

Some Geographical Observations in Western Tibet.

By S. R. KASHYAP.

The present paper describes some of the more important observations connected with the geography of Western Tibet, which are either new, or amplify, or correct the observations of previous travellers. I visited the country first in 1922, and then a small portion of it in 1923, and then again quite a large portion in 1926. The observations recorded in this paper relate to the first and the last journey only. I would like to say that these journeys were not undertaken for geographical exploration, nor did I take any equipment for this purpose with me. The observations were made only incidentally and the equipment consisted of a photographic camera, a compass, a measuring tape and a hypsometer with a few thermometers.

In 1922, I had four professors of the Khalsa College, Amritsar, with me, *i.e.*, Professors B. R. Chatterji, Kashmira Singh, Charan Singh and Harkishen Singh. In 1926, I travelled alone, with two servants.

By Western Tibet we understand the country to the north of the Himalayas, situated along the Sutlej, the Indus, and their tributaries, extending from the watershed between the Sutlej and the Brahmaputra westwards to Kunawar in Bashahr State. This paper relates only to the upper Sutlej valley and does not include the Indus valley. This country is exceedingly interesting in many ways. It is situated at a very high altitude, and some of the portions are amongst the highest inhabited parts of the world. The climate is exceedingly rigorous, being very dry and cold, and is characterised by very strong dry cold winds. On account of the very high wall of the Himalayas the monsoon does not penetrate into the interior, and consequently there is very little rain-fall. Even in winter the snow-fall is not much, but the temperature falls very low, and the dry cold is intense. As a consequence of this the fauna and the flora are represented by very few species; the species present, however, are characterised by very interesting features.

The country is also interesting on account of the sanctity in which it is held by the Hindus and the Buddhists all over Asia because of the holy lake, Manasarovar, and the famous mountain, Kailas, which are held sacred by the followers of both religions.

The third reason which makes the country very important lies in its hydrographical characters. Round about the Mana-

sarovar lake lie the sources of four great rivers: the Indus to the north, the Brahmaputra to the east, the Karnali to the south, and the Sutlej on the west.

On account of all these important features the country has had a great fascination for travellers; but the difficulties of travel are so great on account of the rigorous climate, desert nature of the country, lack of provisions and even fuel, that very few foreigners have been able to penetrate into it. Even the people of the higher Himalayas who go there to trade with the Tibetans at the few trade marts, do so only during the short summer, as the passes are closed during the rest of the year, and therefore the trade marts are also deserted except for the short period of two months or so and in some cases even less.

Sven Hedin in his "Southern Tibet" has given a very comprehensive account of the history of travel in this region, and so great is the importance of this region that out of four volumes of his work dealing with this subject more than 2 deal with the Manasarovar region. Father Desideri is said to be the first European to see and describe the Kailas in 1715. Moorcroft visited Manasarovar in 1812, Strachey travelled in this part in 1846, Rawling and Rider passed through this region in 1905 on their way from Lhasa to Simla, Sven Hedin spent a good deal of his time here between 1905-07, and Sherring paid a short visit to the country in 1907. These are the chief travellers who have left records of their journeys.

In 1922, I entered the country from Bians *via* the Lipulekh Pass, 16,780 ft., which I crossed on the 19th July; thence I went to the trade mart at Takla Kot, thence to the holy lakes Rakastal and Manasarovar, then a little to the north to the Kailas, and after going round it went westwards to the trade mart at Gyanima, thence to the famous monastery at Tholing which is the biggest monastery in Western Tibet, and then re-crossed the Himalayas by the Mana Pass, 17,890 ft., on the 23rd August, reaching Badri Nath, the well-known place of pilgrimage in Garhwal. Thus I spent five weeks in the country and travelled about 250 miles from east to west.

In 1926, I entered Tibet again by the same pass but this time passing through the Darma Valley. I entered Darma a little above Dharchula, went up the Darma Ganga and crossed into the Kali Valley by the Joling Kang Pass, which is exceedingly steep on the Darma side and is one of the most difficult passes that I have crossed. I crossed the Lipu Lekh Pass on the 10th July. After this, passing through Takla Kot, visiting the two lakes and circumambulating the Kailas, I visited the very unfrequented monasteries of Dolchu and Tirthapuri and reached Gyanima. From here I re-crossed the Himalayas into Johar (Almora District) by the three passes Kungri Bingri, Jayanti, and Unta Dhura. The three passes have to be crossed

in one day and this was done on the 6th August. Thus I spent nearly 4 weeks in that country.¹

After these introductory remarks I take up some of the more important observations made during these two journeys. The observations fall into 4 groups, namely:—

1. The source of the Sutlej and the channel between the Manasarovar and the Rakastal lakes.
2. The circumambulation of the Kailas with special reference to the Dama La and Gauri Kund lake.
3. The hot springs at Tirthapuri.
4. The three passes to Johar.

1. THE SOURCE OF THE SUTLEJ AND THE CHANNEL BETWEEN THE MANASAROVAR AND THE RAKASTAL LAKES.

As is well known these two lakes are situated side by side at an altitude of about 15,000 ft., the eastern one being known as Manasarovar or Mabang in Tibetan and the western Rakastal or Lagang in Tibetan. For a long time, there has been a great controversy about the channel connecting these two lakes but it is now generally accepted that a channel does exist between the two lakes though it has been occasionally denied. The only question of importance is whether the channel contains water at fairly frequent intervals or not. Sven Hedin has given all the historical information available up to 1913, in his "Southern Tibet." Strachey who visited the place in October 1846 states that he came upon a "large stream 100 feet wide and 3 feet deep, running rapidly from east to west, through a well defined channel. This was the outlet of Manasarovar". Rider visited the same part in 1905 and says:—"Skirting the lakes we rode across the low hills, which close in on the western side, to look for the outlet, which Moorcraft had not been able to find, which Strachey had found, and Mr. Savage Landor had claimed to have discovered did not exist. We struck the channel a mile below the outlet, a small stream only partly frozen over, this we followed up and found that it did not flow from the lake but from a hot-spring, at which we found and shot some Mallards. We then followed a dry Nullah to the lakes and proved that Strachey was, as was to be expected, quite correct. No water was flowing at this time of the year, but the local Tibetans all agree that for some months in each year there was a flow during the rainy season and the melting of the snows, *i.e.*, about from June to September. As a rise of about two feet in the level of the lake would cause water to flow down the channel this appears quite worthy of the belief. The length of the

¹ Mr. H. Rutledge, I.C.S., then Deputy Commissioner of Almora, was on an official visit in Western Tibet this year and we travelled together for many days.

channel between the two lakes is about three miles". Rawling did not visit the lake, nor did he pass along the bridge between the two lakes.

The fact is that the Manasarovar lake, more or less oval in outline, is surrounded on all sides by mountains, except for a gap at its north-west corner. The ridge between the two lakes is not very high. At the place where the gap begins there is a monastery (Jiu monastery) perched on a cliff on the northern side of the gap, the ground consists of gravel, and water could certainly flow from the Manasarovar lake to the Rakastal lake through this gap. In 1922, on the 28th July travelling from Gossul-Gompa along the bank of the Manasarovar lake for a few miles and then turning to the left I crossed this channel at some distance from Manasarovar, where there are some hot-springs forming a small stream flowing west. Our party crossed this stream by a small bridge, but there was no water coming from the Manasarovar. In 1926, I camped on the bank of Rakastal on the 17th July. Next day I crossed the intervening ridge to the Manasarovar, and camped on its bank near Gossul-Gompa. From this camp I went along the bank of the lake northwards and camped near the bank under the Jiu-Gompa, just at the beginning of the channel. The ground near the bank at this place consists of gravel as already stated, and scattered here and there from the bank of the lake along the bed of the channel were several small ponds. The first pond was at a distance of 50 feet from the margin of the lake. The water at the north-west corner was shallow for a long distance along the bank (more than a mile) and far into the interior of the lake. The ground separating the nearest pool from the lake was not more than 6 inches above the water and it was clear that a rise of about 6 inches in the level of the lake would make the water flow into this pond and then to the next, and so on a continuous stream would be formed. At this corner the gravel formed a plain about $1\frac{1}{2}$ miles long along the bank and bounded by low hills which converged to the channel between the Jiu-Gompa and the opposite hill. The distance between the bank of the lake and the foot of the gompa hill is a little more than half a mile. Next day I travelled for a long distance along a path more or less parallel to the channel and camped at Barkha. Sherring states that the channel is about 3 miles. Sven Hedin makes it 6 miles. So far as I could judge the channel is about 3 miles long.

Meteorological observations on the bank of Manasarovar near Gossul-Gompa were as follows :—

Time : 7-15 A.M., 19th July, 1926, weather calm and clear.

Air temperature	..	..	9°·5 C.
Temperature of lake water	..	..	8°·9 C.
Boiling point	..	..	85°·0 C.

So far my own observations. I was, however, told by very reliable people, Bhotias (Bians people), whom I had known for some years and who had been in Tibet in 1924-25 that the channel contained water flowing from the Manasarovar to the Rakastal in both these years. A lady, well-known, both in Bians and Johar and who had been to the Manasarovar lake no less than seven times told me that in 1924 she had actually crossed that stream on a yak along with other people and that the flow was so swift that she was afraid of being washed away and that the water came up to the abdomen of the yak. Similarly, my guide in 1926—a man from Gunji (Bians)—told me that he had crossed the stream in 1925. I am in a position to add to these statements still more recent information. Last summer (1928) a professor from a Lahore College went to Western Tibet, visited Manasarovar, went round the Kailas and followed my route of 1922. He tells me that in the middle of August 1928, he crossed the channel between the two lakes in which a stream about three feet deep was flowing. The name of the gentleman is D. P. Rai, and he formerly belonged to the Dev Samaj College.

It is clear, therefore, that whatever the conditions may have been formerly, there has been a connection between the lakes during recent years, *i.e.*, 1924, 1925, 1928, and that in 1926 a rise of six inches in the level of the lake would have made the water flow in the channel. Sir Sydney Burrard, considering the evidence available up to 1907, decided that year to include the lake basin of Manasarovar in the catchment area of the Sutlej. The evidence available since that date, as stated above, certainly confirms his conclusions.

There is no evidence whatsoever that any water has flown out of the Rakastal for a very long time. It is probable, however, that there is an underground flow of water from the eastern to the western lake and from the latter into the source stream of the Sutlej. The amount of the water flowing into the Manasarovar from the Gurla Mandhata and the other surrounding mountains is considerable, and as there is no outlet from the Manasarovar in some years, it is difficult to believe that evaporation alone can account for the loss of an equal quantity of water. There must be some underground flow, and this belief is confirmed by the presence of stagnant water in the channel itself. Some miles to the west of Rakastal at Lalingta I found a very small stream of water flowing westward, broadening into a fairly large pond at this place, but after some distance ultimately disappearing into the soil. In 1926, again there was no flowing stream along this channel above Dolchu which is about 20 miles from the foot of the Kailas. I was repeatedly told by the people that between Rakastal and Dolchu flowing water appears and disappears repeatedly. At Dolchu itself the Sutlej is quite a regular stream, which flows on uninterruptedly further on. This would indicate that there is an

underground flow from the Rakastal. In 1926, I crossed this stream at Dolchu where it was 5 to 10 feet wide and 1 to 1½ feet deep. There is a very small spring just under the monastery here and I was told that a much bigger spring a little higher up is the main permanently visible source of the stream.

2. CIRCUMAMBULATION OF THE KAILAS.

Going round the Kailas is considered an act of great merit and of course all pilgrims go round bare-footed. The circuit takes about 2½ days and I have come across people who had done this circuit 10 times. There was one man from Lhasa, who was staying at Darchin, at the foot of the mountain, to complete full 12 rounds, which would take about one month. I have done the round only twice. Some *sadhus* and devout people measure the length with their body, lying prostrate, and as the path is very rough and stony it is an exceedingly austere performance. The Kailas peak is conical, 21,800 ft. high, covered in its upper portion with perpetual snow, and has absolutely vertical walls in the lower parts. The peak is not actually on the long range of mountains known as the Kailas range, but is situated a little to the south of the range with which it is joined by a high ridge about 18,600 ft in altitude at the lowest place. This ridge has to be crossed in going round the mountain. Sherring thinks that the circuit is about 25 miles but he did not actually go round the mountain; Sven Hedin makes it about 30. My own estimate is 29 miles. During the circuit one meets with four monasteries on the four sides of the mountain. The circuit begins from the south side at a place called Darchin, though the actual first monastery is situated higher up in the interior and rather less than a mile above Darchin. It is very seldom visited by pilgrims, and Sven Hedin himself, who gives a very detailed account of the whole circuit around the mountain, says that he did not visit it. This monastery is called Kiangda (also spelt by different people as Gyangta). I visited this monastery on the 24th July, 1926. Unlike the other monasteries which are built in the side of the mountain it is situated on an eminence and has a commanding position. It is a solid, substantial, square building and undoubtedly the finest and the best furnished of the four monasteries. The monastery has some old armour, helmets and swords, in addition to the usual paraphernalia. The circuit of the mountain is usually done in a clock-wise manner. From Darchin the next monastery, the Nyandiphu, is four miles. After going north-west for the first two miles the road turns to the north. This second Gompa is perched along the vertical side of the rock and has two big elephant tusks inside. It is situated in a very perilous position as there is a danger of the rocks falling from above. I was told that some years before a big rock did

actually fall down and destroy a part of the building. Just before the Gompa there is a gateway and a little beyond this two small wooden bridges on the stream coming from the north are crossed to reach the Gompa. From here the road runs on both sides of the stream. The road up to this monastery is on good firm ground, but further on it becomes stony. The valley is fairly open, but the rocks on both sides are steep and vertical, of a sepia colour, and there are small water-falls coming down from them. The rocks have fantastic shapes, resembling forts, battlements, etc. From Nyandiphu-Gompa the road runs straight north for about 5 miles, then it crosses two branches of the stream coming from the north, from the Dungdung pass beyond which is the country watered by the Indus. Both the streams had to be forded, though the second had a small bridge formerly; this was, however, broken at the time, though there was another bridge higher up. The Kailas peak had been visible up to the Nyandiphu-Gompa, after which it was mostly hidden and only occasionally visible. Its western face had a lot of snow. A cornice at the top could be seen projecting like the edge of an umbrella. After crossing the stream the road turns to the east, and the Didiphu-Gompa is a little more than a mile from here. I was now north of Kailas. The north face of the Kailas is extremely steep, with very little snow and formed of a vertical black rock. I camped just below the Gompa. Here there is a huge piece of rock with the Tibetan prayer, "Om mani padme hum" engraved on the surface. The ground at this place forms a rectangle with more or less parallel sides. On the west the straight wall has at its base the stream mentioned above coming from Dungdung and which I had crossed just before reaching this Gompa and which joins the stream running along the base of the Kailas first westwards and then southwards. On the east, one sees a similar wall again with a stream coming from the north and joining the Kailas stream. At the back on the north there is another straight wall with the Gompa in front. On the south there is the Kailas with its snow-covered top and black surface below, with patches and lines of snow. In front of this cone to the north on each side there is a smaller bare conical hill. The west one ends at the stream up which I had travelled and a small stream flows between the Kailas and this conical hill. Another stream flows on the east side of the eastern cone. Beyond this last stream there is another elongated (north-south), rather truncated hill with one more similar but much more elongated (north-south) and snow-covered hill lying still further with streams on both sides. The eastern wall of the rectangle as seen from the monastery appears to end near the last but one southern ridge mentioned above; the last southern ridge is a little beyond this and is not visible from the monastery. All these streams from between these gorges unite and flow in front of the camp in a fairly

broad stream. In going to the next stage one has to cross the stream coming from the north and then go up the small stream to the east of the last ridge. At the Didiphu-Gompa camp on the 23rd July, 1926, the meteorological observations were as follows :—

Time	..	..	..	8 A.M.
Air temperature	..	..	..	7°·2 C.
Boiling point	..	..	..	83°·6 C.
Weather	..	..	..	Calm and clear.

In 1922 when I camped at this place on the 30th July we had a fairly heavy fall of snow at night and hail and rain for part of the journey next morning. During a large part of the journey that year it had been cloudy and rainy, and although I had a fine view of the Kailas at Barkha, a few miles before Darchin, I never had a glimpse of the mountain after that because either I was too near it or it was hidden by clouds. In 1926 except for a few drops of rain and some small hailstones near the Nyandiphu-Gompa it was perfectly clear up to Gyanima.

From Didiphu the next stage, the Zuntu monastery (called Zutulphu also), is about 13 miles over the Dama La (written by some as Dolma La), which is on the ridge that joins the Kailas peak to the Kailas range. The height of this pass is given as 18,599 ft. Of this stage Sven Hedin gives a full description as usual, but since his observations do not coincide with mine I will quote at some length from him. "Southern Tibet" Vol. IV, p. 373, has the following, "Sherring gives a short description of the pilgrimage around the Kailas, but it does not appear from his narrative whether his communications are derived from his own observations or from the native informants. Nor does his map say anything as to his own route, for it has all the trade routes marked in red. Concerning the road from Tarchen (or Tarchan) and back to Tarchen, he says, the circuit is about 25 miles, *i.e.*, 40.2 km. In reality it is 48.4. His description is interesting as it was probably the single one existing before my journey. He says ("Western Tibet" p. 297 *et seq.*) 'The actual circuit round the holy mountain of Kailas—occupies on an average 3 days, the distance being about 25 miles. The path is not good, walking is absolutely obligatory, and the track rises in one place to a very great height, namely, to the Gauri Kund, which is a lake that remains frozen at all times of the year, even in the hottest weather. . . . ordinarily the first monastery visited is the one at Nendiphu (Nyandiphu). . . . The next monastery is at Didiphu (Diripu), and thence the road goes *via* the Gauri Kund frozen lake to Zutulphu (or Jamdulphu), (*i.e.*, Tsumtulpu). . . . Darchan is the spot where the circuit begins and ends.' The description is fairly correct. 'The very great height' is not at Gauri Kund but at the pass, Dolmala, 4 km. west of the lake. A

European who had made a journey would never have omitted to mention the pass which is by far the most striking experience the whole way around the Kailas”.

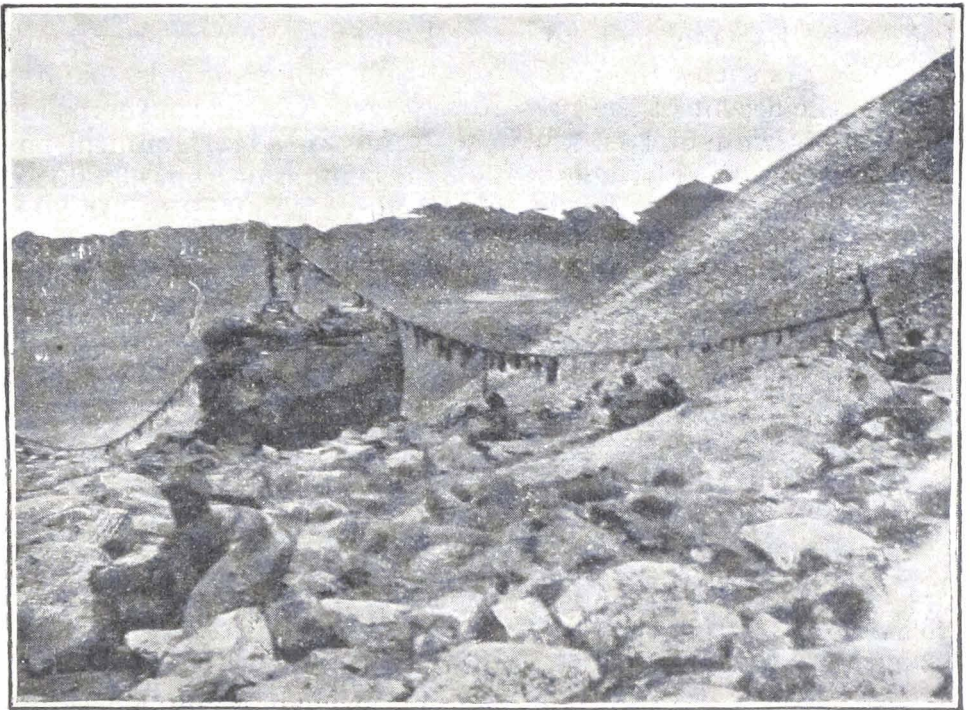
On page 375 we have:—“A moment later we reached the Didigompa with a gigantic block in front of it and the holy formula engraved on the surface of the latter. Here...the altitude is 5,091 m. The blocks lying about everywhere in the region consist of granite (quartzbiotite-biorite). The next day’s march on September 4, took us 17.5 km. S.E., E.S.E., S.E., and finally, S.S.W., around the northern parts of the Kailas massif. From Diripu-Gompa we had 1.3 km. S.E. to the pass Dolmala, one of the highest we had to cross on the whole journey in Tibet, being 5,669 m. high or 578 m. above camp. The rise is, therefore, if taken on a direct line, enormous, or as 1 : 2.25, which was the sharpest gradient I ever had. One had to ascend one m. for every $2\frac{1}{4}$ m. of road. As such a slope is too hard for riding animals, one has to take the ascent of the pass in zigzags. On the southern side of the pass we had 16.2 km. to camp CCXXXII, Tsumtul-pu-Gompa where the altitude is 4,863 m. being a descent of 806 m. and a fall of 1 : 20.1”. In “Trans-Himalaya,” Vol II, p. 201–202, no details of the distance of the journey round the Kailas are given. He simply states “From the pass we descended among boulders to the tiny round lake Tso-kavala”. “IN MY LIFE AS AN EXPLORER” page 425 (1926), he states, “From Dolmala our road ran steeply to the pool of Tso-kavala, which is always frozen over”. In “Southern Tibet,” Vol. IV, p. 413, he gives the altitude and the distances and among them are the following:—

Place.	Distance from last stage.	Altitude.	Rise or fall in metres.	Rate.
Diriphu-Gompa.	..	5,091		
Dolmala.	1.3 km.	5,669	Rise of 578	1 : 2.25.
Tsumtul-Gompa.	16.2 km.	4,863	Fall of 806	1 : 20.1.

It appears also that he had no intention of giving a description of the circuit of the Kailas, when he began writing his “Southern Tibet”. It was an after-thought. In the preface (Vol I, p. XII) he says, “My own journey has been described as succinctly as possible with indications only of its chief characteristic traits. Certain parts have not been mentioned at all. Thus, for instance, I have altogether omitted the voyage round the Kailas for the reason that I had given quite a sufficient account of its features already in my popular work “Trans-Himalaya.” Yet we find in Vol. IV, p. 371, the chapter entitled, “THE PILGRIMS ROAD ROUND THE KAILAS”, containing a detailed description.

Starting from the Didiphu-Gompa the road crosses the stream from the north by a bridge, after which there is a rather

steep ascent for about a mile to the east. After this there is about a mile of more or less level road in the same direction, then comes a mile of gentle ascent to the north-east, and then about a mile and a half of rather stiff ascent,—rather steep in the beginning but nowhere very steep—to the Dama La. The road always keeps on the right bank of the stream and curves round the first long ridge visible from the Gompa. Vegetation begins to decrease, specially at the fourth mile. The road is not particularly bad though it is stony with big and small boulders and stones. There was dense grass forming a thick carpet along streams lower down. After the third mile when the road turns to the right, it crosses a very small stream, coming from the



Dama La, 18,599 ft.

north-east and passing mostly under the stones. At the top of the pass there is a huge stone with flag poles on each side connected by strings with the flag poles on the stone. From the strings hang small pieces of cloth and wool as usual on passes in Tibet. From this stone onwards the road is level for 175 ft., to the edge of the pass. Immediately below this is the frozen Gauri Kund Lake. From the edge of the pass to the edge of the lake along the bends of the zigzag road the distance is 600 ft.; in a straight line, of course, it is much shorter. Thus the distance from the Didi-Gompa to the Dama La is not 1.3 km. as Sven Hedin says but 4.5 miles and the distance from the pass to the Gauri Kund Lake is not 4 km. (more than

13,000 ft.) as he says but only 600 ft. from the edge of the pass or at most 775 ft. from the huge stone with the flag pole, and the rise is not 1 : 2.25 as stated by him but very much less, 1 : 12.5 or 1900 ft. in 4.5 miles. The observations on the top of the Dama La on Friday, the 23rd July, 1926, were as follows :—

Time	..	..	12.15 P.M.
Air temperature	..	..	17° 6 C.
Boiling point	..	..	81° 7 C.
Weather	..	..	Clear and calm.

The lake appears oblong from the pass, but seen from the other places it is rather oval—broad towards the west end and narrower towards the east end ; the sides not quite regular, but with a small bend here and there and a rather large projection near the eastern part of the south side. The lake runs along the ridge to its south, which extends north-west to south-east. The middle of the ridge is concave and is perfectly vertical with a hanging glacier on the top. In 1926, there was very little snow. The northern bank of the lake is formed by a big mass of large and small stones and the road runs along this. This side is also concave inwards. When this stony mass meets the southern ridge there it a depression at each end. It is impossible to reach the south side as snow and stones are constantly falling down. The lake is shallow on the northern side but deeper on the southern. There is also more snow on the south and only a thin layer on the north. In 1922, my bearer and another member of the party had a bath here after removing the snow layers at a height of about 18,500 ft. The length along the bank from N.W. corner to the S.E. corner was 2,212 ft. The other side, of course, could not be measured, but appeared to be approximately of the same length. If the lake is taken to be roughly oblong then the length from the N.W. corner of the cliff to a big boulder under which people take shelter is 1,600 ft., and breadth from this place to the S.E. corner of the cliff 612 ft., but this, of course, is not an accurate estimate as the shape is oval, very broad on the western side and very narrow on the eastern side. The perimeter of the lake would thus be 4,424 ft., or about 4/5 of a mile. Beyond the lake the hills were crumbling on all sides, and the road was very stony for 2 miles, descending eastwards. After about 2 miles of descent, the valley opens into another coming from the north, and we followed the stream coming from this valley to the south. Going up the stream, the road leads to the Indus valley after crossing the watershed. The road runs along both sides of the stream but we kept to the right bank. A little further down there was a natural bridge of big boulders over the stream with the water flowing below them. There was a thick grassy carpet along the stream. The Kailas peak is just visible only from one place which is about

a mile down the bend to the south. Afterwards this valley opens out into another running east and west and the road turns west down the united streams and the last Gompa is about a mile from this place. The road after the first descent of 2 miles is practically level throughout.

From Zuntu-Gompa to Darchin, it is about 6 miles by the direct road but we went northwards and crossed a ridge running north and south to the Kiangda-Gompa on the other side, which is about a mile above Darchin. At Darchin I found a fossiliferous stone full of small shells.

3. THE HOT SPRINGS AT TIRTHAPURI.

From Darchin a road leads directly to Gyanima passing by Lalingta where there are some springs probably connected subterranously with the Rakastal and which I had visited in 1922. In 1926, however, I travelled westwards to the unfrequented Dolchu monastery, which is about 20 miles from Darchin. Starting from Darchin I camped at a place 5 miles off called Kalyab after fording the stream coming from the Kailas past the Nyandi-Gompa about 2 miles from Darchin, and other streams later on. Owing to very little snow the year before and no rain up to that time the vegetation was extremely scanty. The road crossed many ridges alternating with dry channels, some coming from the Kailas range and others simply from local eminences. At Dolchu there is a very small spring but I was told that there is a very large one at a short distance which is the chief permanent visible source of the Sutlej. The observations at Dolchu on 28th July, 1926, were as follows:—

Time	8.30 A.M.
Air temperature	10°.0 C.
Boiling point	85°.1 C.
Weather	Calm and dull
Temperature of the spring water	2°.0 C.

From Dolchu to Tirthapuri is about 20 miles due north-west. The Sutlej is crossed at Dolchu to the left bank simply by jumping across. It flows through a narrow channel in a wide grassy bed. About 2 miles down it expands into a lake, about 4 furlongs, by 2 furlongs with a good deal of *Ranunculus aquatilis*, *Zannichellia palustris* and *Potamogeton pectinatis* in water and *R. cymbalariae* and *Polygonum* species on the margin. Just after this a stream joins the river from the north (right bank) by many branches over a stony bed. The bed becomes stony and a little later narrow. At 5 miles or so the road ascends slightly leaving the bank and passes over a broad stony dry plateau for 2½ miles or so. Then the bed again becomes grassy with a narrow channel and the road goes down to the bank. About a mile and half from here the river passes through a narrow gate or gorge form-

ed by a much contorted yellowish rock on either side and meets another stream from a wide valley just before the gate. The road now passes to the right bank and the river has to be forded and the stream which is quite large is also forded. This stream is about 9 miles from Dolchu. The channel of the river and its bed are very narrow from here to Tirthapuri. The road goes high up on the right bank of the river and crosses a series of 3 terraces one after the other, the first smaller, the second larger, and the third larger still, and after a few furlongs descends again to cross another fairly large stream coming from the north. Then it ascends along a series of terraces and crosses a plain about 5 miles long to Tirthapuri, gradually descending again to the river bank. About 2 miles before the Gompa is reached there is a circular pit on the road with numerous mounds formed by piles of stones all round the margin as well as in the cavity. It is said to be the play-ground of the gods, and my Tibetans sat down inside this for a short time to meditate. Shortly before reaching the Gompa a dry channel is crossed and another immediately before reaching the Gompa. The Sutlej beyond Tirthapuri spreads out into a wide branched stream. There are hot-springs just beyond the Gompa above the right bank. The first one has the water gushing out through a main hole and 3 subsidiary holes. A little further there is another main hole with a few smaller holes. The temperature of the 2 main springs was suprisingly constant. The following were the observations as regards the temperature of the springs :—

7 P.M. 28th July, 1926	..	..	69°C.
7 A.M. 29th July, 1926	..	..	69°C.

Temperature reading after the bulb of the thermometer was pushed deep into the opening, 69°.5 C.¹

The temperature of the subsidiary holes was as follows on the same days :—

In the evening	..	..	67°.8 to 68°.8 C.
In the morning	..	..	67°.0 to 68°.0 C.

The observations at Tirthapuri were as follows :—

Time : 29th July, 1926	..	7.30 A.M.
Air temperature	..	9°.2 C.
Boiling point	..	85°.3 C.
Weather	..	.. Calm, clear.

There is a good deal of lime deposit round the place and calcification is going on round ropes, twigs, etc., which happen to be in the neighbourhood. There is also a great deal of lime deposit

¹ My large meteorological thermometer was broken while taking these observations.

at some distance above showing that the springs were in those places formerly. There is a tradition that the water came out from a place higher up above the monastery and this part of the hill is held sacred and the pilgrims circumambulate it while the monastery is not included in the circuit. There is a reservoir near the springs where the temperature is only 42°C. and where a bath can be taken by the devout pilgrims. So far as I know no traveller has given the temperature of these springs. Sven Hedin passed through Tirthapuri but he does not say anything about the temperature of the springs.

In going to Gyanima from Tirthapuri the Sutlej has to be forded at the latter place.

4. THE THREE PASSES.

The passes were crossed on the 6th August, 1926. On the 5th we had camped on the side of a stream which was too strong to be forded in the afternoon. Next morning we forded the stream. The observations taken at this camp were as follows:—

Time	..	..	..	6.30 P.M.
Air temperature	..	..	..	13°C.
Boiling point	..	..	..	84°C.
Weather	..	..	..	Clear.

From here to Dung across the passes is about 18 miles, and it is a long and rather trying stage. To the top of Kungri Bingri pass it is about 5 miles, then a very rough descent for a mile, then a gentle descent for a mile after which there is an ascent of 3 miles to the top of Jayanti, when again a descent and ascent to the top of Unta, about 3 miles, from which Dung is about 5 miles descent. The figures for these passes as given by Sherring are:—

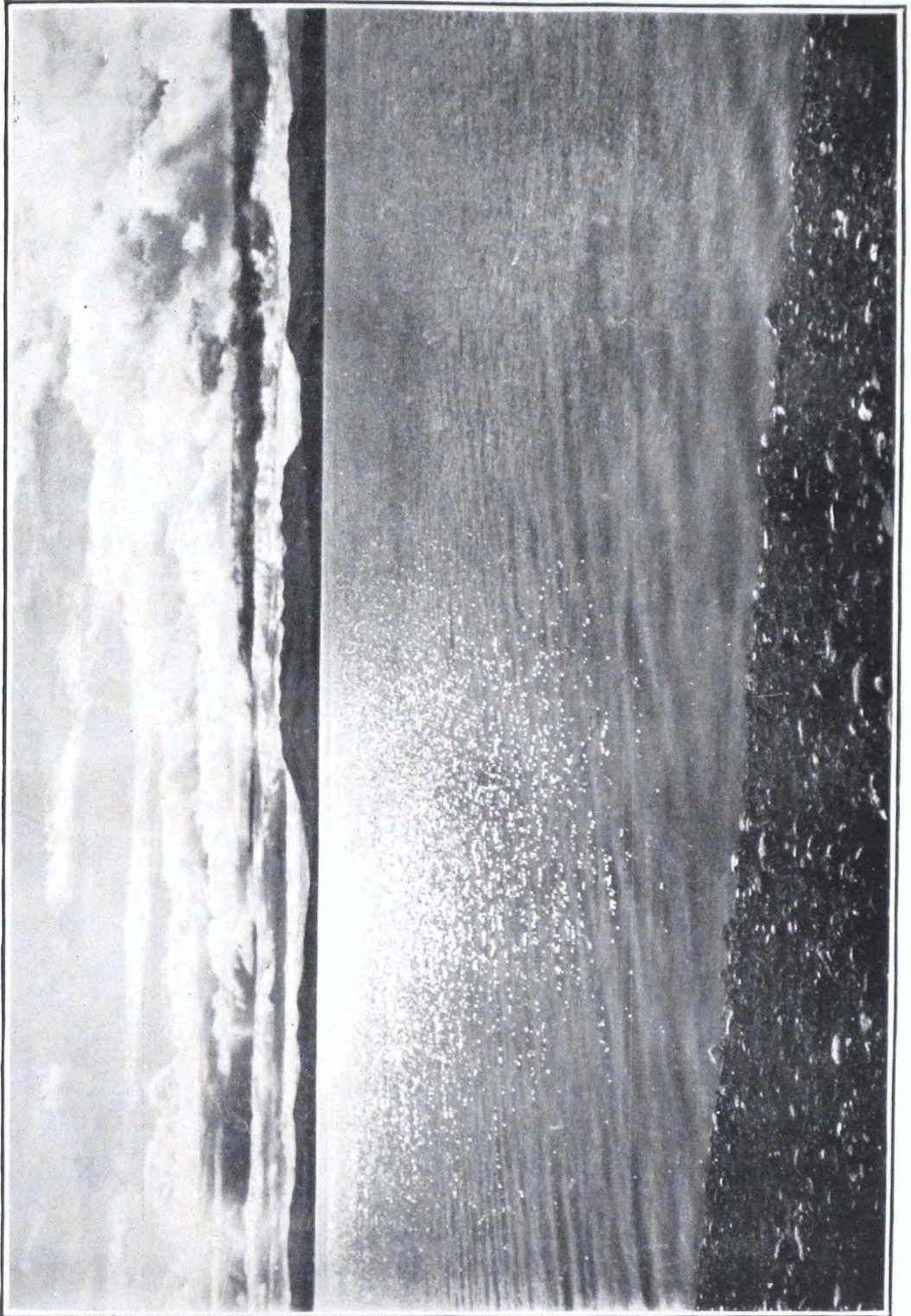
Kungri Bingri	..	..	18,300 ft.
Jayanti (Janti)	..	..	17,000 ft.
Unta Dhura	..	..	17,590 ft.

It was clear even without any hypsometric observations that the Jayanti pass is the highest and this conclusion was confirmed by the boiling point observations which are as follows:—

Pass.	Time.	Air temperature.	Boiling point.
Kungri Bingri	.. 9.30 A.M.	7°.0 C.	82°.0 C.
Jayanti	.. 1.00 P.M.	16°.5 C.	81°.8 C.
Unta Dhura	.. 3.00 P.M.	12°.0 C.	82°.8 C.

The weather was calm and clear throughout the day.

It would appear, therefore, that Jayanti is higher than the Kungri Bingri by about 200 ft.



Manasarover lake from Gossul-Gompa, Mayum la in the distance.



Fig. 1. Jiu-Gompa, Bank of Manasarovar. Note pond, and the channel between the two hills.



Fig. 2. The outlet of Manasarovar at the north-west corner.



Fig. 1. The Kailas Range from the South near Rakastal, Kailas peak on the middle.

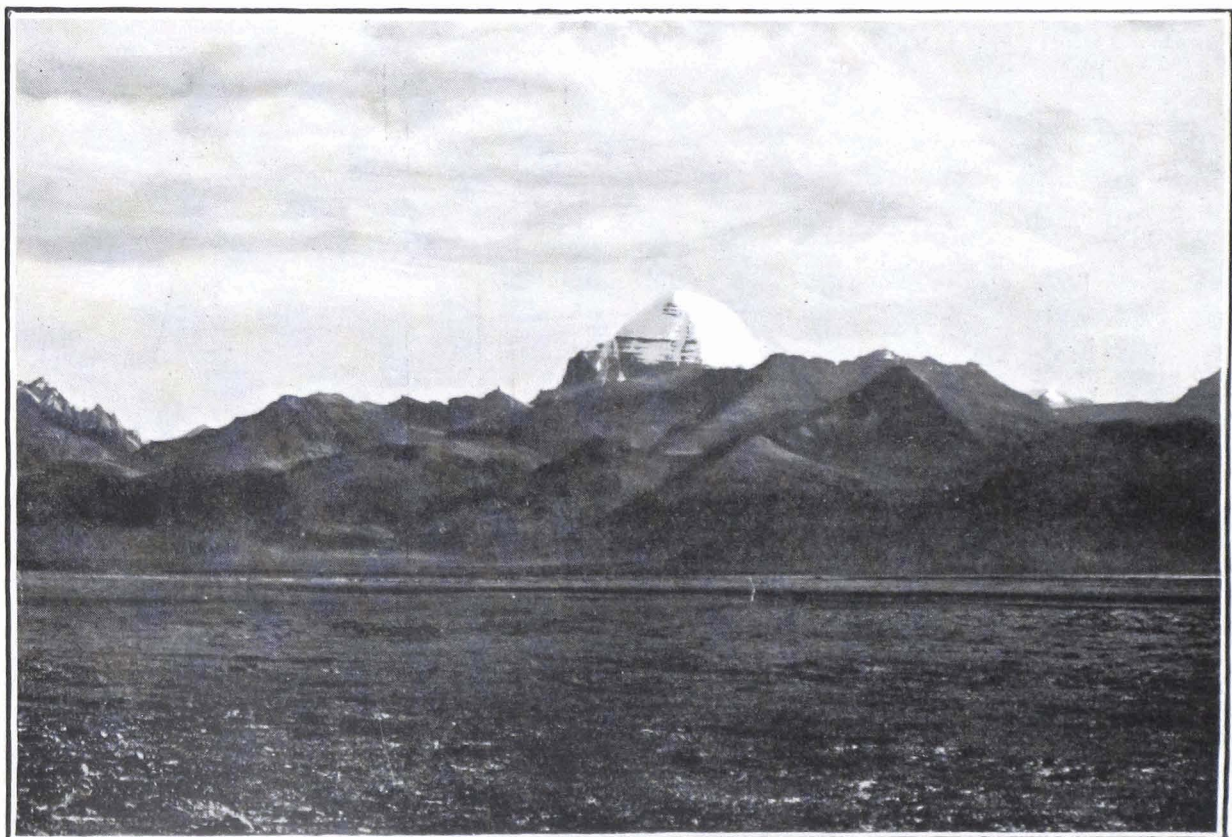


Fig. 2. The Kailas, 21,800 ft., from Barkha.

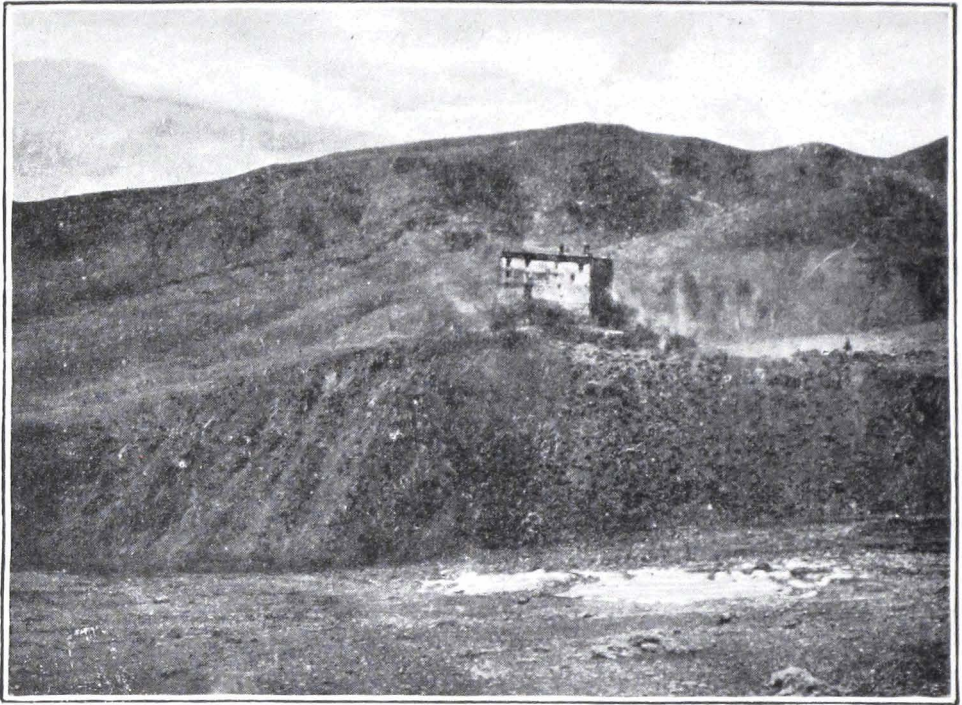


Fig. 1. First Monastery in Kailas round, above Darchin.

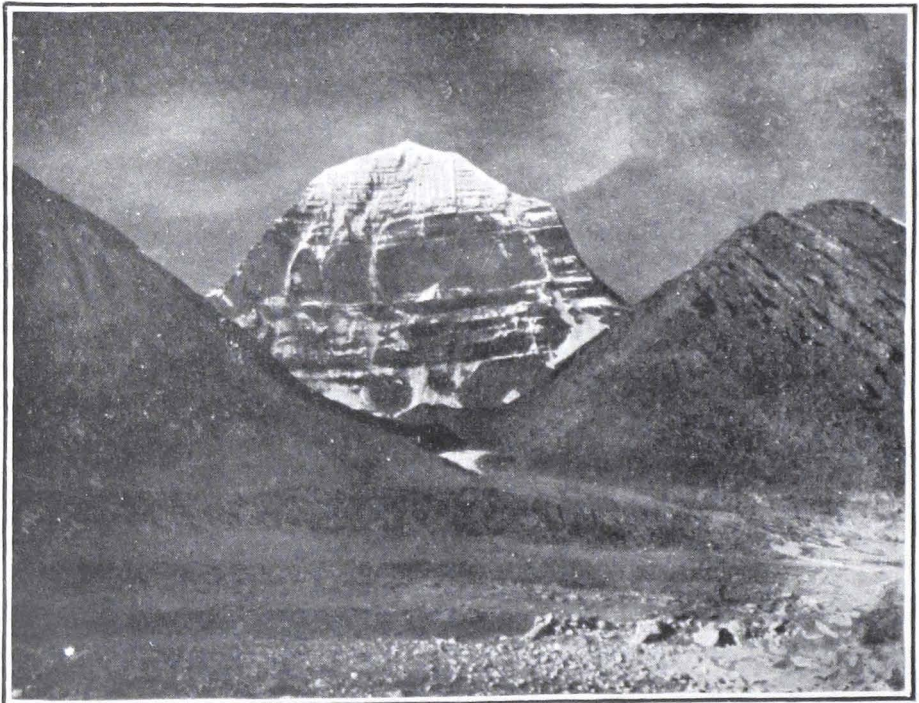


Fig. 2. Kailas from Didiphu-Gompa. North aspect.



Fig. 1. Gauri Kund, 18,500 ft.

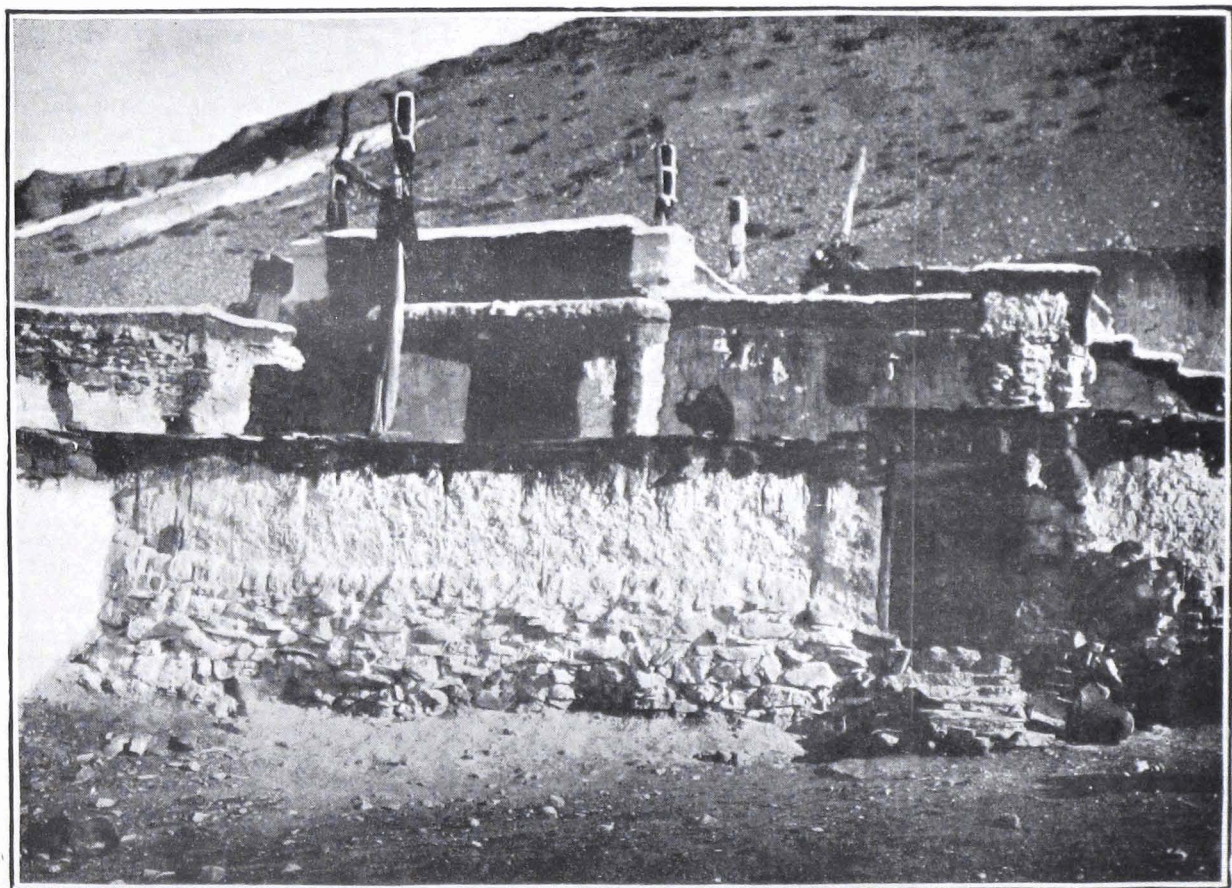


Fig. 2. Monastery at Tirthapuri.



Fig. 1. Lama near a spring close to the source of the Sutlej, Dolchu-Gompa.

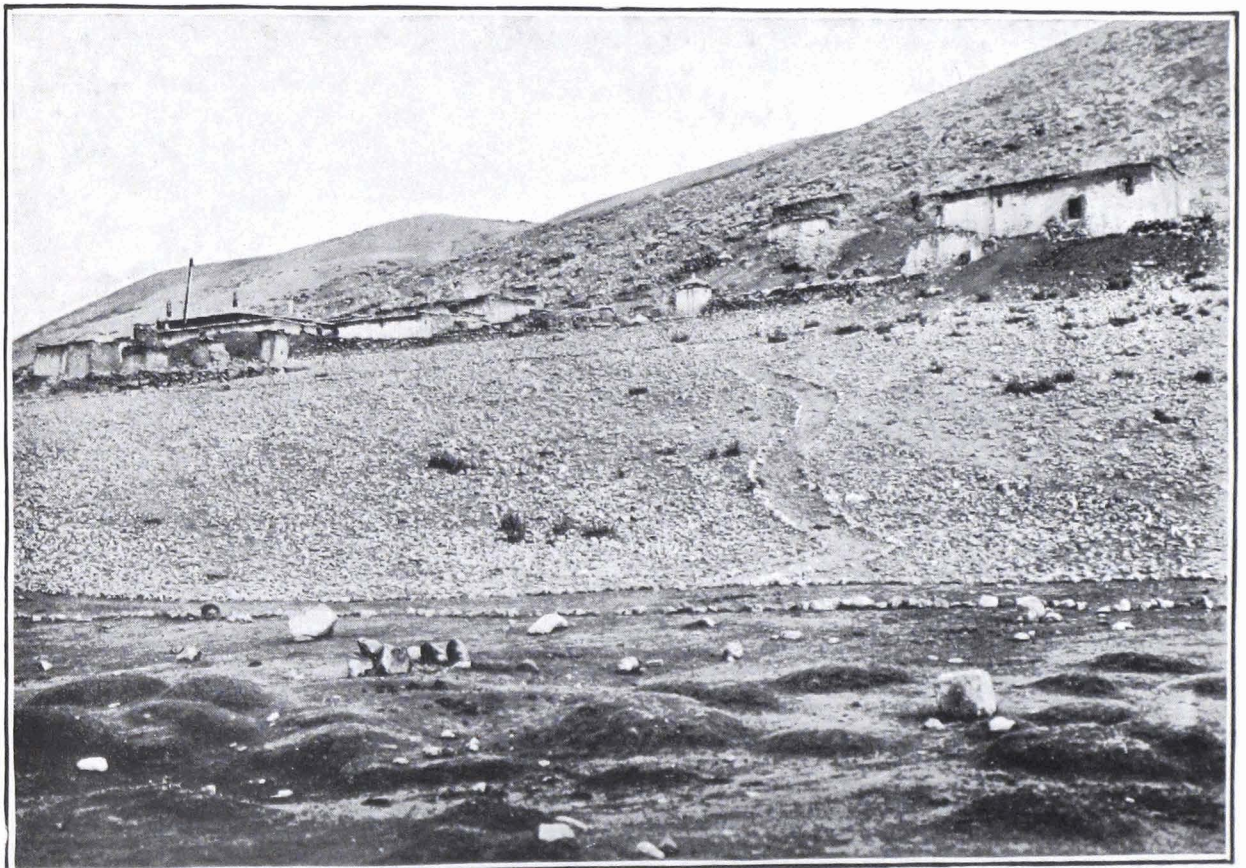
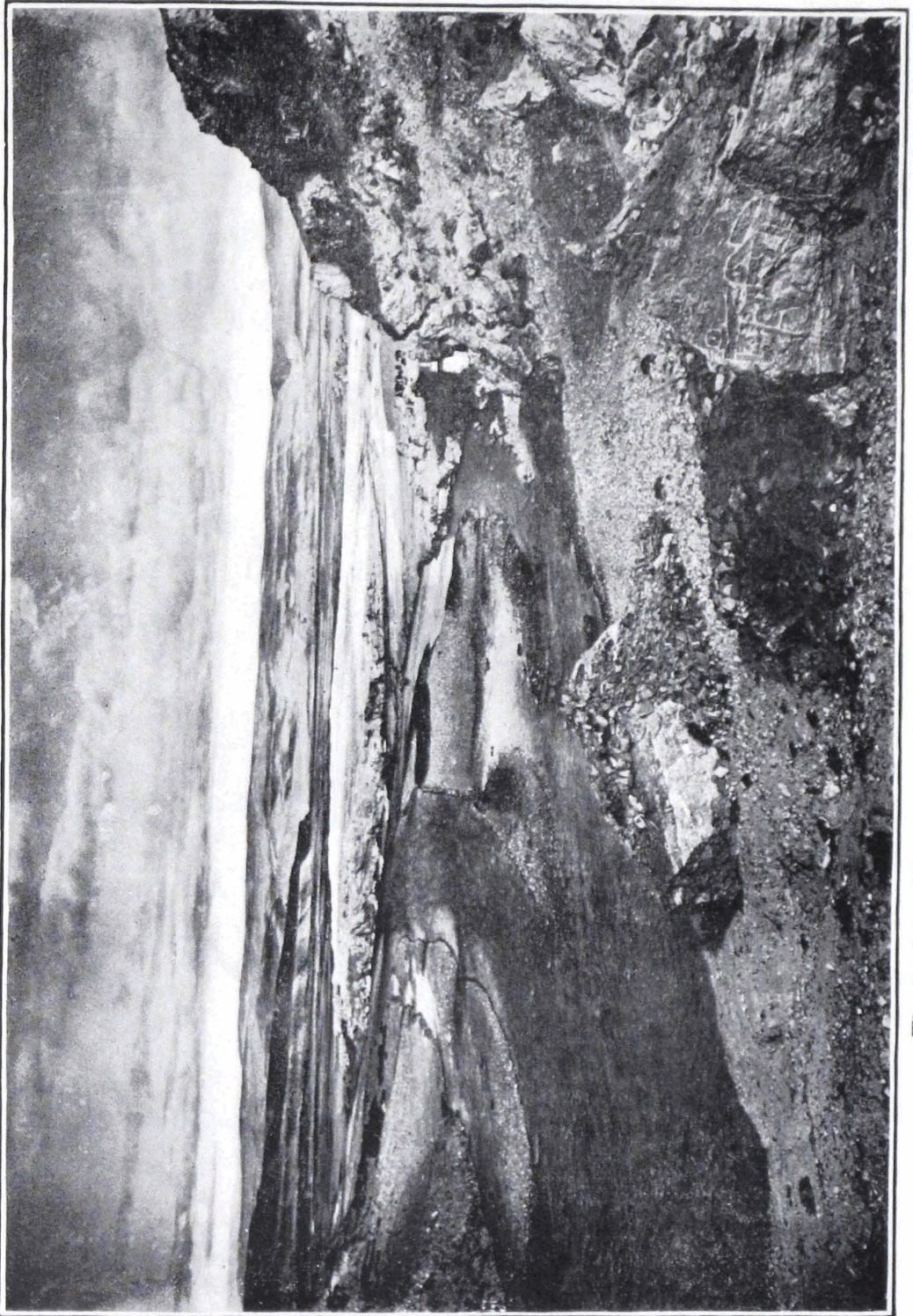
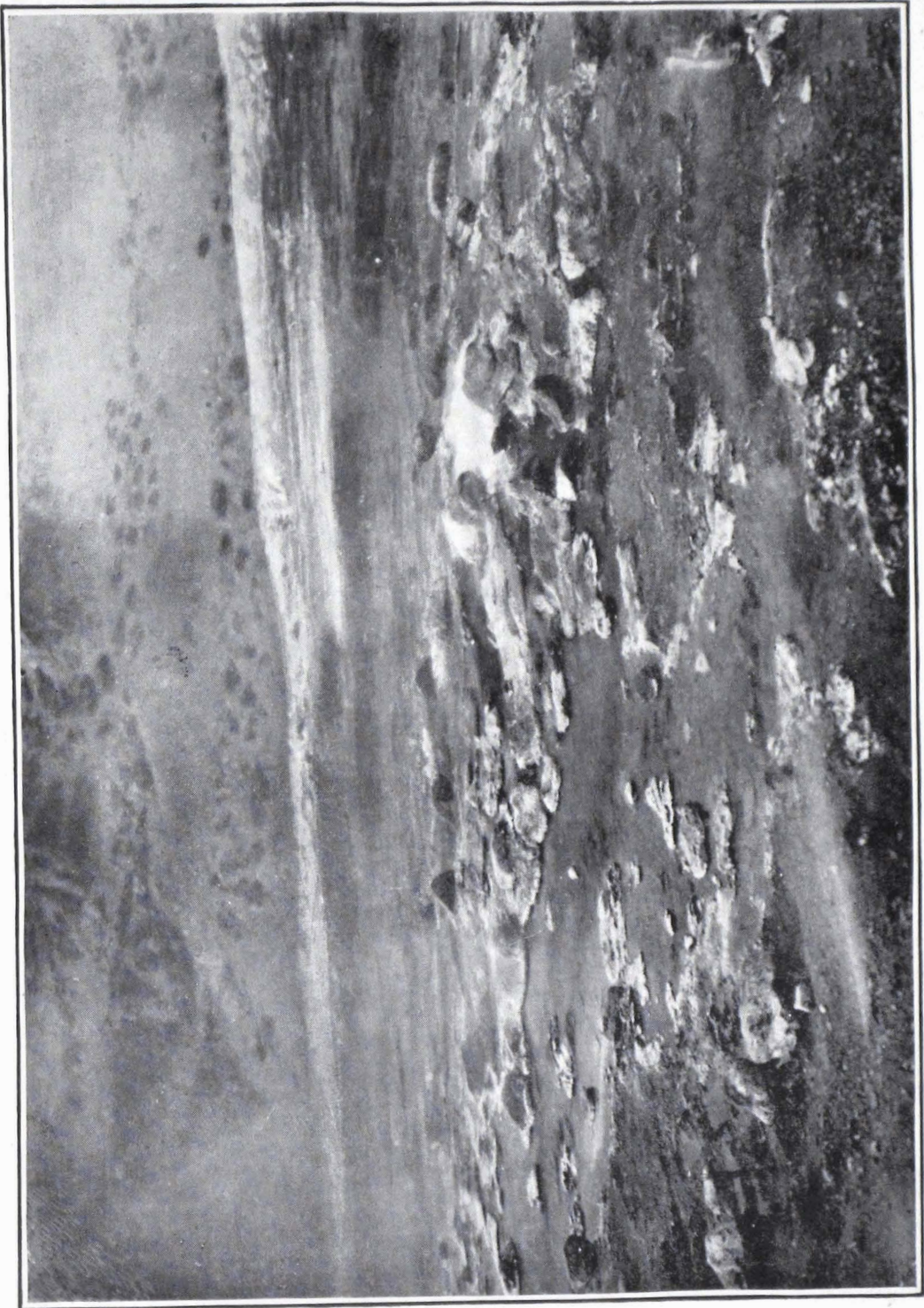


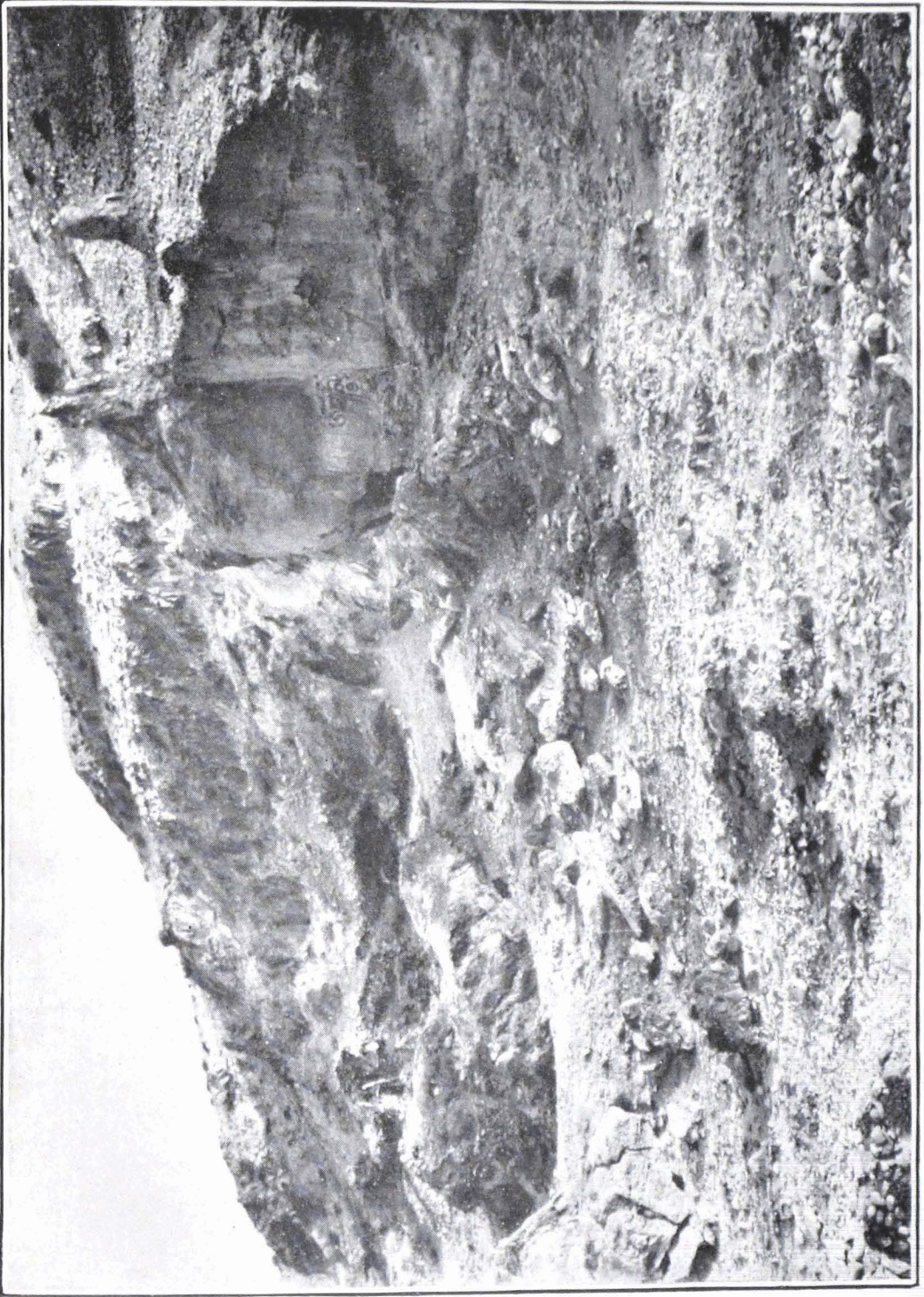
Fig. 2. Dolchu Monastery.



The Sutlej at Tirthapuri. Note inscription: *Om mani padme hum.*



Hot spring at Tirthapuri.



Lime deposits at Tirthapuri. Note the inscription: *Om mani padme hum.*