

with the Teshu and Dalai Lamas, or to promote trade through the Himalayan Passes, cannot fail to add to our stock of geographical knowledge.

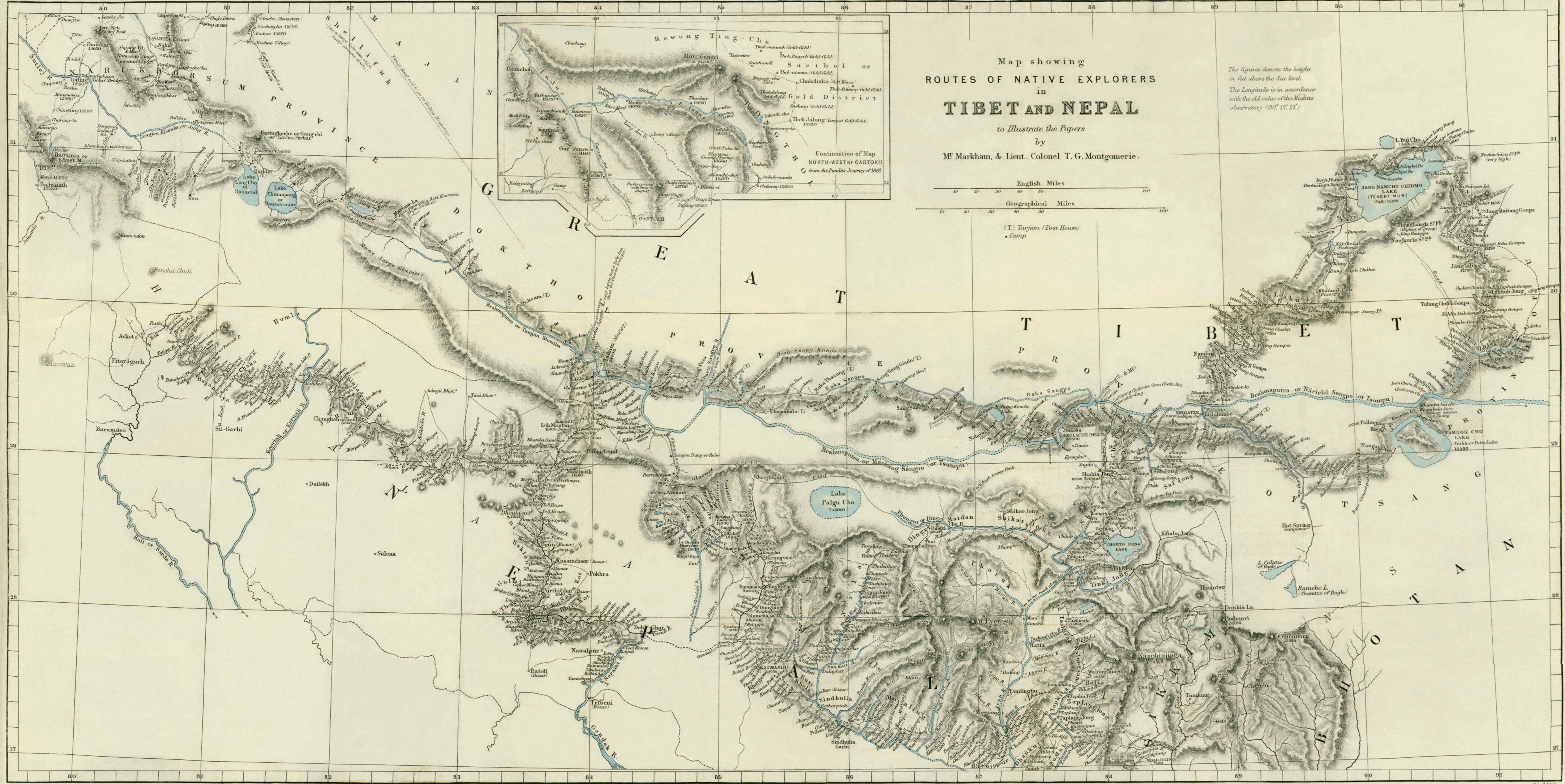
XI.—*Narrative of an Exploration of the Namcho, or Tengri Núr Lake, in Great Tibet, made by a Native Explorer, during 1871-2.*

Drawn up by Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., &c., Deputy-Superintendent G. T. Survey of India.*

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 four 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 Himalayas 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 in his place. This was managed satisfactorily after some delay.

The exploring party then passed from Kumaon into the Tibetan province of Hundes or Nari-khorsum. At first they got on very well, but towards the end of July, when in the neighbourhood of the Mánsarowar lake, their progress was for some time 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 Púrung, instead of going direct to Shigatze from Mánsarowar, as first arranged. The party reached Shigatze on the 24th of November, and remained there twelve days, making inquiries as to the best route to go to the Tengri Núr Lake, and preparing for the journey. Sheep were the only animals likely to stand the journey, as the roads were too stony for yáks, and the country was too cold for donkeys; the explorers consequently purchased fifty sheep, and put all the baggage on their backs. The party left Shigatze on the 6th of December, marching as far as the "Naisáng" village; on the 7th they crossed the great Brahma-

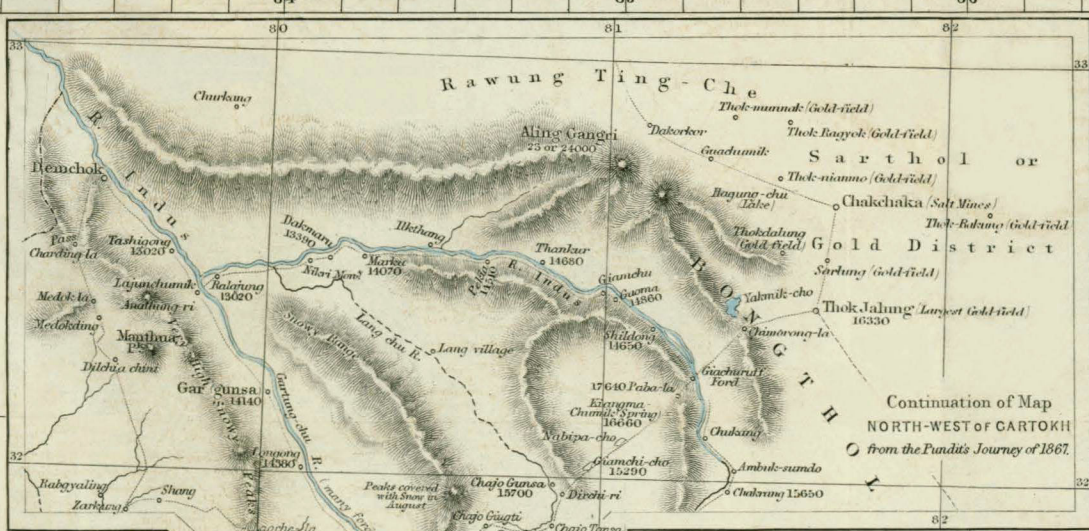
* *Vide* Map, p. 299.



Map showing
 ROUTES OF NATIVE EXPLORERS
 in
TIBET AND NEPAL
 to illustrate the Papers
 by
 M^r Markham, & Lieut. Colonel T. G. Montgomerie.

The figures denote the height
 in feet above the Sea level.
 The Longitude is in accordance
 with the old value of the Madras
 observatory (80° 17' 21").

English Miles
 0 10 20 30 40 50 100
 Geographical Miles
 0 20 30 40 50 100
 (T) Tarjam (Post House)
 • Camp



putra (Sangpo or Tsampu) River by means of rafts, and encamped at Peting village, on the left bank of the river. Peting has about thirty houses. The next day they put up at Chua 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 of December they reached Dongdot-lo, a village on the right bank of the Shiang Chu, a northern tributary of the Brahmaputra; here they found an official from Shigatze, who rules over Dongdot-lo and the surrounding villages, which are numerous. On the 13th of December they reached Chom, a village of fifty houses, with a Buddhist monastery (Gonpa) 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 Shiang Chu River; here there is a large monastery, with about 500 Lamas, 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 bazaar in the centre. The Sokpo Giájú tribe, who bring salt, trade through this bazaar, 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 of December the party reached Kholam village, on the left bank of the Shiang Chu River, which was crossed by means of the iron bridge; Kholam has about fifty houses, the land round about is very productive. On the 19th they reached Gonkiáng, a village of sixty houses, with a well built monastery on rising ground. In this monastery there are about 100 Lamas, ruled by a Lama of high rank, called Churingboche, who is very much respected by the people round about.

On the 20th of December the party halted at another monastery, called Rabdan Chuling Gonpa, built about eighty years ago; it is the residence of another high Lama, called Shaptung Ringboche, 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 Lama, 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 of December, it was so cold that the mercury of his thermometer did not rise out of the bulb till after nine or ten 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 five days in order to repair the damage. On the 26th of December they marched on and reached Gunje; the people of this village said white bears, called "Tik-Dumba," were very common from thence to Namcho Lake, and committed great havoc amongst their cattle.

On the 27th of December he reached Naikor, which has about thirty houses, and some cultivation; beyond Naikor there was no more cultivation, and the only inhabitants are nomadic, going by the name of Dogpá; they graze sheep, goats, and yáks.

On the 28th of December the explorer encamped at Chutang Cháká, where there are some fifteen 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 are eight 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 Dogpá tents at a short distance from the springs.

From the Brahmaputra River near Shigatze up to these springs the country is called Shiang Lungba, and that to the north Lahú-Lungba.

On the 29th of December the Chaping encamping ground was reached; here there were more Dogpá tents; the road was so slippery with ice that one of the men fell and broke a thermometer. On the 30th of December they arrived at Peting Chuja, near which, on the right bank of the Lahú Chu 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 forty or fifty 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 forty or fifty feet in 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 Jáwar Gonpa monastery lies about three 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. Jáwar is the name the Tibetans have for Suket-Mandi, in the Panjáb hills, north by west of Simla. This, according to a tradition, was given in honour of a daughter of a Rája of Suket-Mandi, who was supposed to have married "Laban," one of the idols.

On the 31st of December the encampment of Sulung Sumdo was reached; here they found some forty tents. On the 1st of January they halted at Sulung, which boasts of fifty Dogpá tents. The Dogpás said there were no regular encampments beyond Sulung, the only people about being thieves on the lookout for plunder, against whom it would be necessary to be on their guard.

On the 2nd of 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 Lahú Chu River. The water from these springs is so hot that the river is not frozen for about three 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 sixty 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 thirty 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 three 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 of January they reached Dung Cháká, 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 Jhomo Gangar, somewhat of the same shape as the Kailás Peak, near the Mánсарowar; it is a noted object of worship, being considered as a female divinity. On the 7th of January they

encamped at the foot of the Khálamba Lá, 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 goat's 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 Cháká; 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 of January they reached Kiang Lá, and on the 11th Dokmar encampment, where the Dogpás generally keep their sheep, goats, &c., during the summer. On the 12th they encamped on a plain, and on the 13th reached the Gháiká camping place, from whence they got a view of a very large lake, which they found was called by the Tibetans Jáng Namcho Chidmo, and supposed to be called Tengri Núr in the Tartar language. A camp of several tents was seen to the east, at a place called Dungche. 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 Dogpás, 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 Lhásá, by the Ninjinthanglá, to Jáng Hiangpa Chan Gonpa (monastery), and thence by the Tulung Chubu Gonpa (monastery) to Lhásá.

One mile north of Gháiká the road crosses the Gháiká Chu, a large river, which coming from the west flows into the Jáng Namcho Chidmo 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 of January, after crossing the Gháiká Chu River, the explorer reached a place called Chákri, which is surrounded by a ten feet high wall, enclosing a space about 200 paces square. There were several houses of sun-dried

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 Simjam, where they found about seventy Dogpá 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 Jámaáta De, which lies to the north. Jámaáta De is said not to be under Lhása, and the inhabitants consequently plunder the Lhása districts 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. Simjam, being one of the nearest places to these freebooters, has very often been plundered.

The party were detained two days at Simjam owing to heavy snow, and did not start again till the 21st of January, when they marched to Tára on the shores of the great Namcho 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 Dorkiá Lúgu Dong, situated on a small hill overlooking the lake. "Dor" means a rock, "lúgu," a sheep, "dong," a face; the monastery looking something like a sheep's head.

A chief Láma lives here with some forty ordinary Lamas. 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 Dorkiá 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 Phámo. The explorer determined to make a complete survey of the lake, and he consequently deposited his property in the monastery with three of his men, being afraid of robbers; having done this he started off with three other of his men; on the 24th January they reached Ringa Do on the margin of the lake; here there is another island, called Kuhi Ne Dobo, close to the shore, which is about $1\frac{1}{2}$ mile in length by about 1 mile in breadth.

On the 25th they reached Jádor Gonpa (monastery). Here they saw three pyramids or cones of earth, or sun-dried mud, each about 500 feet in circumference, rising to a considerable height. The explorer went under these mounds by an artificial

passage 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 LÁma, who used to worship under one of these mounds, died, he was taken up into heaven through the opening. The Jádor Gonpa has about fifty LÁmas. Near the monastery there are a great many fossil stones which are held in veneration; they are called "Naidhowa." The explorer saw a gigantic doorway cut in a rock through which the LÁmas say the god Ninjinthanglá passes; its height is about 25 feet. Owing to heavy snow the explorer was detained two days at Jádor.

On the 29th they reached Nángbá 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 Lángdang; here they found the Shukpá bush very abundant. On a low hill there is a temple of a god called Chogo LÁ. 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 Chu, 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 Tashí Doche Gonpa, a monastery which is on a low hill near the lake; it has thirty-five LÁma monks. To the south-west of this monastery there are a number of magnificent snowy peaks which are called the Ninjinthanglá peaks. The LÁmas 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 Tashí Doche there is another mass of high peaks called Nuchin Gásá, which appeared to the explorer to rise higher above the Namcho Lake than the Kailás peak does above the Mánсарowar 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 shells 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 Dorkiá, 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; in the morning they found they were well covered with fresh snow. On the 5th they went on to the Gháiká Chu 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 Simjam 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 of February they reached the Dorkiá monastery from which they originally started, having been fifteen days in making the circuit of the lake. They halted three days at the monastery, and started off on the 11th, getting that day as far as Ringa Do; on the 13th they reached the Jádor Gonpa before mentioned, and on the 14th Nángbá Do. Here the explorer heard there was a lake called Bul Cho, about six or seven miles to the north; he accordingly climbed a peak in that direction and saw the lake. He estimated it to be about six miles by five. 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 Lhásá and Shigatze 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 Lángdang, on the 16th Dakmar, on the 17th the plain of Cháng Pháng Chujá, where there are several hot springs in which the thermometer rose to 130°. On the 18th as they were about to start, some sixty armed men arrived on horseback and begun 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 Namcho Lake to the north as far as the city of Sinning, 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 Lháśá, 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 of February they went as far as the banks of the Nai Chu River; 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 they were exposed to the snow and wind, which blew very hard.

On the 22nd they reached Dam Niárgan Lá. 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 Niárgan Lá Pass. After crossing they decided to kill one of the 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 six 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 Niárgan Lá there is said to be a road to Lob Núr, and to Jilling or Sinning. From Dam Niárgan it is about ten days' journey to Nákcukhá, a place that has a bad reputation as to the number of robbers who prey upon travellers; from thence it is about forty-five 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 Núr (? Koko Núr) Lake is in the Sokpohuil territory, and close to it is the town of Kharká. It is about fifteen days' journey from Sokpohuil to Sinning city, where a Chinese Anban, a man of considerable authority, resides. Sinning is described as being very superior to Lháśá, good horses, sheep, &c., are procurable, and the shops are well supplied with silk, woollen articles, carpets, &c.

On the 26th they halted under the Cháná Lá Pass; the country up to this point was called Dam Niárgan. On the 27th they halted at Angchusa, where they noticed six Dogpá tents. On the 28th they reached Láchu Sumna, the extremity of the Bádam district which begins at Cháná Lá.

The Uirong district extends from Láchu Sumna to Dhog Lá. On the 29th they reached Siwalungi Ritu Gonpá (monastery), which has some sixty Láma monks. Here the height was observed by boiling-point, but owing to the loss of his quicksilver, when robbed at Cháng Pháng, the explorer was unable to take latitude observations; he however hoped

that on reaching Lhásá 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 Lá Pass, encamping on the other side; the district of Jáng Tálung extends from the Dhog Lá to the Chak Lá Pass. On the 2nd they reached the very large monastery called Jáng Tálung, which has two head Lámas 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 Lhásá to Lob Núr (?) and Jiling (Sinning) passes about one mile south of the monastery. The Sinning Kafilas pass by this route with their camels laden with merchandise. On the 4th of March he crossed the Chak Lá Pass, and encamped at its foot on the opposite (south) side, near the village of Lángmo, where they saw the first signs of cultivation that they had met with since the 29th of December. On the 5th they reached Jhokár Churtan; on the 6th Naimár village, which has about twenty houses, surrounded by a number of smaller clusters of houses. On the 7th they reached the monastery of Nehlin Dák; on the 8th, after crossing the Phembu Gong Lá Pass, they halted at Lingbu Jong. The Phembu district ceases at the pass of that name. On the 9th of March the party reached Lhásá; they were excessively glad to get back to a civilised 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 Lhásá 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 Sinning as he had intended; with the greatest difficulty he managed to borrow 150 rupees from a trader who was going to Gartok, 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 headquarters of the Great Trigonometrical Survey in safety.

Memorandum by Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S.,
&c., on the Results of the above Exploration.

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. long. 83° to E. long. 93°, and I have consequently, from time to time, tried to get more information as to this *terra incognita*; but since the Pundit made his way from Kumaon to Lhásá, 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 Mánсарowar Lake. One explorer made his way from Rudok, on the Pangkong Lake, to Thok-Jalung, and thence back to the Mánсарowar, passing quite to the east of the great Kailás peak. The same explorer subsequently made his way to Shigatze, 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 Shigatze and Lhásá.

The preceding 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 Shigatze, at least 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 Shigatze; there they, as directed, made inquiries about the Tengri Núr 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 Shiang Chu tributary of the river, the party day by day got into still higher

ground, until they reached the Khálamba Lá 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 Núr Lake, which was found to be about 15,200 feet above the sea.

For eight 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. Naikor was the last village with cultivation; northward they were informed they would find nothing except the camps of "Dogpás," 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 Namcho 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 $\frac{3}{4}$ °. 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 Núr, 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 fifty 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, 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, Jáng Ninjinthanglá, 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 six miles in length, which he was told was called Bul Cho from the borax (bul) which is produced there in large quantities, supplying both Lháśá and Shigatze with most of the borax that they require.

The Namcho Lake is considered to be a sacred place like the Mánsarowar 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 Lámás 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 Sindh and Panjáb nummulitic fossils yet described, but they come near them; there is a small *Fusus*, two specimens of 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 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 Pundit on his first journey remarked on the stone, bones, shells, &c., that he saw in the Lháśá bazaar, 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 Lángdang the Shukpá 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 J^ama^ata De, the district north of the lake. These robbers stripped the party so completely that they were forced to make their way to Lh^as^a as fast as they could. They were very nearly starved to death, and underwent very great hardships before they got there.

In Lh^as^a 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 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 L^amas of the Namcho 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. J^ama^ata De (De means district), immediately north of the lake, is not under the Lh^as^a Government. It must be even more elevated than the country about Namcho, 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 J^ama^ata people are a lawless set, and always try to make up for any such losses by robbing their neighbours about Namcho, Simjam, &c., and where cattle thrive better. Lob N^ur was said to be 2½ to 3 months' journey north of Namcho. It was not clear from the explorer's account whether this was the Koko N^ur Lake or some other lake more to the west. The route ran north from the east end of the Namcho, leaving at a camping-place called Dam Ni^argan. From this point N^akchukh^a is distant 10 days' journey, and has a very bad reputation as to robbers. From N^akchukh^a it is 1½ month's 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 N^ur, near which is the town of Khark^a, the residence of a great L^ama called Jipchun Ringboche, who rules over the Sokpohuil country. Khark^a is said to be above 15 days' journey from Jilling or Sinning-fu, the large city near the north-western end of the great wall of China. Jilling was well-known to the people about Namcho, who admit that it is larger even than Lh^as^a itself.

The great northern road called the Janglam, which runs far

north of the course of the Upper Brahmaputra River, passes by the Namcho or Tengri Núr Lake, and from thence by Shellifuk Lake to Rudok on the Pangkong Lake, east of Leh, the capital of Ladák. The route followed by the explorer from Dam Niárgan to Lhásá 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 Núr, and thence through Sinning-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 Lhásá and Sinning-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 Namcho is evidently the lake referred to in old maps as the Tengri Núr. 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 Shigatze and Lhásá, as determined by this route survey, is nine minutes less than that deduced from the Chief Pundit'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 7000 or 8000 feet above the sea, yet in the neighbourhood of Shigatze (at Peting), which was previously known to be about 11,000 feet above the sea, the aneroid observation indicated an altitude of nearly 4800 feet higher. The aneroid observations, on the average, give altitudes 4631 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-Jalung 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 Ladák, 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 movable 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 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 Shigatze, thus adding to our knowledge of its actual course; no iron suspension bridge was however seen there, such as Turner supposed to exist near Shigatze. The explorer was much struck with the magnificent glaciers to the south of the Namcho, or Tengri Núr 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.

XII.—*Journey to Shigatze, in Tibet, and Return by Dingri-Maidan into Nepaul, in 1871, by the Native Explorer No. 9.*
By Lieut.-Colonel T. G. MONTGOMERIE, R.E., F.R.S., &c.,
Deputy-Superintendent G. T. Survey of India.*

THE native explorer whom I designate as No. 9, for one portion of his work, made his way from Dárjiling, passing through Sik-

* *Vide* Map, p. 299.

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