singhya</i> (height 15,790 feet), $7\frac{1}{4}$ miles ...	} Road passes through the Doba Shingkun, and Yākpa districts belonging to the Shigātse Government.
76. <i>Nāngongo</i> (height 15,720 feet), $10\frac{1}{2}$ " ...	
77. <i>Fungchen</i> (height 14,790 feet), $10\frac{3}{4}$ " ...	} The country is level and well watered. The Pandit counted 130 shepherds' tents while passing through this district. No cultivation.
78. <i>Dhejen</i> (height 15,350 feet), $11\frac{1}{2}$ " ...	
79. <i>Keräk</i> (height 15,360 feet), 11 " ...	} Road, as usual, over rich pasture land, with no cultivation; about 100 shepherds' tents passed <i>en route</i> . The district is under the Garpon of De Chenrik, a subordinate of the Lhāsa Government. Water, grass, and fuel everywhere plentiful. All the streams passed <i>en route</i> flow to lakes in the north.
80. <i>Bul lake</i> (height 15,460 feet), 14 " ...	
81. <i>Lāngma (Fort)</i> (height 15,240 feet), $14\frac{3}{4}$ " ...	
82. <i>Rākyam Dongpa</i> (height 15,340 feet), $13\frac{1}{4}$ " ...	

83. *Thuiqo Chumik* (height 15,440 feet), 16 miles.—At 4 miles cross the Nāg† Chu river, which flows westwards from the Nam lake into another large lake north of Lāngma (Fort), from which it is said to issue and flow north to the Nāg Chu Kha river. The bed of the Nāg Chu river where crossed by the Pandit was 100 paces wide and of great

\* The Pandit sent one of his men across it in order to get its correct dimensions.

† Nāg is the Tibetan word for black; *kha*, mouth.

depth, but the actual stream was not more than enough to turn one mill; in the summer months the river bed is said to be filled with a violent torrent. Camp on the northern edge of the Nam or Tengri Nor lake.

84. *Jūdor Sumdyaling Monastery* (height 15,400 feet), 7 miles ... } Two large monasteries near the banks of the Nam lake.
85. *Arka Bagu* (height 15,430 feet), 9 miles ... } Road and camps on north edge of Nam lake. Pass a few tents of *Dok-*
86. *Dukti* (height 15,460 feet), 10 $\frac{1}{2}$  ,, ... } *pa* shepherds and two small monaste-
87. *Dākmar-chu-chan* (height 15,580 feet), 16 $\frac{1}{2}$  ,, ... } ries. Abundance of grass, water, and fuel.
88. *Bago Karma* (height 15,710 feet), 16 $\frac{1}{2}$  miles.—At 8 miles cross the Nai Chu, a small river that flows west into the Nam lake; several snowy peaks visible about 25 miles to the east of the road.
89. *Goblung Yokma* (height 14,510 feet), 10 miles.—At 2 $\frac{1}{2}$  miles cross the Dam Niargan pass (16,900 feet) by an easy road, which, however, for a mile lay through freshly-fallen snow about 1 foot in depth.
90. *Kyanglung* (14,320 feet), 4 $\frac{1}{2}$  miles.—Road passes through the Dam plain, which is scattered over with houses in twos and threes; excellent pastures; supply grazing for numerous herds of yaks. Through a gap in the hills to the east of this plain lies a road which joins at Phendo Chaksam (6 marches from Lhāsa) the caravan route from Lhāsa to Pekin *viâ* Talung and Nāg Chu Kha. From Dam there is a more direct road to Lhāsa *viâ* Talung than the one followed by the Pandit.
91. *Chinbo* (height 14,340 feet), 10 $\frac{1}{2}$  miles. Road lies parallel to the Dam river. At Chinbo this river changes the direction of its course and flows through a gap in the hills to the south-east of Chinbo; through the same gap runs a direct road to Lhāsa.
92. *Camp on bank of La river*, 8 $\frac{1}{2}$  miles.—Road passes up the Nindung valley, through which flows the La, a river which flows by a circuitous course to Lhāsa. There are several scattered hamlets in the La valley, which is bounded on the north by the Ninchin-thang-la snowy mountains, at the southern foot of which is a thick belt of low forest.
93. *Jung-chu* (height 14,240 feet), 10 miles.—Camp near the head of the La valley.
94. *Jyālung* (height 14,700 feet), 6 miles.—Road lies up a tributary of the La river. Pass *en route* the small village of Baknāk-do.
95. *Yulo Gongma* (height 14,800 feet), 8 $\frac{1}{2}$  miles.—Between 4 and 5 miles of ascent to the Bākknāk pass (18,000 feet). The last part very steep; road good, and no snow on the pass; rapid descent to camp.
96. *Tulung Dinga* (height 13,020 feet), 7 miles.—Steady descent down-stream to the village of Dinga, containing a monastery and 20 houses. Cultivation met here for the first time since leaving Ombo (58th march from Leh).
97. *Yungjuk village* (height 12,630 feet), 9 $\frac{1}{2}$  miles.—Pass *en route* the town of Dhejen Dzong, the residence of a Jongpon. The direct road to Lhāsa from Senja Dzong (fort), in the Hor country passes through Dhejen.
98. *Nai village* (height 12,510 feet), 8 miles.—Road passes through a well-cultivated and thickly-inhabited country.
99. *Saibu village*, 6 miles.—Pass several small villages *en route*. Between Nai and Saibu a stream enters the To-lung valley from the west, a long day's journey, up which lies the large monastery of To-lung Chūrbu (or Chubuk), containing two hundred Lamas.
100. *Lang-dong village* (height 12,100 feet), 6 miles.—Pass several hamlets and the monastery of Kimulung, which contains about a hundred Lamas, all from the Ngari Khorsum district of Western Tibet.
101. *Lhāsa* (height 11,910 feet), 14 miles.

TOTAL DISTANCE, *Leh* to *Lhāsa*, 1,095 miles.

*Lhāsa* to *Tawang*.—Distance 213 miles.

From *Lhāsa* to—

1. *De-chen* (*Fort*), 14 miles.—Road lies up the Lhāsa river (*Kyi Chu*), and passes *en route* several villages. *De-chen* itself contains about 500 houses and a large monastery with 300 Lamas; here is a large fort on high ground outside the town. *De-chen* is the first halting place on the high road to *Pekin*.

2. *Ohāng-ju village* (height 13,650 feet), 8 miles.—Road ascends an affluent of the Kyi Chu river. The latter part of the road occupied by *Dokpas*; no cultivation, but abundance of jungle.
3. *Camp on south side of Gokhar pass*, 10½ miles.—Road good, but ascent 5 miles to the Gokhar pass (16,620 feet) very steep; descent easy. From the pass which is on the watershed between the Kyi Chu and Brahmaputra rivers there is a very extensive view, embracing the Ninchin-thang-la peaks (south of the Nam lake), and a very conspicuous peak nearly due north, about the same distance off, and the same height as the Ninchin-thang-la (*i. e.*, about 24,000 feet). Other snowy peaks (the Yala Shampa or Yāla Shampo) were visible to the south-east.
4. *Samaye Gom-pa* (height 11,430 feet), 10½ miles.—A very large and ancient monastery, situate about 3 miles to the north of the Tamjan-Khamba or Brahmaputra river. The road is good, but deep in sand, which overlies the whole of the surrounding country.
5. *Dhomda village* (height 11,350 feet), 12½ miles.—Road passes over a sandy plain along the northern bank of the Brahmaputra.
6. *Tsetang city* (height 11,480 feet), 6½ miles.—At Garpa Duga, two miles from Dhomda is a ferry over the Brahmaputra. The river is about 350 yards across, 20 feet in depth, and has a very sluggish current. The road here leaves the main valley and goes up the branch valley of Yarlung. Where the Brahmaputra river was quitted it trends due east, a direction which it maintains for about 30 miles, after which it turns off to the south-east. Tsetang contains 500 houses and two very large monasteries, which give shelter to 700 Lamas.
7. *Womba or Ombu village* (height 11,620 feet), 7½ miles.—Road good up the Yarlung valley. Several monasteries are passed *en route*, from one of which, *Tamtuk Gom-pa* a road passes up-stream and meets, several marches farther on (at *Tangsho*), the Pandit's line of march. This alternative road passes through an uninhabited pastoral country.
8. *Ohukya Phutāng* 3½ miles.—A large town with a fort, 400 houses, and a large monastery (*Takche*). Up to this point from *Lhāsa* the road is first rate.
9. *Pisa Dokpo* (height 11,890 feet), 9 miles.—Road still up the Yarlung valley. Numerous villages and monasteries passed *en route*.
10. *Karma Lhākhang* (height 13,190 feet), 10½ miles.—Up the Yarlung valley. Several small villages passed *en route*.
11. *Dilūtang* (height 16,020 feet), 6 miles.—A large rest-house with good accommodation for travellers, on the plain which forms the watershed between the Yarlung and a more eastern tributary of the Brahmaputra. This plain was covered with cattle, although the cold was very severe. High snowy peaks to the north and south-west of the camp.
12. *Karkang village* (height 15,200 feet), 9½ miles.—A small village on a highly-elevated plain, which is said to be covered with snow after January. It was bitterly cold when the Pandit was there (December), although there was then no snow on the ground.
13. *Lhākchang village*, 13½ miles.—Crossed on this day's march the main watershed by a high but easy pass (the *Karkang*, 16,210 feet), from which a very commanding view was obtained in a north-east direction.
14. *Yūbi village* (height 13,120 feet), 11¾ miles.—Descend the stream from the pass, and eastward camp on the right bank of the Sikung river, which flows, through a highly-elevated but thickly-inhabited and well-cultivated plain (the *Chayul* country), and ultimately finds its way to the *Duffa* country. Several conspicuous snowy peaks visible over the *Chayul* plain, between 40 and 50 miles east of camp.
15. *Se village* (height 14,220 feet), 11¾ miles.—Road lies up the *Jumbai* branch of the Sikung river; road good through scattered villages. Hot springs at camp (temperature 91° Fahrenheit), a few hundred yards above which were other hot springs with a temperature of 170°.
16. *Tungsho*, 17 miles.—After 5 miles ascent by a good road, traverse for 3 miles an elevated grassy plain, elevation 15,300 feet, where it is said that travellers often perish from cold and snow; descend to the frozen *Nera Yu Tso* (lake), which is 6 miles in length by 4 in breadth. A large *Chukhang* (or Government bungalow) at camp, in charge of watchman from *Lhāsa*. Many snowy peaks visible to the west and south-west. At this camp the alternative road (stage 7) from *Womba* is met; the road is much used by traders from the *Hor* country.
17. *Gaiba village* (height 13,250 feet), 15 miles.—Road passes over very elevated but tolerably level plain, covered with fresh snow to a considerable depth.

18. *Tsöna Dzong town*,  $3\frac{1}{2}$  miles.—A strong stone fort, the residence of two Jongpons from Lhāsa; about 300 houses; numerous hot springs; snow on road.

19. *Mondo village*,  $3\frac{1}{4}$  miles.—Ten houses.

20. *Ohyāmo Karmo* (height 14,620 feet),  $5\frac{1}{2}$  miles.—Pass a small lake, from which a river flows in a south-west direction to Bhutān.

21. *Chukhang*, 9 miles.—Cross the Kyakyen La. The journey very laborious on account of the deep snow lying on the ground. Road good. A toll-house at Chukhang, where taxes are levied by the Lhāsa authorities, 1 in 10 on all exports and imports.

22. *Pang Khang*,  $10\frac{3}{4}$  miles.—Cross the Mila Katong pass, 14,210 feet, after which cross two spurs. Camp in a forest. The whole of the country south of the Mila Katong pass is designated *Mönyul*, and is inhabited by a race of people whose language differs very considerably from that of Lhāsa.

23. *Tawang* (height 10,280 feet), 3 miles.—Road descends to the Tawang river, the valley of which contains numerous villages, and constitutes the district of the same name. At Tawang is a large monastery containing 500 Lamas. It is surrounded by a fortified wall.

From Tawang there are three roads to Hindustān—

1st.—The eastern route *viā* the Se La to Odalguri; this is the route followed by the Pandit.

2nd.—The middle route *viā* the *Makto Ohaksam* or Iron Bridge and the country of Mirastān (belonging to Bhutān).

3rd.—The western route down the Tawang river *viā* Jāka Sāmba\* and Trashigang Dzong. The two last routes emerge at Dewāngiri.

*Tawang to Odalguri*.—Distance 97 miles.

24. *Okar village*, 4 miles.—Road through deep snow the whole way.

25. *Pekhang village* (height 8,010 feet), 2 miles.—A village with about 40 houses and a large monastery.

26. *Jang-huil Samba* (height 6,690 feet), 3 miles.—Cross by timber bridge over the Tawang river, which is a rapid stream about 40 paces in width and 5 feet in depth.

27. *Pangkang Yokma*,† 4 miles.—A deep ascent through heavy snow the whole way (February). Pass near the river the large village of Jang-huil (300 houses).

28. *Pangkang Lharcha* (height 12,830 feet),  $5\frac{1}{2}$  miles.—Road up slight ascent along a path that had been beaten down through very heavy snow. Thick jungle on both sides of the road.

29. *Pangkang Nyukmadong*, 8 miles.—A rest-house near the village and fort of the same name. Two miles of ascent through heavy snow to the Se La (14,260 feet), from which there is said to be a very extensive view; at the time of the Pandit's passage it was unfortunately obscured by clouds. Four miles south of the pass is the village of Senge dzong, belonging to the Tsöna (or Tawang) Jongpons. The snow only extended for  $1\frac{1}{2}$  miles south of the pass, and its depth was very much less than on the north.

30. *Jyāpshang village* (height 3,930 feet), 11 miles.—The road passes down the Dirang valley, near the stream of the same name which takes its rise in the Se hills on the north. Several large villages passed *en route*. Nyukmadong (60 houses), Lih (100 houses), and Chepjang (100 houses).

31. *Camp north of Manda pass*, 5 miles.—Very steep ascent up the range which separates the Dirang from the Phutang valleys. The northern slopes of this range are covered with enormous deodar trees. Pass *en route* the village of Dirang, containing about 250 houses, and a fort or barrack several storeys high, the residence of two Jongpons. About 25 miles down the river from Dirang is the boundary of the independent *Lhoba* or *Daphla*‡ country.

32. *Phutang Samba* (height 6,270 feet), 8 miles.—Four miles of steep ascent through deodar forest to the Manda La (9,290 feet). Snow was lying about 1 foot deep at the top. Descent to the Phutang river very steep, especially the lower portion near the river; road good. Pass the village of Phutang, containing about 150 houses.

\* Jāka Sāmba is situated near the junction of the Lhoba and Tawang rivers, and is the boundary between Tawang and Bhutān.

† A *pankang* is a wooden rest-house.

‡ Commonly written *Dafle*.

33. *Taklung Dzong* (height 6,940 feet), 9 miles.—Cross the river by an excellent wooden bridge; ascend for 2½ miles to the Phutang La (7,040 feet), cross it, and then ascend to Taklung, the summer residence of two Jongpons who spend the winter months at Khalak Tang and Amrutul near the British frontier.

34. *Khalak Tang* (height 3,000 feet), 9 miles.—A village of 30 houses. The road ascends for 2 miles to the Chino La (3,170 feet), from which is a commanding view of the Assam plains to the south, and from which the Brahmaputra river is said to be visible in clear weather.

35. *Amrutul* (height 630 feet), 14 miles.—Road down-stream and through thick jungle the whole way. To the west of the road is the village of Chingmi. The river is crossed no less than fifty-five times on this march by temporary bridges, which are always carried away in the rains and replaced in the cold weather. The road is quite impassable in the rainy season, prior to which the Tawang residents of Amrutul retire to their villages to the north. In the cold season there are about 200 temporary grass-built huts at Amrutul, which is at that time a great rendezvous for merchants from Assam and Tawaug.

36. *Odalguri* or *Kāriapāro*, 15 miles.—Road carried along the stream to its junction with the Sangti Chu; the two streams form the Dhansiri river. The Sangti river is crossed by a wooden bridge, near which is the frontier between British and Tibetan territory.

*Odalguri* (450 feet), is in the Darrang district of Assam, and is about 26 miles from Mangaldai, whence Gauhati can be reached by boat in 1½ days.

TOTAL DISTANCE, *Lhāsa* to *Odalguri*, 310 miles.

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*Memorandum on the construction of the two maps illustrating the route of the Pandit.*

The village of Noh, in the left-hand corner of Sheet I, is practically the starting-point of the Pandit's new work. Its position was approximately fixed several years ago by Captain Godwin-Austen, while surveying the country in the neighbourhood of the Pangong lake, in connection with the regular operations of the Great Trigonometrical Survey of India. Captain Austen, however, only approached to within a few miles of the place, and never actually saw it. Its position was not finally determined until 1874, when it was fixed independently and almost simultaneously by Pandit Nain Singh and by another Pandit (P. Kishen Singh) who had accompanied the Mission to Yärkand in 1873, and who returned to Ladākḥ in 1874 *via* Khotan, Polur and Noh. Both of these men connected Noh with points in its neighbourhood which had been accurately fixed by Captain Austen, and the resulting positions agree almost exactly.

The closing point of Nain Singh's work is Odalguri, in the Darrang district of Assam, a village whose position has been rigorously fixed by the Indian Revenue Survey Department, whose work is based on the Great Trigonometrical Survey of India.

The resulting positions are:—

	North Latitude.	Longitude East of Greenwich.
Noh           ...           ...	33° 37' 0"	79° 51' 0"
Odalguri     ...           ...	26° 45' 30"	92° 9' 30"

The latitude of Lhāsa, as determined by the Pandit in 1866, was 29° 39' 17", and on the present occasion 29° 39' 23", the stations of observation having in both instances been near the centre of the *Thom* or City of Lhāsa. A mean between these two gives us:—

Centre of City of Lhāsa, North Latitude 29° 39' 20".

On the present exploration the Pandit took observations for latitude at numerous points throughout his journey. It is not deemed necessary to publish these observations in full, but a brief abstract of those that have been computed out\* is here appended. Nain Singh's observations at Yärkand and elsewhere, which have been published with full details on a former occasion, prove him to be a skilful and accurate observer. The whole of the observations on the present journey were taken with a six-inch sextant by Troughton and Simms, and a mercurial artificial horizon; a reference to the maximum discrepancy between results which is tabulated for each station in the abstract shows that his work is highly satisfactory.

*Abstract of latitude observations taken by the Pandit on the road from Noh to Lhāsa during the months of August, September, October and November 1874.*

NAME OF PLACE.	Number of marches from Leh.	Number of Stars observed.†	Maximum discrepancy between result- ing latitudes.	Final Latitude.
Bujnng           ...           ...	22	5	0 37	33 22 15
Thachap Cho   ...           ...	27	5	0 53	33 15 51
Hama lake      ...           ...	37	1 and ☉	0 12	32 27 13
Kezing          ...           ...	43	3 and ☉ twice	1 41	32 12 4
Thok Danrakpa ...           ...	49	7 and ☉	1 34	32 6 39
Gipu Khara    ...           ...	55	6 and ☉	0 46	31 38 53
Yomo Zinga    ...           ...	58	6 and ☉	0 34	31 21 32
Loua Karma    ...           ...	67	5 and ☉ twice	1 4	31 14 26
Yunzchen      ...           ...	77	4	1 7	30 48 31
Jador Samdyaling My. ...           ...	84	4 and ☉	0 41	30 49 12
Dākmar-chu-chau ...           ...	87	4 and ☉	1 4	30 55 11
Kyanglung     ...           ...	90	3 and ☉	1 21	30 31 30
La river        ...           ...	92	2	0 33	30 20 44
Jyalung        ...           ...	94	3 and ☉	1 4	30 12 12
LHĀSA          ...           ...	101	4 and ☉	0 43	29 39 23

\* It was found, during the construction of the map, that it was unnecessary to compute out the whole of the Pandit's observations.

† Where ☉ is inserted in the third column, it denotes that the sun also was observed.

*Abstract of latitude observations taken by the Pandit on the road from Lhāsa to Odalguri (in Assam) during November and December 1874, and January and February 1875.*

NAME OF PLACE.	Number of marches from Lhāsa.	Number of Stars observed.	Maximum discrepancy between results.	Final Latitude.
			' "	' "
Samaye Monastery ... ..	4	3 and ☉	0 42	29 19 23
Karma Lhākhang ... ..	10	2	0 4	28 53 30
TAWANG ... ..	23	4 and ☉	*2 48	27 35 36
Pangkang Larcha ... ..	28	4 and ☉	*3 28	27 30 2

The latitudes and longitudes of Noh and Odalguri, and the latitude of Lhāsa, as given above, together with the latitudes given in the abstract, are our fixed preliminary data on which to construct the map.

The most important element remaining to be determined is the *longitude* of Lhāsa.

Colonel Montgomerie, in his published account of the Pandit's former journey to Lhāsa, enters at considerable length into this very question. The value finally accepted by him was longitude  $90^{\circ} 59' 43''$  east of Greenwich (*see* p. 9). The value which has now been obtained from the more recent data is  $91^{\circ} 5' 30''$ , agreeing very fairly with the first determination.

The Pandit's survey, on both occasions, consisted of a traverse line, in which the distances were recorded in paces; the magnetic bearings were taken on his first journey with a small pocket compass, but on the last occasion a three-inch prismatic compass was employed. The Pandits are carefully trained to take, as near as possible, two thousand paces to the mile, and on even ground they approximate very nearly to the standard. With a careful survey executed in this manner, and checked by numerous observations for latitude, very excellent and reliable results can be obtained *when the traverse runs in a meridional direction*, as any difference that exists between the actual and estimated length of the Pandit's pace can be accurately deduced and allowed for. This cannot be done when the distance traversed in longitude greatly exceeds that in latitude.

It is obvious that, *ceteris paribus*, the closer the line of survey follows a meridional direction, the more accurate will be the determination of longitude, provided that the variation of the compass is well known. A reference to Sheet II of the map will show that the route followed by the Pandit from Lhāsa to Odalguri is much more favorable for the purpose of determining the longitude of Lhāsa than the routes which were available to Colonel Montgomerie, *viz.*, Captain Turner's survey in 1783 from Baxa (in Bhutān, in nearly the same latitude as Odalguri) to Gyāntse Dzong, and the Pandit's survey from Gyāntse to Lhāsa in 1866.

It is true that Colonel Montgomerie had, with a great deal of labour, obtained what was probably a very correct value of the Pandit's pace, but, on the other hand, Turner's longitude of Gyāntse, to which the Pandit's survey had to be applied in order to obtain the longitude of Lhāsa, was by no means satisfactorily determined. It appears that the professional surveyor (Lieutenant Davis) who was to have accompanied Captain Turner was not permitted to go farther north than Trashichōdzong, the capital of Bhutān; and whatever may have been the accuracy of the survey up to that point, there is no doubt that Turner's latitude of Shigātse to the west of Gyāntse is in *defect* of the true latitude by ten minutes, while his latitude of Chumalhari to the south of Gyāntse is in *excess* of the true latitude by a still larger amount. With these errors in his latitudes we may naturally expect greater errors in the longitudes and no determination of the longitude of Lhāsa—based on Turner's determination of the longitude of Gyāntse—can be considered final.

The difference in longitude between the Nam lake and Odalguri is inconsiderable as compared with the difference of latitude. As numerous observations for latitude were taken by the Pandit on this portion of the route, the error of pace, and consequently the unit of measurement, has been obtained with considerable accuracy for the various sections of the route.

The azimuthal correction was found in the following manner:—The whole of the work from Noh to Dākmar-chu-chan—at the eastern end of the Nam lake—was plotted out on a previously-prepared graticule, on the scale of eight miles to the inch, on the assumption that 2,000 of the Pandit's paces were equivalent to one mile; a constant correction of  $4^{\circ}$  (which amount had been estimated approximately) was added to his bearings to allow for the combined

\* The sextant appears to have received some injury prior to arrival at Tawang; the index error, which throughout the journey up to this point remained tolerably constant at between  $+1'$  and  $+2'$ , was as high as  $+7'$  at Tawang and Pangkang, where the results are not so satisfactory as at the other stations.



index error and magnetic variation of the compass. His astronomical observations were meanwhile computed out, and the resulting latitudes of his stations of observation were projected on the map in longitudes corresponding to those that had been already approximately determined from the plot of the traverse. It was found that the total amount of error generated in latitude was eighteen minutes, the line of survey having been more than eight hundred miles in length. It had now to be ascertained whether this error, which corresponded to a constant azimuthal error of about  $1\frac{1}{2}^\circ$ , was due to bad work or to the insufficiency of the constant correction that had been applied to the bearings. The whole of the plotted route-survey was shifted uniformly in azimuth with Noh as a centre, so as to make the position of Dākṃār coincide with its astronomical latitude, and the result was that every intermediate station of the route-survey fell very nearly on the corresponding astronomically determined point, the maximum discrepancy at any of the eleven points of comparison was found to amount to only  $2\frac{1}{2}'$  in latitude, and in two instances the positions were absolutely coincident.

A further examination was then made to test the accordance between the astronomical and plotted work. For this purpose the route-survey was supposed to be divided into sections, and comparisons were made between the general bearings of each section, as deduced from the plotted traverse and from the astronomical determinations of latitude. The following results were obtained:—

NAME OF SECTION.	Distance in miles by road.	Bearing deduced from plotted traverse.	Bearing deduced from astronomical observations.	Difference.	Difference from mean
Noh to Bujung ... ..	48	106½	109¼	2.75	+ 1.4
Bujung to Thachap Cho ... ..	71	95	95	0.0	- 1.4
Thachap Cho to Huma lake ... ..	119	118½	119¼	0.75	- 0.6
Huma lake to Kezing ... ..	68	105	106½	1.75	+ 0.4
Kezing to Thok Daurākpa ... ..	81	89½	93	3.75	+ 2.4
Thok Daurākpa to Gipa Khara ... ..	70	117½	118½	0.50	- 0.9
Gipa Khara to Yomo Zinga ... ..	39	120½	120½	0.25	- 1.1
Yomo Zinga to Loma Karma ... ..	87	93½	95	1.25	- 0.1
Loma Karma to Yungchen ... ..	98	108½	108½	0.50	- 0.9
Yungchen to Jador Sumdyaling My. ... ..	87	86	88	2.0	+ 0.6
Jador Sumdyaling My. to Dākṃār-chu-chan ... ..	36	75½	77½	1.50	+ 0.1
TOTAL ... ..	794	...	...	mean 1.36	...

The small variations thus obtained, in the differences of azimuth on the line between Noh and Dākṃār suggest the desirability\* of applying the same correction, viz.,  $1^\circ 4'$  to the bearings of the traverse line between Dākṃār and Odalguri (in Assam) the meridional direction of which precludes any independent deduction of azimuthal correction from being made.

This correction of  $1\frac{1}{2}^\circ$  has accordingly been applied to the bearings of the route between Odalguri and Dākṃār-chu-chan, which had previously been plotted in the same manner as the section from Noh to Dākṃār. The true unit of length on this (meridional) section was calculated proportionately, in the usual manner, by comparison of the plotted with the astronomical values; true bearings and distances were thus obtained by which Lhāsa and Dākṃār were accurately laid down from Odalguri.

The longitude of Lhāsa thus obtained was  $91^\circ 5' 30''$ , and that of Nam lake (Dākṃār-chu-chan)  $90^\circ 57' 0''$ .

The latitude of Dākṃār ( $30^\circ 55' 11''$ ) having been obtained astronomically, and its longitude in the manner just described, the previously plotted route from Noh to Dākṃār had merely to be fitted with the pentagraph on to the present map (scale 16 miles to the inch) to give very nearly correct positions for the whole of the intermediate points, for, as the nature of the ground traversed between those two places is uniform throughout, it may fairly be inferred that the error of unit, the amount of which is immaterial, remained constant throughout.

The geographical details shown along the Pandit's route are taken entirely from his field-books. Where the letters *S. P.* occur, they indicate a snow-peak fixed by bearings from two or more points of his route. Numerous other peaks along the different ranges were also fixed in the same manner.

The general shape and run of the lakes, whose borders are shown in firm lines, may be looked on as very fairly correct, as is indicated by the fact that the delineation of the borders of

\* It may be remarked that the apparent constancy of error receives confirmation from the magnetic charts compiled by the Schlegelweits, in which a constant amount of variation is shown to be supposed to exist between the Pangong and the Nam lakes.

the Nam lake, as plotted from Pandit Nain Singh's field-book, agreed in a most remarkable manner with that given by the other Pandit (P. Kishen Singh) who made the complete circuit of the same lake in 1872, and whose rendering of the outline of the southern margin of the lake has been followed in the present map.

The skeleton routes and outlines shown on other parts of the map have been taken from the latest maps published in India, and do not require any further notice here.

The eastern road between Dam and Lhāsa (to the south of the Nam lake) is taken from the map which accompanied Colonel Montgomerie's account of the exploration of the Nam lake in 1872.\*

Dotted lines are employed to indicate features inserted on oral as distinguished from visual evidence.

The heights above sea-level have been carefully computed from the Pandit's observations of the temperature of boiling water. The thermometers employed were by Casella.

The water was always boiled in the Pandit's own brass drinking vessels, which a long experience has indicated as the best article for the purpose. An aneroid barometer was always read simultaneously, but its readings have only been employed as a check against any gross error in the reading of the thermometer. On one or two occasions where such an error was suspected, no computation of height has been made.

A comparison of several of the heights as computed from the Pandit's observations on the road between Leh and the Pangong lake has been made with my own rigorous determinations in 1873, on which occasion mercurial barometers were employed, in connection with simultaneous barometric observations at Leh.

Similar comparisons were made with known heights in the neighbourhood of Calcutta; the result in both cases indicated a constant additive correction of nearly 700 feet to reduce to the true height. This correction has been applied throughout, and the figures given in the map and in the letterpress are the *corrected heights*.

The heights of camps and passes, in English feet, are given to the nearest ten; and although it is not pretended that they are correct within ten feet, yet a better idea of the relative positions of neighbouring places is obtained than if the heights were given to the nearest hundred. The Pandit's observations must have been very carefully made, as will be apparent on an inspection of the *relative heights* of contiguous places.

The heights of peaks in the neighbourhood of the line of march are given to the nearest hundred, with the exception of those to the east of Tawang, which have been fixed rigorously by the Great Trigonometrical Survey operations. When heights of peaks are given, their double altitudes have been actually measured with a sextant; this can of course only be done when the mountains are near the line of march.

### *Subdivisions of Tibet.*

As but little is known of the territorial Subdivisions of Tibet, it appears desirable to write a few words on the subject.

The name Tibet is unknown in the country itself, and the only term at all corresponding to our word Tibet is Bot, or Bod-yul, *i. e.*, country of Bot or Bod; the inhabitants thereof are termed *Bodpas*. This definition would and does include the country of Ladākh now belonging to Kashmir and the countries of Sikkim, Bhutān, &c., on the south.

Great Tibet appears to be a name that has been given by geographers to that portion of Tibet which is drained by the Brahmaputra. Little Tibet is the name given to Baltistān, a country lying to the north-west of Ladākh, whose inhabitants are now Musalmāns.

That portion of the country of Bod-yul which we designate generally as Tibet embraces the following provinces:—

I.—Ngari Khorsum.	IV.—Tsang.
II.—Dokthol.	V.—U.
III.—Hor.	VI.—Mönyul.
	VII.—Khām.

\* Published in Great Trigonometrical Survey Report for 1873-74 (also on pages 133-140 of this book).

I.—Nga-ri or { *Nga ri Khor Sum* } includes the three provinces of Rudok, Guge, and Purang, whose chief towns are Rudok, Daba and Chaprang, and Taklakhar or Purang and Kardam, respectively.

The chief official in Ngari Khorsum is the Garpon of Gar-tok. His jurisdiction extends over the whole of Western Tibet, and embraces in its north-east corner the district of Gerge Thol; in the south-east it is bounded by the Ma-yum pass (approximate longitude 82° 30').

II.—Dokthol, *i. e.*, country of the *Dokpas* or nomads; chief town Sa-ka. This province extends from Ma-yum pass on the west to the Ka pass on the east, half-way between Sang Sang Kau and Guap-ring (approximate longitude 87°); it is bounded on the south by Nepāl or Gurkha-yul, on the north by the snowy range which lies to the north of the Brahmaputra in approximate latitude 32°.

III.—The province of Hor is also inhabited by nomads, termed *Horpas*, which term includes both *Khāmpas* and *Champas*. This province is bounded on the south by the snowy range north of Brahmaputra, on the west by Ngari Khorsum, on the north by Eastern Turkistān (called Yärkin in Tibet), and Sokpohuil or the country of the Sokpos or Kalmucks. Eastward this country extends beyond the Nam lake to the frontiers of the Khām province in approximate longitude 92°.

IV.—The Tsang province is bounded on the west by Dokthol, on the south by the Gurkha-yul, the Den Jung (Sikkim) and the Dokpa-yul (Bhutān), on the east by the Kam-pa pass which separates it from the province of U, and on the north by the snowy range which separates it from Hor.

V.—The U\* province is bounded on the west by the province of Tsang. These two names together are frequently employed as the designation for a single united district of U-Tsang. † U is bounded on the south by Dokpa-yul and Mönnyul; on the east it extends up to Sängwa Kwombo Gyāmdo, ‡ the twelfth halting place on the road from Lhāsa to Pekin *via* Yünnan. On the north it is bounded by the Ninchin-thang-la snowy range, which separates it from Nam lake and the Hor country.

VI.—Mönnyul or the country of the Mönbas lies to the south of the U province, from which it is separated by the Kyakyen pass (latitude 27° 50' north), and includes the whole of the Tawang district, which extends from the Kyakyen up to the British frontier, and forms, as it were, a wedge thrust in between the Bhutān country on the west, and the *Dofta* or *Lhoba* country to the east. The language spoken in this district resembles much more nearly that spoken in Bhutān than that which is spoken at Lhāsa and throughout almost the whole of Tibet.

VII.—Khām is bounded on the west by U, and extends on the east as far as Tächindo, Tazi-do or Ta-chien-lu, which is the boundary between Tibet and China Proper.§ Tsiamdo or Chiamdo is, according to the Abbé Huc, the capital of this province; it is the thirty-third halting place on the road from Lhāsa to Pekin, whilst Tachindo is thirty-one marches farther on, on the same road.

With the exception of one or two facts which are noted as on the authority of Mr. Hodgson the above description of the provinces into which Tibet is divided is derived from the Pandit.

According to Hodgson, there should be another province, Sokpohuil, to the east of Hor, but I should be rather inclined myself to locate it to the north of Hor. As, however, this passes beyond the range of the Pandit's work, I will not discuss the matter here.

\* Pronounced like the French word *ou* (where), and *written*, according to Cunningham, *d'Bus*, and identified by him with the *Dabus*, the country inhabited by the *Dabasa* of Ptolemy.

† So called from the shape of the hats worn in the country, *U*, or round; the hats in the western province are *Tsang*, or lofty; thence the name of the province.

‡ Mr. Hodgson, late Resident at Nepal, is my authority for this and for other details about the province of Khām.

§ Called in Tibet *Gyā-nākā*.

The temptation is great to pursue further the subject of the geography of Tibet, but time and space are both limited. While employed in taking the Pandit's report, I have had occasion to look up data in various out-of-the-way places, and have come to the conclusion that there is much material available which might be put together with advantage, and enable clearer and fuller account of Tibet to be given than we at present possess. Should I hereafter have the leisure, I may perhaps myself attempt to do so.

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*Report on Explorations of Lala in South-Eastern Tibet, 1875-76, compiled  
under the supervision of J. B. N. Hennessey, Esqr., M.A., F.R.S.*

In March 1875 the explorer Lala, a hill man of Sirmūr, started from Darjeeling and carried a route-survey through Sikkim *via* the Tibetan frontier out-post of Kam-pa (Fort) to Shigātse. From Shigātse he proceeded eastward along the banks of the Tsang-po or the Great River of Tibet, for about 50 miles, thence to the Yam-drok Tso or Palti lake, leaving which he reached the river again and traced its course down to Tsetang. From here he turned southward and endeavoured to penetrate into Assam, but his progress was stopped at Mautangong (Tawang) and he was compelled to return to Shigātse. Starting again from Shigātse he proceeded to Gyāntse Dzong, and travelling thence *via* Ka-la-shar, Phāri, and Chum-bi (the summer residence of the Sikkim Rāja) he crossed the Jelep La and returned to Darjeeling in July 1876.

His route-survey was carried on by the usual methods of compass bearings and pacing, and was the first work of the kind ever undertaken by him independently. His instrumental equipment comprised a box-sextant, a watch, two pocket compasses, two boiling and two ordinary thermometers; of these on the present occasion he only used a compass, and the boiling thermometers for the approximate determination of heights.

The first part of his work from Darjeeling to Thango, a village some 16 miles south of the Sikkim frontier, was over ground which had been traversed by Dr. Hooker in 1848-49; a map of Independent Sikkim by the latter\* shows all the country through which explorer Lala travelled as far as the Kāngra-lāma La or Lachen pass. Thus there was a good check on this portion of Lala's work. The positions of Shigātse, Gyāntse Dzong and Tsetang had been fixed by former explorations, and the routes followed by Lala from Shigātse to Gyāntse Dzong, and from Tsetang to Tawang were the same as those traversed by the now well-known Pandit Nain Singh in 1865 and 1874. Hence there were considerable portions of Lala's work which could be tested against explorations formerly made by a thoroughly experienced and reliable man, and thus a fair idea obtained by inference of the correctness of such portions of his work as had no intermediate checks.

Shortly after crossing the Kāngra-lāma La into Tibetan territory and when he had arrived within some 3 miles of Kam-pa (Fort), the explorer was taken prisoner by a party of horsemen and carried into the fort for examination into his business, destination, &c., by the Jongpon or Governor, who confined him in a house outside the fort, under a guard and detained him for about 15 days. Though not subjected to actual violence he was threatened and otherwise treated so as to cause him no little anxiety. Eventually he was sent on to Shigātse, where he was again questioned by the Governor, and at first told to present himself for his dismissal in 3 days time; but owing to the suspicions of one of his guard from Kam-pa (Fort) it was subsequently determined to detain him until the arrival of a party of merchants who were shortly expected. He was compelled to remain in Shigātse altogether over five months, having a certain amount of liberty in wandering about the city and its environs, which he utilized by collecting information regarding the place, and the great monastery of Tra-shi-lhun-po; but he was too narrowly watched to succeed in escaping as he wished to do. Finally, on the arrival of the expected merchants at the end of October, he contrived to secure their support, and so was allowed to proceed eastward.

Leaving Shigātse in November 1875, he travelled along the banks of the Tsang-po river for about 50 miles to Jagsa, between which place and the iron bridge over the river on the road to Lhāsa at Chak-samchori there is said to be no road along the river bank, the river in this part of its course passing through rugged hilly country and falling over many rapids. From Jagsa he turned south-east, and then eastward again to Ya-sik on the Yam-drok Tso. With regard to this lake, Lala contradicts the hitherto accepted statement that it is a complete ring or circle of water surrounding the Tungchīn mountain; he states that this apparent island is connected with the mainland by a broad causeway, and that he saw flocks and herds grazing on the slopes of the mountain, and some houses in a valley. This statement is confirmed by a more recent explorer (Nem Singh) who visited the lake in 1873, and who, travelling along its margin, saw the connecting link, a broad isthmus covered with boulders, which he places some 10 miles S.E. of Ya-sik.

From the lake, Lala turned northwards again to the Tsang-po river, and followed its right bank down to Tsetang, where he remained some little time. Being warned that any further

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\* In Volume I, Hooker's Himalayan Journals.

progress down the banks of the Tsang-po, unless in company with a strong body of men, would be attended with considerable danger from robbers and from the wild tribes along the route, he turned southward *viâ* Karkang with the intention of penetrating into Assam, through Tawang, over the route taken by Pandit Nain Singh in 1873-74-75. On reaching Tawang however he was seized and carried before the authorities, who refused to allow him to proceed any further southwards, and confined him for a month in the public flour-mill at Kiā-kā-rong, some 2 miles north of Tawang; the only attempt he made at negotiating his own release being punished by the infliction of a fine. Eventually a mounted guard was told off to escort him to Lhāsa; but fortunately some informality in the documents carried by the guard induced an intermediate official, through whose hands he passed *en route*, to release him. Though thus set at liberty he despaired of success in any further attempt to reach Assam, and so made the best of his way back to Shigātse.

About the end of Mareh 1876, the explorer succeeded in making arrangements at Shigātse to return to Darjeeling *viâ* Gyāntse Dzong and Phāri to which latter place Captain Turner had travelled from Shigātse in 1783. He travelled in company with a party of merchants, and with the exception of men occasionally boldly demanding alms from them, they were unmolested till they reached Phāri. Here however the explorer seems again to have fallen under suspicion; he was detained for a month, and probably matters would have gone very hard with him but for the kindly interference on his behalf of one of the leading men of the village, who obtained his release from the Chinese officials. From Phāri he made his way across the Jelep La and reached the cart road from Darjeeling at Lingdom. Travelling along this road he found the Commissioner of Darjeeling in camp at Kālimpong, and reported himself to him in July 1876, having been absent on his journey sixteen months.

Such portions of his work as could be compared against former explorations, proved fair, and the new ground traversed between Shigātse and Tsetang, plotted between the positions of those two places as formerly determined, proved satisfactory. But on fitting in his route from Darjeeling to Shigātse on the known positions of those two places, sensible discrepancies appeared in the positions of points common to his work and Dr. Hooker's, which were difficult to reconcile. As the explorer had traversed the northern portion of this route, from Kam-pa (Fort) to Shigātse, under the surveillance of a guard, it appeared probable that he could not have been able to take his bearings and count his paces with much care or exactitude, and hence it was suspected that the major portion of the error, apparent in his route from Darjeeling to Shigātse, would be found to lie between Kam-pa (Fort) and Shigātse. However, as he could not with safety revisit the neighbourhood of Kam-pa (Fort), it was considered expedient to send him out again as far north as the Kāngra-lāma La, over the portion of his work common to himself and Dr. Hooker, to observe the latitudes of certain obligatory points, and to connect these points by short route-surveys with the nearest hill tops whence bearings could be taken to trigonometrically fixed peaks.

Accordingly he left Darjeeling again on the 29th September 1877, with a pocket compass, a prismatic compass, and a 6-inch sextant; but on account of clouds and bad weather he was unable to take the preliminary bearings he had been instructed to observe until the 27th October. He then proceeded on his way to the Kāngra-lāma La, observing for latitude at five points of his former route, and connecting two of these latitude stations by short route-surveys with adjacent hill tops whence he took bearings to known peaks. He failed in connecting the other latitude stations by bearings in this manner with trigonometrically fixed peaks, owing to clouds and bad weather. The results of these observations satisfactorily demonstrated that the errors in his former route from Darjeeling to Shigātse lay chiefly in the portion north of Kam-pa (Fort) as has been suspected; and on replotting his work on the basis of his latitude observations, the points common to himself and Dr. Hooker agreed very fairly.

The explorer notes a strange and apparently unaccountable phenomenon connected with the Giamsena lake. At intervals of from five to ten minutes a kind of explosion is heard, apparently proceeding from under water at some 40 yards distance from the shore. During the four hours he sat by the margin of the lake, these curious and inexplicable sounds were repeatedly heard: the sound was not sharp like the report of a gun, nor like the noise of falling rocks, but a dull, heavy concussion; the surface of the water was not in any way disturbed over the part whence the sound apparently proceeded. One of the men of the *chauki*, or guard-house on the banks of the lake, told him that these sounds were caused by the breaking up of ice at the bottom of the lake. But on this hypothesis the fragments must necessarily have floated to the surface of the water; no ice however was visible on the lake except a fringe of shore ice along the margin.

*Narrative of the Route-Survey of Explorer Lala, from Darjeeling to  
Shigātse, Tsetang, and Tawang; and from Shigātse back to Darjeeling  
viâ Gyântse Dzong and Phâri, 1875-76.*

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Having taken latitude observations at Darjeeling, compared his thermometers, &c., Explorer Lala, on the 29th March 1875, started from Darjeeling for Shigātse, with orders to proceed viâ the Tibetan frontier out-post of Kam-pa (Fort). The explorer had with him as companion a man well acquainted with the Tibetan language, but had considerable difficulty in procuring three men to serve him as coolies for the trip, as the route he had been instructed to take is supposed to be closed to all but Tibetan officials.

Starting work from the Darjeeling bazar, he descended to the bridge over the Ranjit river, crossed it, and ascended to the village of Namchi in Sikkim territory. From this place his route to Thango is over a line of country which had been traversed by Dr. Hooker, and is shown in his map of Independent Sikkim. In Namchi is a small monastery occupied by 8 Lamas.

From this place the road ascends for 4 miles through forest; a descent of 6½ miles then took the explorer down to the right bank of the Tista river. For 9 miles further, the road follows the bank of the river as far as a cane bridge over the Tista, across which goes a road to Phâri; from this bridge the road, still keeping to the right bank, goes up about 4 miles to the crest of a mountain spur whence a descent of another 4 miles leads down again to the river; here is another cane bridge known as the *Pasamjhûla* (*Balakjhûla?*), which is 80 paces in length, about 20 feet above the water, and not passable for baggage animals.

Crossing on the *Pasamjhûla* to the left bank, the road still keeps the general direction of the river, and about 3 miles from the bridge is the village of Dâbia whence a path is said to lead across the range of mountains to the east into the Chum-bi valley and to Phâri. Passing through splendid open forest and by several villages, the explorer reached the junction of the Lachung and Lachen rivers, which united form the Tista; the Lachen, the western branch, is apparently the larger of the two, and brings down the greater volume of water. Crossing the Lachung to the village of Cheungtung or Choongtam by a good wooden bridge well planked and covered with earth, he noticed another branch road going off eastward along the right bank of the Lachung and said to go to Gyântse Dzong. About a mile beyond Cheungtung he reached the village of Rûma, and crossed the Lachen river by a cane bridge 60 paces in length and about 30 feet above the water. Four miles further on he recrossed the Lachen by a wooden bridge about 25 paces long; and about a mile and a half beyond this, crossed a bridge which is enveloped in the spray of a stream which falls over the rocks above from an immense height, and sweeps under the bridge into the Lachen river close by with tremendous force. Six miles beyond this bridge is Lânteng, or Lachen *Chauki*, a village of some 60 houses. Here reside a Tibetan and a Sikkim official who are called *Chipans*, and who guard the road and levy taxes on any merchandise which passes.

A party of six Tibetan merchants, returning from a trip to Calcutta with indigo, cutlery, cloth, and drinking cups, were found here; they had left Darjeeling a month before the explorer, but were detained here till instructions concerning them were received from Lhâsa. The merchants had chosen this route on account of the low rate of the tolls; on the usual Phâri route Rs. 30 per donkey load is charged for indigo, whereas at Lachen *Chauki* only Rs. 5 per load was charged. On the other hand, however, there was the objection against allowing any traffic on this route, except official, which had resulted in their detention. Between Lachen *Chauki* and Shigātse there is a small trade in madder and plauks, yaks being employed for carriage. Lachen *Chauki* is about 7,500 feet above sea-level.

After a detention of 6 days the explorer was allowed to pass on; but he afterwards heard that the merchants were not released till a month later. From Lachen *Chauki* the road becomes practicable for laden animals; at about 4½ miles is the village of Niuân, situated in an extensive plain; the houses were found full of property but deserted, no one being left in charge. Crossing the Lachen to its left bank by a bridge at the village of Jämtong, a march of some 6¼ miles took him to Thango, which he reached on the 20th April 1875.

In the houses of Thango were stores of grain and cooking utensils, all unguarded, the owners not intending to come up from their winter quarters at Lachen *Chauki* till the month of May. A mile and a half beyond Thango is a wooden bridge over the Lachen—here an inconsiderable stream fordable



though swift, its breadth only about 20 paces. Here all forest and jungle were left behind, and nothing was to be seen but a few stunted trees and occasional patches of grass. Eleven miles from Thango are the two Sarola lakes, separated from each other only by the road: the eastern one about a square mile in extent and rather deep, the western one somewhat smaller and shallow. Round about the lakes were patches of a small plant which yaks will eat, but which sheep and goats refuse to graze on; near the lakes are numbers of low stone wall enclosures used as folds for sheep and oxen during the warm season when there is plenty of a sort of grass, the roots of which the animals eat.

From the lakes the road continues to ascend for 6 miles to the summit of the pass, which is known by the various names of Sarola, Lachen La, Ta-tsang La, and Kängra-läma La: the low snowy range from the west dies out at the pass, and to the east of the road are extensive plains. The height of the pass is about 16,500 feet. On the summit of the pass, by the side of the road, are three small heaps of stones with a number of sticks about them, to which are tied bits of rag and paper with prayers written on them. These piles of stones mark the boundary between Tibet and Sikkim, and devout travellers never fail to make the circuit of them, hat in hand, muttering the usual formula of prayer. A mile and a half beyond the pass is a tiny lake; a mile beyond this again is a road going off eastward to Ta-tsang *Gom-pa* from here the road descends at a slope of about 7° for 1½ miles, and about 7 miles from the foot of the descent is the fort of Kam-pa, situated in the midst of an extensive plain. Scattered over this plain in little clusters are the tents of shepherds, part of whose duty is to give warning at the fort of the approach of travellers. Every tent has its complement of large dogs which are chained up during the day and let loose at night to scour the country, and are very dangerous. When about 3 miles distant from the fort, three unarmed horsemen galloped up and ordered the explorer's party into Kam-pa (Fort) for due enquiry into their business, &c.; shortly afterwards five horsemen armed with swords and guns (port fire) came and took them in charge and brought them before the Jongpon or Governor. He asked them a few questions and then assigned the explorers a house outside the fort, where two armed men mounted guard over them with their horses picketed close by, ready saddled and bridled.

The fort of Kam-pa is circular, about 1,500 paces in circumference, and is built upon a small mound; the walls, 6 feet thick, are built of Kam-pa (Fort) to Shigätse. uncemented stones. In the middle of the fort is the entrance to a subterranean passage which leads to a small stream of water that washes the base of the mound on which the fort stands. The fort is used as a jail, and in it were confined some 50 prisoners, all for minor offences. The Jongpon is assisted by three *Nirpas* or writers, and every third day a runner is sent to Shigätse with letters.

On the second day after the arrival of the explorer and his party at Kam-pa (Fort), they were ordered to Lungdung, a village some 5 miles distant along the road to Shigätse, and here they were carefully watched, the men of their guard being changed thrice a day, the horses only once. Provisions were procurable at the following rates: *Chamba* or *Sattu*, a kind of barley, at six seers per rupee, Nepäl rice at five seers per rupee, and a day's supply of fuel for an anna. The only fuel was dried yak's dung. Negotiations for their release proceeded slowly, and the explorer fell ill. On the fifteenth day of their confinement a *Nirpa* from the fort arrived and ordered them to proceed without delay to Shigätse, any carriage which they required being supplied to them.

From Lungdung the road traverses an extensive plain, and at 15 miles a road coming from the west from Singsohulung joins it. Singsohulung is said to be six marches distant, and to consist of two villages built on the slope of a hill, the upper one called Singso, and the lower Singsa. The road from Singsohulung to Ku-ma is constantly travelled by the Nepälese trading to Shigätse; Ku-ma is a village on the Shigätse road, 16 miles from Lungdung. At about 15 miles from Ku-ma the road ascends a moderate slope for half a mile to the summit of a pass called the Läsüm La. From this pass 7 miles a slight descent leads to the Bhädur plain, covered with villages and cultivation. The village of Bhädur consists of 14 groups of houses, three to the east of the road and 11 to the west; each group contains about 30 houses. Through the middle of the valley a small stream flows gently to the west; the fields are irrigated and manured; the crops are principally peas and barley.

Six miles beyond Bhädur is a monastery containing 600 Lamas; there are 5 gilt bosses on the roof of the principal building. Nine miles further on is a slight ascent to the pass called *Čämpo La* where the road crosses a range of hills with peaks about 1,000 feet above the level of the surrounding country: the descent on the other side is a mile and a half long, steep and stony; this is the only bit of road between Thango on the Lachen and Shigätse that would be difficult for the construction of a cart road. In the plains lying at the foot of the slope, the explorer saw many herds of antelope. At the village of Rabgiälung is a plantation of dwarf

*maznu* (willow) trees, the first trees met with since leaving Thango. From Rabgiäläng the road, passing the large villages of Lugri and Lachung, meets the great road from Ladākḥ at the S.E. corner of the outer wall of the great Tra-shi-lhun-po monastery which adjoins the Shigātse *bāzār*. Shigātse is usually pronounced Jigārche by the Nepālese.

The explorer arrived at Shigātse about the 15th May 1875, and soon after taking up his quarters at the *Ta-sam* (or travellers' rest-house and encamping ground) he was questioned by messengers from the Governor, news of his coming having preceded him. The explorer was taken before the Governor in the *kachahri* of the fort, and, after some questioning, was told to come again in three days time. He thinks that he would speedily have obtained his dismissal, but for the suspicions of one of the *Nirpas* from Kam-pa (Fort), who was very troublesome. It was finally determined that he could not leave Shigātse till the arrival of certain traders whom the explorer said would probably recognise and vouch for him. On one occasion he obtained 15 days' leave to visit Gyāntse Dzong, and intended making his escape on his way there; but he found himself so closely watched that he gave up the idea and returned to Shigātse. Finally, on the arrival of the expected traders, he succeeded in making arrangements through them; and at the end of October was told that he was at liberty to go where he pleased.

While the explorer was in Shigātse, information was brought in that the Lieutenant-Governor of Bengal and the Commissioner of Darjeeling were in Sikkim and had reached the Chola pass. This news caused the greatest consternation; detachments of troops were sent off to all the Sikkim passes, and 13 companies of Tibetan soldiers from Lhāsa with 10 mounted officers marched in to garrison Shigātse. Each company comprised 30 to 40 men. These troops were armed with swords, and a gun to every two men. The guns are very heavy; in action the muzzle is supported on two sticks which are hinged on to the woodwork under the barrel; one man places the butt against his shoulder and takes aim while another touches it off. The force had two buglers whose instruments were of brass, about 6 feet long, straight, and with a huge bell-shaped mouth, which was rested on the shoulder of another man whenever the bugler sounded.

Sometimes the soldiers went out for ball practice, having as a target a wall of considerable size; whenever the wall was struck by a bullet, a bugler concealed behind the wall blew a blast. On two or three occasions there were parades, at which the manœuvres were rather curious. Each company clustered round its officer in any way it pleased, and then they marched in a confused mass to the fort and disposed themselves in two bodies: one party enclosed a large circular area with a cloth screen about 3½ feet high and remained inside it as a defending force; the party outside forming the attacking force, surrounded the enclosure, and then both parties fired away at each other till their ammunition was exhausted. The towns-people appeared to take great interest in these evolutions, and also in the target practice. When the explorer first reached Shigātse there were only 100 soldiers in the fort.

The monastery of Tra-shi-lhun-po contains 3,800 Lamas. Its walls are 15 feet high, 5 feet thick, and built of large sundried bricks, the whole structure being whitewashed. The buildings are numerous and large, and many of the roofs are gilded. The *bāzār* of Shigātse covers an area of 1200 paces by 1000, and contains, specially set apart, Kashmīri and Nepālese quarters. Quantities\* of newspapers come from Darjeeling, and most of the houses have their walls decorated with them. There is however very little traffic between Shigātse and Darjeeling *viâ* Kam-pa (Fort), notwithstanding the excellence of the road; during the 15 days the explorer was detained near Kam-pa (Fort) not a single merchant passed.

In November 1875 he left Shigātse and again commenced work. Three and a half miles from Shigātse is the enclosed garden of Kunkyäläng, Shigātse to Ya-sik.

600 paces by 300, with a small *Imasarūi* situated in its midst; near the garden is a bridge over the Pen-nang-chu, which is 80 paces in length, and constructed of large wooden beams resting on four large piers built of uncemented stones; the bridge is 4 paces wide and has no side rails. The banks of the river are moderately steep, the current gentle, and the water alive with large fish; during floods the river is said to rise 12 feet above the ordinary level. After crossing to the right bank of the Pen-nang-chu, the explorer followed it down for 2½ miles to its junction with the great river of Tibet called the Dugsum above the junction, and the Ekyāp or Tsang-po below. He could not give any precise idea of the size or width of the river; in places it flows in several channels and in others spreads out into a great expanse of water with hardly any perceptible current. For 50 miles he travelled along the right bank of the Tsang-po to Jagsa, passing many villages on the road, and seeing others, and, at places, extensive cultivation some distance off inland. The banks of the river are shelving and the water probably never rises more than 6 feet above its mean level; the bed of the river is stony in places, but the stones are not large; there are large expanses of sand, and the current is slow. On the left or north bank many villages were seen; the margin of the river for a width of from 20 to 80 paces was bound in ice, but the river is said never to freeze over entirely. Sometimes

the country is flooded in places, especially about the village of Taktūkha, but the water does not go far inland.

There is a regularly organized goods and passenger traffic by boat down stream from Shigātse to Jagsa, divided into two stages at the village of Nimo, which is about 20 miles from the mouth of the Pen-naug-chu; the boats used are oblong in shape, flat-bottomed, and formed of leather stretched over a wooden framework. Arrived at the end of a stage, the boatman draws his boat on shore, dries it, and then carries it back on his shoulders to the upper end of the stage again.

The houses near the river have the lower 3 feet of their walls built of stone, while the upper portion is of unburnt brick; the houses are low, with sloping roofs covered with earth. Some of the houses cover a large area and contain many little rooms, each occupied by three or four persons; the windows are small openings with wooden gratings, and are few in number.

A plain varying from 3 to 5 miles in width stretches from the north bank of the river to the foot of a range of rounded hills about 1000 feet above the surrounding country; opposite Jagsa this range falls into the left bank of the river. A range of snow-clad hills closes in on to the right bank of the Tsang-po about 3 miles to the east of Jagsa, and there is said to be no road along this bank the river here entering the hills and falling over many rapids; there is no boat traffic between Jagsa and the iron chain bridge of Chak-sam over the Tsang-po (Brahmaputra) near Lhāsa.

From Jagsa the road turns S. E. and enters the district of Rangchung; 5 miles from Jagsa is the village of Jāmchen, and a monastery of 1500 Lamas. The plain about Jāmchen is studded with small villages. Beyond Jāmchen is the monastery of Humidolma containing 900 Lamas: from here the road runs through a fertile valley containing several villages, and about 13 miles from Humidolma is the village of Chuchen, (from *chu* water, and *chen* warm) built on a mound from the base of which issues a small stream of water whose temperature is 152° F. The water issues in little jets and is conveyed by a short trough to a little pool in which the sick bathe. The water is not unpleasant to drink, but it has a bluish tinge and a strong sulphurous smell.

From Chuchen the road passes several villages, two small monasteries, a lake 400 paces long by 200 wide, and, at 26 miles from Chuchen, joins the road from Gyāntse to Lhāsa at the village of Ya-sik on the margin of the Yam-drok Tso. The range of snow-covered hills overlooking the village of Jagsa on the east, continues on parallel with the road to the Yam-drok Tso; but it diminishes in height as it gets further from Jagsa. To the south of the road lie plains bounded by low hills which in places are close to the road, and in places are 4 or 5 miles distant.

Between Shigātse and Ya-sik there is considerable traffic; the explorer met or passed 300 or 400 men with loads every day; for 3 days he travelled with some 30 Nepālese merchants on their way to Lhāsa with cloth and brass vessels; and he met many Kashmiris returning from Lhāsa with brick tea. A brick of tea, size about 9" by 4" by 2", rarely costs more than ten annas; it is composed of large, coarse leaves and stalks which have undergone very little manufacture. The orthodox method of preparing the liquor is to pound the tea to powder and boil it with a sprinkling of salt; when boiled it is poured into a long wooden cylinder, a lump of butter added, and the mixture thoroughly churned; it is then reheated over the fire before drinking.

From Ya-sik the road traverses the western margin of the Yam-drok Tso for 17 miles, as far as the village of Demālang; here the road leaves the lake and, turning northwards, crosses the range of hills, bordering the lake on the north, by the Kam-pa pass. There are two roads up the ascent; the one for horse traffic is easy, and a little more than half a mile in length.

The Yam-drok Tso is at least 2 miles wide opposite Ya-sik; at Demālang its width does not exceed half a mile. The eastern shore, visible from between Ya-sik and Demālang, is an expanse of flat land, from which rises a mass of mountains culminating in a rounded peak called Tungchūn, which attains an elevation of about 2,000 feet above the level of the lake, the latter being about 13,700 feet above sea-level. On the slopes of this mountain the explorer saw herds of yak and sheep grazing, and in a valley he noticed several houses. He was informed that the lake has no outlet, and that it does not (as hitherto supposed) completely surround the Tungchūn mountain; for the flocks of yak, sheep, and goats which graze on the slopes of that mountain can get on it without crossing water. A path at the south end of the lake, branching off from the road between Gyāntse and Ya-sik, 9 or 10 miles from Ya-sik, is said to lead across a wide expanse of boulders and big stones to the mountain. As however, no traveller has yet been round the lake the accuracy of the above report remains in some little doubt.

From the Kam-pa pass there is an easy descent of about 5½ miles, and some 4 miles further the village of Jāma on the right bank of the Tsang-po is reached. Here the road divides, one branch going N.E. to Lhāsa, crossing the Tsang-po by the Chak-sam iron bridge, 3 miles from Jāma; the other continuing eastward down the river. The explorer having been ordered not to go to Lhāsa, took the eastern branch of the road, skirting the southern base of an isolated mountain about 1500 feet high, situated between the fork of the two roads, and 6 miles from Jāma, came again close on to the right bank of the Tsang-po. Following the bank for 4 miles, he reached Kukhang village, protected by a fort, and containing a monastery with 1500 Lamas. The fort, 800 paces in circumference, is on the bank of the river; its walls are 30 feet high, of rough uncemented stone; the garrison consisted of 7 or 8 soldiers only, as a guard for the Governor.

From Kukhang the road passes through many villages, one of which, Dāchang-rāngmī, contains at least 250 houses. Seventeen miles from Kukhang is the fort, monastery, village and large *bāzār* of Kirtijung. This fort is 600 paces in circumference; its walls, 15 feet high, are in ruins in many places. In none of these so-called forts are the walls loopholed or crenellated, or any means supplied to promote an effective fire: the defenceless state of these enclosures may be due to political reasons.

Between Jāma and Kirtijung there are many great expanses of sand in the bed of the Tsang-po. The plain bordering the north bank of the river is from 2 to 5 miles in width, full of villages, and bounded on the north by a range of low hills culminating in the fine peak of Dorje-thag, to the north-east of the village of Kirtijung, about 3000 feet above the river. The plain to the south of the road varies from 2 to 5 miles in breadth, bounded by low, rounded hills which are uninhabited.

Fifteen miles from Kirtijung is the village of Jhānpāling containing 300 houses, and a mile beyond the village is a monastery with 700 Lamas. Nine miles from Jhānpāling, but on the left bank of the Tsang-po, is the famous monastery of Samaye which contains 1400 Lamas. The buildings in this monastery are large and very lofty, many of the roofs being gilt, and it is a renowned place for pilgrimage. The road continues along the right bank of the Tsang-po through plain country, and 40 miles from Jhānpāling enters the *bāzār* of Tsetang, a mass of buildings covering an area of 600 paces by 400. A daily open-air market is held here which is well supplied; and here also may be purchased goods of all kinds from Calcutta, China, Kashmir, and Nepāl; this *bāzār* is also famous for the sale of perfumed sticks (Joss-sticks) that are burnt in the temples. In the monastery at Tsetang there are 700 Lamas; it is 700 paces in circumference. The explorer always followed the Tibetan custom of making the circuit of a monastery, hat in hand. He saw various curious methods of making the circuit adopted by the Tibetans, some walking round on their knees, and others laying off the length of the body fully extended on the ground successively till the circuit was completed, even if it took them all day to get round thus. The fort of Tsetang is a little way out of the town, and is in the same partly ruinous condition as the other forts before mentioned. It is about 600 paces in circumference, and has a garrison of about 40 men.

At Tsetang low hills come close down to the south bank of the Tsang-po; the hills bordering the plain on the north bank of the river are also low. From here the river was seen trending away to the horizon about east by north in a wide valley, the view down which was bounded by a snowy range apparently a great distance off. The explorer was told that after flowing in this direction for 15 marches the river turned south, and, passing through a wild mountainous region, entered a country governed by the English. This accords with the generally received opinion that the Tsang-po enters Assam as the Dihāng river, flowing into the Brahmaputra 12 miles below the frontier station of Sadiya.

The road continues along the right bank of the Tsang-po past Tsetang, but the officials warned the explorer against going along it unless he accompanied a strong body of merchants; for it is beset by thieves, and there are wild turbulent tribes armed with bows and arrows to be met with near Tsāri.

After remaining in Tsetang 6 days, the explorer, thinking he might run short of funds, left about the middle of December 1875, and turned southwards, intending to follow the route of Pandit Nain Singh into Assam. For some 13 miles from Tsetang the country is fertile and there are many villages along the road; but thence the country becomes bleak and barren. He probably took the alternative route from Tsetang to Tangsho mentioned by Nain Singh in his itinerary as passing through uninhabited country and used by traders from the Hor district. Twenty-seven miles from Tsetang he passed the two monasteries and village of Dāgyeling: snow-capped mountains here close in on to the road which ascends for 3 miles to the Yarto Tra La, (16,300 feet) on which there is a frozen lake 300 paces in circumference. Three miles of easy descent

and the road enters upon great, bleak, stony and barren plains. Seven miles from the pass is Karkang where is a house for travellers, and a small monastery containing 6 Lamas. Karkang is at the trijunction of the districts of Tsetang, Photāng, and Nia. Here he met a small party of merchants going to Lhāsa with loads of tea, salt, and rice, carried on donkeys and horses: these were the first travellers met with since leaving Dāgyeling. Beyond Karkang the country is very bleak and desolate; the plain through which the road passes varies in width from 1 to 10 miles, and is bordered by low undulating hills. Thirteen miles beyond Karkang is Giārokh, where are a few houses and some fields. Three miles beyond Giārokh is a road going south-west to Nia, which is distant 8 miles from the bifurcation of the roads. The explorer visited this place on his return journey from Tawang: he found there a fort, 500 paces in circumference, built on a small eminence, with many villages scattered about on the surrounding plain.

Twenty-one miles from Giārokh is the small village of Sumna, and  $4\frac{1}{2}$  miles further a small stream, frozen over when crossed, draining to the south, crosses the road. From here the road ascends for 3 miles and then descends for a mile to a great lake\*, 6 miles long by 4 wide, west of the road, which was frozen half over. The lake is bordered by low rounded hills, and several miles off to the east is a lofty range: near the lake is much short grass, and herds of autelope and wild asses (the *kiāng* of Ladāk, called *tha* in Tibet) were seen. Three miles beyond the lake is the Tangsho guard-house, and a large house for travellers. To the east and west, 10 miles distant, are ranges of snow-clad hills. Fourteen miles from Tangsho is Tsōna Dzong†, where there is a large *bāzār*, a monastery, and a detachment of mounted soldiers. In the *bāzār* are the shops of 5 Nepālese who have married Tibetan women and settled at Tsōna Dzong. The monastery is at the south end of the *bāzār*; it is 700 paces in circumference and contains 120 Lamas. The detachment of soldiers numbers 25 strong only; they are armed, some with spears and long straight swords, others with guns and swords. Tsōna Dzong is situated in a large plain, 5 miles long by 4 broad, surrounded on three sides by low hills; there are several villages scattered over the plain, containing altogether not less than 500 houses. There is very little cultivation however, only a few small patches on the banks of the stream, the place being chiefly a trading mart. There are several springs of warm water, colorless and almost inodorous, from which the inhabitants take their drinking water. Tsōna Dzong is about 12,900 feet above sea-level.

A mile and a half beyond Tsōna Dzong the road ascends for a mile, and another road branches off to the south-west which is said to go to a considerable place called Lubrakh, near a large river. Nineteen miles from Tsōna Dzong the road descends 2 miles and reaches the toll-house at Chukhang, where a tax of three annas is levied on each traveller. Passing Chukhang the road undulates a good deal, and the slopes of the hills are covered with trees like chestnut trees; ten miles off to the east of the road are visible great snowy peaks. Eight miles from Chukhang is a small lake, 700 paces in circumference, which was frozen over. A mile beyond this lake the road enters a forest of gigantic trees, like *deodār*, of a greater height and girth than the explorer had ever seen elsewhere, and then goes down a continuous and moderately steep descent for about 5 miles to the important Tibetan post of Mantangong or Tawang. About 300 houses are scattered round about Tawang, and there is heavy *ringāl* (dwarf bamboo) jungle about the place, which is situated on a broad spur sloping to the south; a mile or so further down the slope is said to be the village of Mau situated on the boundary line between Tibet and the *Dokpa* country or Bhutān. There is a Tibetan regiment 500 strong, quartered at Mantangong, commanded by 3 officers who also exercise civil functions. There are barracks for the soldiers, but no fort. There is also a large monastery‡, 1000 paces in circumference, containing about 700 Lamas; several of the buildings in this monastery have gilt roofs.

At Mantangong the explorer and his party were seized and taken before the authorities, who were inexorable in refusing to permit them to pass on, and sent them back to be confined in the public flour-mill at Kyakyarong, 2 miles away; here they were detained a month, the only attempt at negotiations which they made resulting in a fine being inflicted on them. A party of some 300 traders from Tibet were also in Mantangong. They had intended going to a place they called Giagarjāmssetung in British territory, but permission to proceed had been refused by the authorities. Two young men amongst them one day spoke their minds too freely on the subject of such arbitrary detention, and they were promptly placed in the guard-house, and their goods sold by public auction.

\* The Nera Yu Tso of Nain Singh.

† For a fuller account of this place, see report on Nain Singh's journey, 1873-74-75.

‡ For a full account of this monastery, and the large territorial jurisdiction and political influence held by it, see report on Nain Singh's Explorations, 1873-74-75.

In the mill in which the explorer was confined, the lower mill-stone was circular, about 5 feet in diameter, and fixed; the upper one was rectangular, and revolved thus:—through the centre of the lower mill-stone a spindle, fixed in the upper stone, passed loosely; to the lower end of this spindle, some 3 feet below the stone, were fixed a number of flat boards radiating like the spokes of a wheel, thus making a horizontal water-wheel against which a small stream was conducted, and so caused the rotation of the upper mill-stone.

At length three mounted soldiers were told off to escort the explorer and also the two insubordinate Tibetan merchants to Lhāsa. Fortunately however, before they got to Lhāsa, the governor of a fort on the road objected to some informality in the document carried by the soldiers and ordered them to return to Mantangong, informing the prisoners they might go about their business. The explorer therefore made the best of his way back to Shigātse by the route he had come. The explorer suffered much from extreme cold and high winds on his journey from Tsatang to Mantangong and back thence to Shigātse. The aspect of the country between Tsatang and Mantangong he describes as very bleak and desolate.

With regard to the climate and weather at Shigātse, he states that during the month of May no rain fell, though the sky was cloudy. The rain set in about the middle of June, and there was a good deal of rain during the months of July and August: the prevailing wind was from the east. In September there was little rain, but it was very cloudy. In October there was no rain, and strong winds from the east set in, commencing regularly at 11 A.M., rising to their height about 2 P.M., and gradually declining till about 5 P.M., when they ceased: they rarely blew at night. These winds were extremely cold, and in December and January they increased to such tremendous violence that for three or four hours in the day, while they were at their height, no one stirred abroad as it was impossible to travel in them.

About the end of March 1876, the explorer completed his arrangements at Shigātse for returning to Darjeeling by travelling in the foot-steps of Captain Shigātse to Phāri. Turner, who in 1783 went from Shigātse to Phāri: from Phāri the explorer intended taking the road over the Jelep La to Darjeeling. From Shigātse he followed the same route as that taken by Nain Singh in 1865-66 (pages 1-77), as far as the bridge over the Pen-nang-chu (Nyang river) at Pen-nang (Fort); but from there he kept to the left bank of the river. Some distance beyond Pen-nang (Fort), the hills come down close to the road, and there is one large and very steep hill called Kuriradon overhanging the river, which is famed as the haunt of robbers, whose mode of attack is to sling down stones at the solitary traveller, who drops his load to escape across the river. The explorer travelled in company with 14 or 15 merchants, and except that several men came up and boldly demanded alms, they were not molested. A mile from this hill is the monastery of Nurbugiāngcha containing 300 Lamas. Passing several villages and water-mills, they came to Chāchin monastery, 2000 paces in circumference, and containing 1000 Lamas. Three miles further on is Manilāgong village, and a bridge across the river: the bridge is 100 paces long and is supported on 5 stone piers. The river here is very swift. Half a mile from the bridge, on the right bank of the river, is the important town of Gyāntse. The *bāzār* covers a space of 600 paces by 300; the fort is large and built on an isolated mass of rocks overlooking the town; its walls are at least 40 feet high, but are in a ruinous condition in places.

From Gyāntse a remarkable cluster of 8 needle-shaped peaks was noticed, bearing S.W., distant about 10 miles, and perhaps 3,000 feet above the level of the river. After a stay of a couple of days at Gyāntse the explorer returned to Manilāgong and travelled along the left bank of the Pen-nang-chu 11 miles to Changra. Four or five miles east of Changra are lofty snowy mountains. The hills bordering the west of the road are low and rounded.

From Changra he left the Pen-nang-chu river and turned up the bed of a small stream flowing in a narrow valley bordered by low, rounded, sterile hills. Twelve miles up this stream he came upon a shallow pool of warm water in the rocks; the water had a blue tinge and slightly sulphurous smell; the outflow from the pool was very small. Eleven miles further on is Sālu village of 50 houses, with some cultivation about it. The road here is bordered by low hills of a reddish kind of gravel. Five miles beyond Sālu is the large village of Pika, and 4 miles beyond this again is the Ka-la lake; the road passing along its margin for 2 miles to the village of Ka-la-shar. This lake is about 2 miles broad, and the villagers of Ka-la-shar are great fishermen, going out on the lake in their little leathern boats and fishing with line and hook baited with paste. They catch numbers of large fish, which are dried in the sun. About Ka-la-shar there is extensive cultivation irrigated by several small hill streams. Five miles beyond is the village of Cha-lu on the banks of the small stream flowing from the Ram or Bam lake into the Ka-la lake. A mile from Cha-lu the stream opens out into a chain of small lakes, and at 3 miles from Cha-lu joins the Ram lake lying to the east of the road. The explorer did not obtain any other name for this lake. The road crosses the little stream near its issue from the lake on a small bridge built on 2 stone piers.

The road now enters extensive plains, and at 19 miles from the Ram lake it reaches the village of Tu-na, situated about 12 miles N.N.W. of the great snowy peak of Chumalhari (or "Phāri-Jummu" as the explorer gives the local name) 23,900 feet high. Eleven miles beyond Tu-na the road commences to descend a slight incline for 4 miles to the village of Chukya; and 2 miles from Chukya, in the midst of a large plain, stands the fort and small town of Phāri, from which place a road leads off about north-east into Bhutān.

The fort at Phāri is 1,500 paces round, and its walls, built as usual of rubble stone, are 30 feet high. There are no fields or cultivation about Phāri; the inhabitants of the 60 or 70 houses which form the town surrounding the fort own large herds of sheep and yaks, and employ themselves exclusively in the carrying trade. *Sattu* and *āta* (barley and wheat flour) are imported from Gyāntse, and rice from Bhutān; their own flocks supply them with meat.

At Phāri there are 3 Chinese officials and 30 mounted soldiers. The explorer was arrested here and detained a month; and matters would have gone hard with him but for the kindly interference of one of the leading men of the village, who eventually procured his release. Leaving Phāri, at 5 miles from it, he crossed to the right bank of a small stream, the Ammo river, and entered a great forest. From here the road descends a slight incline for 7 miles, and 12 miles from Phāri it again crosses the Ammo river to its left bank; here the stream is not fordable. Five miles beyond the bridge by which he crossed he emerged from the forest and reached the village of Kālīka which belongs to the country of Dumu or Sikkim. From here the road descends a slight incline for 4 miles, and at 5 miles from Kālīka is Chum-bi, the summer residence of the Sikkim Rāja. All the houses in this village are roofed with planks; the Rāja's palace is not large, but the roof is handsomely gilt. There is also a small monastery here. A bridge 30 paces in length spans the Ammo river, and crossing this, 4 miles down the stream, the explorer came to Rincingaon, the houses in which are all very large and are roofed with planks. At Rincingaon he left the Ammo, and entered a forest of huge pine trees, the road ascending continually, but with an easy slope, to a small lake, 300 paces in circumference, on the summit of the Jelep La. Snow was lying on the peaks along the ridge when he crossed this pass, from which a good road has been made into Darjeeling by the British Government.

The explorer proceeded *viā* Kālīmpong to Darjeeling, where he arrived in July 1876 after an absence of one year and four months from British territory.

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## *Narrative of the Second Expedition of Explorer Lala, 1877.*

The object of the second expedition of the explorer over portion of the ground which he had traversed in his first journey has already been explained on page 198. He was ordered to proceed to the Kāngra-lāma La and to determine its latitude and that of several other points on his former route. His instructions were to visit first the G.T. Station of Senchal, situated not far from Darjeeling, in order to find and recognize a number of trigonometrically fixed peaks in the neighbourhood of his former route, the bearings of which from Senchal h. s. were given him. He was then to resurvey the small portion of his route from Darjeeling to the Ranjit, and thence to proceed to Patam for his first latitude observations. After taking bearings to all visible fixed peaks from the nearest hill-top, and connecting that hill-top by a short route-survey with the place where he had observed latitude, he was directed to proceed to Cheungtung village and thence to the Kāngra-lāma La to observe their latitudes and check their positions by bearings as before. In the case of his failing to reach the Kāngra-lāma La on account of snow, he was directed to take his northernmost latitude observations at the Sarola lakes, and to carry a route-survey from there to Darjeeling again *viâ* Phāri.

The explorer left Darjeeling on the 29th September 1877, accompanied by a *Lepcha*, who was well acquainted with the country up to the Kāngra-lāma La, and 3 coolies. His instrumental equipment consisted of a pocket compass, a prismatic compass, and a 6-inch sextant. He proceeded to Senchal h. s., distant some 7 miles from Darjeeling, but was detained there for a whole month before he could take the bearings of the trigonometrically fixed peaks and recognize them, as the weather was very cloudy the whole time. On the 27th of October it cleared up for a while and enabled him to see all the peaks: he then returned to Darjeeling. On the 29th October, starting from the Darjeeling *bāzār*, he carried a route-survey down to the right bank of the Ranjit river, near Ranjit village. The river here is deep and cannot be forded. The first portion of this route lay through tea-plantations; the remainder through thick forest. Crossing the Ranjit by a *jhula* or cane bridge, the explorer proceeded to Patam where he took observations for latitude, and then ascended a hill near by called Phiram to take bearings to peaks; in this, however, he failed owing to the cloudy weather. From Patam he went to Cheungtung at the junction of the Lachen and Lachung rivers, where he remained for 3 days, but was unable to get any observations owing to the clouds. Fearing to delay on account of the lateness of the season, he pushed on through Lachen *Chauki* (Lāmteng) to Thango; but the sky being still heavily overcast, he wasted no time here waiting for it to clear, but proceeded to the Sarola lakes. Near the lakes his progress was temporarily arrested by some Tibetan officials who ordered him either to return or to show a *parwāna* (order or permit) from the Sikkim Rāja. On giving them a bribe, however, he was allowed to proceed. At the Sarola encamping ground he was again met by the same demand from other Tibetan officials, who were also bribed in their turn, and he proceeded to the Giamsena lake, a few miles further. Here he was for the third time questioned, and peremptorily ordered back, so he returned for a short distance, and halting for the night at a station of his former route-survey, took observations for latitude there, as he saw no hopes of being permitted to proceed quite up to the Kāngra-lāma La. He then returned to Thango, and taking his observations for latitude there, attempted to ascend the Pālung (Phallung) hill, about five miles east of Thango, but was obliged to give it up on account of a heavy fall of snow.

From Thango the explorer returned to Cheungtung, where he had to remain 8 days before the sky was clear enough to enable him to observe the latitude. He then ascended a hill close by for bearings, but did not succeed in obtaining any as the clouds had again come up and hidden the hill-tops. He then traversed up the Lachung river a short distance, and thence to the Thānka La, a pass about 8½ miles east of the village of Lachung. The road up the Lachung river as far as the village was good; it crossed the river in three places by wooden bridges 39, 35, and 15 paces in length respectively. From the Thānka La he obtained the bearings of Chumalhari, Kinchinjunga, and two other well-known peaks.

From Thānka La the explorer marched to Singtam La, about 2 miles north of Patam, where he took observations for latitude. He then carried a route-survey up to a hill about 12 miles to the west, and succeeded in obtaining the bearings of several trigonometrically fixed peaks. This hill is called the Karangit Kurson La or Karkang La; and near it, according to local rumour, is a large lake (surrounded by red stones) which, on the approach of anyone, overflows its banks and drowns the inquisitive intruder. The explorer endeavoured to visit this wonderful lake himself, but there being no path, and the forest being dense and impenetrable, he gave up the attempt.

Returning from Patam to the Ranjit, the explorer proceeded to Kūlingpong, and from there took a traverse *viâ* Ranjit to his original starting point—the Darjeeling *bāzār*.

A tabular statement of the explorer's latitude observations is appended.



## Observations for Latitudes taken by Lala on his Route from Darjeeling to Kāngra-lāma La, 1877.

No. of observation	Date	STATION	Object Observed	Double Altitude	Deducted Latitude	Mean Latitude	Final Latitude	Latitude on Hooker's map to nearest minute
1	1877 Nov. 8	Patam	Sun	92° 37' 20"	27° 22' 58"	0° 0' 0"	0° 0' 0"	0° 0'
2	" "	Do.	Sirius	92 15 20	22 48	}	}	}
3	" "	Do.	Rigel	108 39 0	23 2			
4	" "	Do.	Fomalhaut	64 50 0	22 34			
5	" "	Do.	β Ceti	88 2 30	22 39	}	}	}
6	" 24	Giamsena	Sun	83 18 30	23 4 24			
7	" "	Do.	Polaris	58 51 0	1 21			
8	" "	Do.	Sirius	90 56 30	2 11	}	}	}
9	" "	Do.	Rigel	107 20 0	2 30			
10	" "	Do.	Fomalhaut	63 28 40	3 14			
11	" "	Do.	β Ceti	86 42 20	2 44	}	}	}
12	" 27	Thango	Sun	82 30 0	27 54 9			
13	" "	Do.	Polaris	58 33 20	52 31			
14	" "	Do.	Sirius	91 12 20	54 15	}	}	}
15	" "	Do.	Rigel	107 39 0	53 0			
16	" "	Do.	α Hydræ	108 2 30	54 0			
17	" 16	Cheungtong	Sun	87 51 0	27 36 28	}	}	}
18	" 17	Do.	"	87 21 40	36 21			
19	" 18	Do.	"	86 52 40	36 26			
20	Dec. 3	Do.	"	81 10 0	36 5	}	}	}
21	" 6	Do.	"	80 22 30	36 31			
22	" 7	Do.	"	80 8 30	36 37			
23	" 6	Do.	Sirius	91 48 10	36 17	}	}	}
24	" 7	Do.	"	91 49 0	35 51			
25	" "	Do.	Rigel	108 13 10	35 52	}	}	}
26	" 6	Do.	α Hydræ	108 39 0	35 28			
27	" 7	Do.	"	108 39 30	35 44	}	}	}
28	" 3	Do.	Fomalhaut	64 22 20	36 22			
29	" 6	Do.	"	64 22 30	36 17	}	}	}
30	" 7	Do.	"	64 22 20	36 21			
31	" 3	Do.	β Ceti	87 36 0	35 52	}	}	}
32	" 6	Do.	"	87 35 30	36 6			
33	" 7	Do.	"	87 34 30	36 36	}	}	}
34	" 22	Singtam La	Sun	78 56 40	27 24 6			
35	" 29	Do.	"	79 23 0	25 54	}	}	}
36	" 19	Do.	Polaris	57 33 20	22 34			
37	" 22	Do.	"	57 33 10	22 30	}	}	}
38	" 29	Do.	"	57 33 20	22 36			
39	" "	Do.	Sirius	92 13 20	23 36	}	}	}
40	" "	Do.	Rigel	108 87 30	23 38			
41	" 19	Do.	β Ceti	88 0 30	23 34	}	}	}
42	" 22	Do.	"	88 0 30	23 34			
43	" 29	Do.	"	88 0 40	23 28	}	}	}

NOTE:—Each of these double altitudes must be diminished by 4' 30" (index error of the sextant) before finding the corresponding latitude.

*Report on the Exploration of Nem Singh in Eastern Tibet, 1878-79,  
drawn up by Lieut. H. J. Harman, B.E., Survey of India.*

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In June 1878 I engaged Nem Singh to give me instruction in the Tibetan language. He is a married man and a Lama of the Pemionchi monastery in Sikkim; he is a Sikkim Bhotia and is about 30 years of age—a good Hindustāni scholar, said to be well read in his own language and Tibetan literature, has a smattering of English, understands English figures and simple accounts; has been employed as a *Sardār* (head of a gang of coolies) in the Public Works Department and casually as Interpreter at the Court of Darjeeling; he has also travelled a little in the plains of India.

Finding that my studies seriously cut into my time, I gave up reading and took to teaching Nem Singh a little surveying, he took to it very well, and as I found him to be very sharp and industrious, I gave him the offer of service as an explorer which he eagerly accepted. He soon learnt traversing with the prismatic compass, to plot his work, use the boiling point thermometer, read a Hadley's Sextant, and understand maps. The rainy season of 1878 was very wet, and during 27 consecutive days Nem Singh did not get a sight of the sun or stars.

I decided it was better for him to go to work with his imperfect knowledge than to lose a season. He was instructed to trace the Tsang-po river from Tsetang downwards as far as he was able. Also to make a circuit of the Yam-drok Tso or Palti lake and give a good description of the iron chain bridge over the Tsang-po river at Chak-sam.

On the 6th of August 1878, he left Darjeeling and travelled by the Jelep La to Phāri and thence by the Yam-drok Tso and the iron chain bridge to Lhāsa. He did not make the circuit of the Yam-drok Tso, but made some observations which will be found on pages 212 and 213. He gave an account of the bridge, which will be found on page 213.

He spent considerable time at Lhāsa and in the monasteries thereabouts, and spent a round sum in presents to high Lamas, in purchase of butter for burning at shrines, &c.

He went to Dre-phung monastery and found it contained 9,800 Lamas, so that it has become the largest monastery in Tibet. He saw the great copper caldrons in which rice and tea are prepared for the Lamas; caldrons measuring 20 feet across and 6 feet deep, built up in masonry and with planks laid across, so that the cooks might easily stir up the contents and ladle them out.

He paid a visit to the bell foundry and saw some large bells 2 feet high; very little work was going on.

He states that the rice from Bhutān, which is considered the best, is not allowed to be sold in the *bāzārs* to the general public but can only be sold to Lamas. Nepāl rice is sold to the public, and is dearer than rice sold at Darjeeling, and the commonest kind of butter is very expensive.

He was very little troubled by rain, leaving it behind him at Phāri, and getting it only at Rip village and Mimdzong. Some snow fell at Chukurgyi monastery and the Lung pass, and the country between the monastery and the Cholamo lake was covered with snow. Near Rip village he entered an undulating country covered with low thorn bushes, so low that he could see about him in every direction but quite obscuring his line of route. From fear of robbers and of not turning out much work, he hurried over this piece of his route at undue speed, and some 8 or 9 of his bearings have had to be changed that his work might plot. He also kept the record on pieces of paper and did not make daily entries in his field-book from these scraps of paper, according to the strict orders he received, but I have very carefully questioned him about this portion of the route and think it sufficiently trustworthy for geographical purposes.

His altitudes of the sun are very doubtful and his dates are wrong; as yet I have not been able to make anything of the astronomical work.

He took very few boiling point observations, but they may be relied on; his value for Tsetang agrees well with Nain Singh's determination. Altogether he did not do the amount of survey I expected from him, and on his return in January 1879 I dismissed him. His persistent declarations that he had done his best, distress at being sent adrift, and the probabilities of his traverse being correct from its fulfilment of the conditions required by D'Anville's map, and affording from its course the drainage areas which by recent discharge measurements of the rivers of Assam are required, led me to take the man on again and send him to Pandit Nain Singh

at Almora for proper instruction in the use of the Sextant and his survey duties. He prosecuted his studies with vigor and has gone away on a most important journey, guided by a Lama who has traversed the whole route Nem Singh has to follow.

Starting work at Tsetang in October 1878, he followed down the right bank of the river for  $1\frac{1}{2}$  miles and then crossed by boat to the left or N. bank of the river to the monastery of Ngäri Tratsang (300 Lamas), fort of Takurdzong and village of 40 houses. The Tsang-po river at point of crossing flows in a wide sandy bed and the breadth of water is about 400 paces. For a distance of 100 paces the boat had to be rowed, the remainder of the passage was made by poling with poles 25 feet long; the current was very slight. The discharge of the river at the most moderate estimate would give on the above data about 15,000 cubic feet per second, which accords well with what would be deduced from Nain Singh's report.

At 10 miles from Tsetang is the village of Jamtong or Jang (80 houses) where a road comes in from Lhāsa: it is a road for the Gewa Ring-bo-che to travel to the small monastery of Densuti, which is 4 miles to north of Nem Singh's route. The road is defined by two parallel rows of stones placed close together, marking the limits of the road.

At 14 miles from Tsetang the route ascends for half a mile and the monastery of Chakurjong (Kongchakar) comes into sight: I would identify the name of this monastery with the name of the small river marked "Tchiacar" on D'Anville's map.

At  $18\frac{1}{2}$  miles from Tsetang are the remains of a large fort and the small monastery of Saugri: I would identify the monastery with the "Sancri" of D'Anville's map.

At 30 miles from Tsetang the route leaves the Tsang-po and goes to the north.

At  $40\frac{1}{2}$  miles there strikes in a road from Lhāsa, prepared for the Gewa Ring-bo-che to pass along. About 2 miles further on, the Mik Chu stream (which rises in the Lung pass) is crossed: I think this may be the small river marked on D'Anville's map.

At 44 miles, he met 300 Lamas returning to Ngäri Tratsang monastery from a trip to the Chukurgyi monastery.

At 54 miles he crossed the Lung pass, the rise up to which was very gradual. The pass is high and there was snow lying all about. A moderate descent over  $5\frac{1}{2}$  miles took him to the Chukurgyi monastery which contains 300 Lamas. Here he stayed and took a trip to the small lake of Cholamo, which is situated on very high ground about 8 miles from Chukurgyi. Into this lake it is customary to throw rupees and white silk scarves. To the Gewa Ring-bo-che this lake is of importance, for he can by looking into it foretell his death and new birth.

The large and fine fort of Gyatsa Dzong and the Takpo monastery are met with at 68 miles from Tsetang: 2 miles further on, the route again meets the left bank of the Tsang-po river. Just across the river is the meeting of 3 roads, one from Tsetang, one to Tsäri 7 days' journey, and a route to the Kongbo district. Talha Kampo monastery is seen to north of the route at  $101\frac{1}{2}$  miles from Tsetang, and the Talha Chu stream is crossed by a bridge 26 paces long. All the bridges over the streams are of the same pattern: the abutments are of stone and the chasm is spanned by beams one above the other, each one overlapping the one below till but a small gap remains in the middle which is covered by planks; the shore ends of the beams are weighted down with stones.

At  $105\frac{1}{2}$  miles is the small monastery of Pari Chöte where the Gewa Ring-bo-che (a boy of  $1\frac{1}{2}$  years of age, and seen by Nem Singh) was born. 150 Lamas have recently taken up their residence at Pari Chöte.

At 111 miles is Aru monastery of 60 Lamas and close by is a village of 21 houses.

A mile beyond Aru, he met with 5 Chinese journeying to Lhāsa with loads of musk balls which they had collected in the Lepcha district to south of and near Tsäri. Across the Tsang-po is a road going south to the country where lead mines are worked: the district is 4 days off: it supplies Lhāsa and all the surrounding country with lead; the people pay their revenue in lead.

At 120 miles, he again crossed the Tsang-po to its right bank. The water has a breadth of about 250 paces, has a very slight current and is apparently very deep.

He now journeyed by the right bank of the river all the way to Gyāla Sindong (Gyāla and Songdam) which is at 287 miles from Tsetang. There are many ups and downs along the route, but the river is kept in sight nearly all the way.

At 123 miles is the large monastery of Nang Dzong, the name of which I would identify with the name of the district "Tæpou y" on D'Anville's map.

At 125 miles he crossed the Tsäri Chu (La Pu Chu) which comes straight from Tsäri only 2 days off to the south. I take Tsäri to be the "Chai" of D'Anville. It is said to be not a large town,

but there are many villages in its vicinity and plenty of bamboos and wood.  $1\frac{1}{2}$  days to south of Tsāri is a country of wild tribes: the district is called Gimuchen, literally the "naked man country".

There is a rise of 5 miles on to the ridge called the Kongbo Nga La which forms the western boundary of the Kongbo district and which I take to be the "Conc Pou y" of D'Anville. Kongbo is the general name for Eastern Tibet. At 140 miles is the small monastery Kongkār Dzong and a ruined fort.

On the 23rd October the Kyimdong Chu was crossed, it is rather large and flows in a wide bed. The bridge had been washed away, and the river being full the crossing was a matter of great difficulty and danger. 2 days' journey up this river is the town of Kyimdong Dzong, distant 3 days from Tsāri. Near the river is a low stone wall to mark the boundary between Kongtu (upper) and Kongme (lower) Kongbo. At this place the Tsang-po makes a great bend and turns to the north-east for a course of nearly a hundred miles.

At 171 miles the route enters an undulating country covered with low scrub, thorn jungle: habitations are very scarce.

At 188½ miles he came to the large forts of Orong and Gācha whose Jongpons (governors) were in charge of the adjacent tracts of country. Here he met many people whom he calls *Lepchas*. They are called *Mōnbas* by the Tibetans, who give the same name to the *Lepchas* of Sikkim. In face, complexion and dress they are not distinguishable from the Sikkim *Lepchas*, but they do not speak the *Rong* language (that of the Sikkim *Lepchas*) but have a language of their own: an interpreter is kept for them at Orong. They pay tribute to Tibet, and are much esteemed for their truthfulness and straightforward dealing. They had come down the Lilung Chu, and said their country was 9 days' journey off and that it marches with Gimuchen the country of savages. They said they had many villages near the line of route from Tsetang to Tawang and Odalguri in Assam; a route traversed by P. Nain Singh and the explorer Lala.

They call themselves *Pāchakshiriba* and I would draw attention to the Dsiri mountains and the town of Dsiri marked on D'Anville's map to the west of Tsāri. A good number of men had come to Orong for trade and had brought with them valuable loads of musk balls, madder, pepper, and *lāshin*, also numbers of caue and bamboo baskets of the fashion of the Sikkim *kilta* or *tapa*, which is a basket resting on the back and held by a strap across the forehead. Nearly all the musk which is found at Lhāsa comes from the Lepcha district, which also supplies most of the baskets found about Lhāsa.

At 212 miles, across the Tsang-po, is a road to Lhāsa, said to be only 9 days' journey off, though there are 2 high ridges to cross. This is a most important statement, as it corroborates the accuracy of the survey up to this point.

At 215 miles he crossed the Nayü Pu Chu, a large river flowing in a sandy bed 500 paces wide. A short distance from the Tsang-po it splits into three streams. Formerly the route used to cross these three streams but the bridges have been washed away.

The river takes its rise in the Nayü Pu La hills which are far away, but visible, to the south.

At Mimdzong he stayed 2 days to question the savages who had come there for trade. They had come down the Nayü Pu Chu and said their homes were 2 days' journey to south of the Nayü Pu La range. They are the people of Gimuchen. Madder, *dari* cloths and much Indian corn were brought for exchange with wool and iron. They would not receive cash payment. Occasionally, children and short witted men are brought for sale as slaves; for a woman they would get the equivalent of 60 Rupees. The practice of selling slaves is common among the Miris of the Subansiri valley. To Nem Singh I showed some photographs of Hill Miris, and he affected to recognise a resemblance between them and the savages he met at Mimdzong, also the long swords and plaited cane waist belts. At 226 miles is the village of Kongboding on the eastern boundary of the Kongbo district.

An ascent of 6 miles takes one to the small village of Fucha.

At 242½ miles is the important monastery of Chamna (500 Lamas). Across the river, on the left bank, is the monastery of Chamkar or Tomo (400 Lamas), with villages in its neighbourhood and a road to Lhāsa. I take this monastery to be the "Tchamca" of D'Anville, on account of the great bend in the river to the south which both Nem Singh and D'Anville place just below "Tchamca." Before reaching Gyāla Sindong (Gyāla and Sengdam), which is a large fort at 287 miles from Tsetang, the ruins of many villages and forts were passed. At Gyāla Sindong the snowy peak of Jungla bore 130°, the river passing through a gorge to west of it. Nem Singh closed work at Gyāla Sindong. The road continues on along the right bank of the river for 4 days and then crosses

to the *Poba* or *Lhoba* country. The word *Poba* signifies a man of Bhutān, also independent. The country is peopled with all the eastcast rogues and black sheep of Tibet; the inhabitants proper have a peculiar dialect and differ greatly from the Tibetans in costume and religious observances. They are bordered to the south by a country of savage tribes known as the Gimuchen country.

There is a road from Gyāla Sindong into the Pemakö district, which is subject to Tibet. In it are many villages of *Lepchas* and people of Bhutān. I think this Pemakö may be the "Kenpou" of D'Anville. To Gyāla Sindong Nem Singh gives the height of 8,000 feet, so that the river has fallen 2,000 feet in its 250 miles of course from Tsetang; most of the fall may occur in the unexplored bit of the river, beginning at 30 miles east of Tsetang.

If the Tsang-po be the Dihāng branch of the Brahmaputra, then it has a fall of about 7,000 feet in about 160 miles, or 40 feet per mile, which is not a very great fall for Himalayan rivers.

Nem Singh was told, that report had it, the river after flowing through the Gimuchen country entered a land ruled by the British. The Dihāng river has at its mouth a discharge, at minimum level of the year, of 55,000 cubic feet per second, or 4 times that of the Subansiri river and twice that of the Brahmakund branch of the Brahmaputra river. The wild tribes called *Abars* who live in the Dihāng valley, trade with Assam and Tibet; the more wealthy among them wear Tibetan woollens. They say their river comes from the far north-west, and our survey operations in Assam have shown there is a great gap in the snowy ranges through which the Dihāng passes, and that thereabouts (to N. W. of the mouth of the Dihāng) is much low lying country.

Nem Singh states, that from Gyatsa Dzong to Gyāla Sindong the river is of very variable width and is in places very narrow; at Gyāla Sindong it is but 150 paces wide though deep and with moderate current. The flat and sandy nature of the bed in this part of its course may cause considerable filtration and Nem Singh may not have noticed the places where it flows in more channels than one.

According to D'Anville's map, the Tsang-po flows into the Subansiri, but according to Nem Singh's exploration this can hardly be, the river would have to turn back on to itself and after draining a large tract of country and the very rainy district of the Miri Hills to north of latitude 28°, appear in latitude 28° with a discharge of but 9,000 cubic feet per second at minimum level of the year. Very agreeable results are found by turning it into the Dihāng.

In the construction of my map I have considered that 2,000 paces cover one mile of route. The route traverses  $2\frac{1}{2}$ ° of longitude and there are many ups and downs along it, so that I think it would not be unfair to make some reduction in the longitudinal distance traversed and plot the fort of Gyāla Sindong in longitude 94°. This adjustment would give the Tsang-po below Gyāla Sindong a more easterly course.

Nem Singh returned to Darjeeling by the routes marked in the neighbourhood of latitude 30°: I have obtained from him very little information concerning them.

On his way back through Phāri he found encamped there a large number of Tibetan soldiers, not less than 200: it was rumoured that 500 more soldiers were on their way to Phāri from Shigātse, Gyāntse and Lhāsa. One day when near Singlo monastery he met about 500 soldiers, mostly Chinese, on their way to re-inforce Lhāsa; they were all mounted on ponies and travelling anyhow, singly and in groups: they had no arms with them. The demonstration at Phāri had for its object the causing the Deb Rāja of Bhutān to make some reparation for a number of excesses recently committed by his people in the Chum-bi valley and elsewhere. I have been told the demonstration had the desired effect and the soldiers did not need to go to Trashichödzong (the capital of Bhutān) as was thought might be necessary.

Nem Singh describes Phāri as a most desolate place, without any wood, situated in the midst of a vast plain, at 12,000 feet above sea-level. The ascents and descents from Phāri to Lhāsa are very gradual and the route is extremely easy, an account which agrees with the statements of other explorers and the traveller Turner.

About the Yam-drok Tso I had written in my report on the journey made by the explorer Lala in 1875-76. It is at least 2 miles wide at Ya-sik and half a mile at Demālang. The lake has no outlet yet the water is sweet and good. The eastern margin of the western part of the lake borders a stretch of flat land from which rises a mass of mountains culminating in a rounded peak called Tungchin, which is about 2,000 feet above the lake. On the slopes of the mountain, herds of yak and sheep were grazing, and several houses were seen in one of the valleys. The water of the lake does not surround the Tungchin mountain making it an island as is represented on our maps, but the mass is connected with the mainland by a wide isthmus covered with boulders, at about 10 miles S. E. of Ya-sik.

The Yam-drok Tso is the famous ring lake of Palti shown on D'Anville's map. Mr. Manning saw it in 1811, but did not know it was in the form of a ring. He said the water was very bad whereas Pandit Nain Singh, C.I.E., who visited it in 1866, reported the water to be perfectly fresh, and he also obtained the additional information that the lake had no outlet and it required 18 days to make the circuit of it. Starting from Nang-kar-tse (Fort and *Ta-sam*) near the S.W. corner of the lake, Nem Singh soon struck the lake and going along the western margin he journeyed northwards for 2 miles and noticed the water rapidly decreased in width. There he found it but 400 paces wide and the lake broken through by a gap at least a mile wide, covered with boulder stones: the general level of this causeway was raised but little above the level of the water of the lake.

Nem Singh describes the lake, between this break and the Kam-pa pass, as a chain of lakes, the connecting links being often very narrow. He was told by a man who had made the circuit of the lake for *neko* (that is, the making a journey for cleansing from sin and sloth) that the circuit of the lake took 15 days, the eastern part of the lake was wide and the marches there were difficult. Thus the lake may be put down as having a circumference of 100 miles. The explorer Lala saw the lake in December 1875, Nem Singh saw it in September 1878.

The great iron chain bridge over the Tsang-po river, between the Yam-drok Tso and Lhāsa, is of the following construction.

The bridge is called Chak-samtuka, the small monastery at south entrance to the bridge is called Chak-sam.

The bridge is formed of 4 iron chains, 2 on each side. From the chains are suspenders of rope, carrying the footway which only allows of one passenger crossing at a time. During the rains the bridge is not in use on account of its northern end being separated from the shore by a wide stretch of water; then the river is crossed in boats. No toll is taken: the neighbouring villages support the monastery and maintain the bridge as payment of their revenue. The chains are stretched very tight and are fastened off by wrapping round huge bollards of wood built into the masonry of the piers. The width between the piers is 300 paces. The chains are formed of loops of iron a foot long, the diameter of the iron rod forming the loops is only one inch. Nem Singh could obtain no history of the bridge; he thought it the most wonderful structure he had ever seen.

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