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GEOGRAPHICAL JOURNAL

Vol XCIX No 1 R.G.S. *January 1942*

THROUGH WESTERN TIBET IN 1939

CAPTAIN ROBERT HAMOND, Royal Norfolk Regiment

Meeting of the Society, 1 December 1941

IN August 1938 I was sent to Kailana, a small hill-station lying between Mussoorie and Simla, where we were shrouded in mists and drenched with rain, and I began to wonder what any one could see in the hills. Within a month the monsoon had lifted and it was our good fortune to see that magnificent section of the snows which runs from Nanda Devi and Trisul in the east, through holy Badrinath and the Gangotri peaks, to Bandarpunch in the west. The sight of these lovely mountains made a great impression on me which I can never forget.

I was unable to get leave that year, but their attraction was so great that I began to contemplate an expedition the next year. In this I was joined by a great friend, T. R. Glancy, of the 19th K.G.V's.O. Lancers. As neither of us knew anything of Himalayan snow work, exploring was more in our line than climbing, and we determined to get to the other side of the snow mountains that we saw every day.

During the winter at Delhi plans gradually grew, and we did a great deal of reading and work. Eventually our pass was granted for June and July 1939. Meanwhile Glancy had joined his regiment, and it was a bitter disappointment to us both that he was able to get leave only during July. So on 1 June 1939 I left the sweltering heat of Delhi Fort and drove alone to Ranikhet, filled with worries and apprehensions about the future; but the smell of the pines and the cool air of the hills drove them from my mind.

British Garhwal

At Ranikhet I had the pleasure of meeting Mrs. A. E. Browne, well known to so many climbers. She had very kindly picked my ponies and sent them out to Garur, thus saving a great deal of time and trouble for me. The next day I was able to drive out to Garur and do my first march. At Ranikhet I also met the Swiss climbing party (Roch, Zogg, Steuri, and Huber), who were proposing to attack Dunagiri *via* the Rishiganga.

My journey through Garhwal was without any important incident and my route was that used by the Kamet party in 1931. I decided to go by the higher route to Ramni, *via* Wan and Kanaul (Kanol), as the lower road through Ghat was liable to be dirty owing to the numbers of pilgrims at this time of year. At one place I lost all my transport for a day and a march was wasted, but otherwise everything went according to plan.

At Ramni I met the Swiss party who had come *via* Ghat, and travelled with them for three more days. On the Kuari pass we were struck by a severe snowstorm before we had put up the tents, and this continued till the late evening, making every one very cold and rather miserable. However it cleared the air and the view of the snows from the pass the next day was wonderful and not marred by cloud at any point. After the clouds had risen and hidden the snows we descended to Tapoban, a bad drop of about 6000 feet down to the Dhauli valley. Here I left the Swiss party and did the four marches up to Niti, the scenery becoming wilder and more precipitous with every mile.

At Niti I had two days' delay while transport was being procured, which was particularly annoying as before leaving Delhi I had written to the headman, Bhupal Singh, had told him the date of my arrival, and asked him to have transport ready. I spent the days in drying and reorganizing all my stores, and in climbing the hills round the camp. I saw some butterflies at 15,000 feet, some *bharal*, and some irises with colours varying from the white of the snows to the dark blue of the skies.

Here I obtained an excellent man who stood me in very good stead for the rest of my journey. Kalian Singh had been a high-altitude porter on Kamet, with Oliver on Dunagiri, and with Major Osmaston during the recent surveys of Garhwal. His job was to translate Tibetan for me and obtain all my transport. He stated that the Niti pass was becoming less and less used owing to the rough and stony path and the dangers of landslides. The alternative route lay over the Chor Hoti pass and the Tun Jun La, and as neither pass had its height marked on the Survey of India quarter-inch map and I had no information of the country round them, I decided to go by this route.

Niti to Gartok

The rates of transport at Niti were extremely high, but I was forced to take them owing to lack of time. They were asking 2 rupees for each of ten animals and 1 rupee 8 annas per man for the five they insisted were necessary for driving the yaks. It was an absolute racket, but I had to agree to their terms or stay where I was. I told them before we started that I should lose no opportunity of doing them down if one arose, and, as luck would have it, I was able to carry out this threat at a later date. In Tibet I found that I could get yaks for a rupee a day or sometimes even eight annas, and that it was only necessary to have one man to four yaks.

We left Niti on June 18 and climbed steadily for 4 miles from 11,600 to 13,500 feet, along a very rough and barren valley. I had caught a bad cold and did not really enjoy the next few days. We stopped for the night at a small camping-ground called *Huniakirk*, where there was little grazing or fuel. I did not attach very much importance to the names of these camps as there

View up valley to Wan

View up Niti valley

Chor Hoti pass

Kuari pass

were numerous alternatives in most cases and no buildings of any sort to mark the place.

The next day I felt very ill, but dared not waste any more time, so we pushed on up the valley. There was little to see of any interest except a hen Monal which flew down from the snows above 17,000 feet. The day was sultry and even the local men felt the altitude a great deal. To add to our difficulties the previous night had been fairly warm and only the top crust of snow had frozen. This would bear a man's weight for a few yards and then break, leaving him to flounder through 3 feet of soft snow to a firmer place, where the same thing would happen again. It was exhausting and discouraging, and I felt sorry for the yaks, who could find few places on the snow that would bear them. It took us $5\frac{1}{2}$ hours to do the $4\frac{1}{2}$ miles from the camp to the Chor Hoti pass, and we rose from 13,600 to 18,200 feet. By now the sun had come out and the glare was very bad even through snow goggles. I had to close the aperture of my Leica down to f/18 and give 1/500th of a second before I could take any photographs.

We rested for a short while on the pass and then descended a very steep shale slope to a large snow-field where the snow was hard as it was on the north side of the mountains. After a few miles we came to a bad drop and the animals had to go a long way round while we clambered down the cliff. Rim Kin, which is marked on the map, is a small pass of about 15,000 feet, but was hardly worthy of notice as we came down to it and only had a short rise of 500 feet to cross it. Just north of Rim Kin is Bara Hoti, where there is a large basin, and here we camped for the night, having done twelve of the hardest miles I have ever known. Four miles north of Bara Hoti, on the northern lip of the basin, is the Tun Jun La, 16,650 feet, which is apparently the political boundary. The geographical divide is obviously the Chor Hoti pass as it is here that the country changes rapidly, the precipitous gorges of Garhwal giving place to the rolling golden hills and green turf of Tibet.

On the climb to the Tun Jun La I picked up several fossils which I believe are ammonites, badly broken or scratched by ice action.[1] I also saw a pair of Brahminy ducks on their way to their Tibetan breeding grounds; there were a few marmots about. From the top of the pass we could see the Ladakh range beyond which lay Gartok, our goal. After a few miles we travelled along the *Sakya Nala* and camped at a point where it meets the *Jindu Chu* and *Tun Jun Chu*, 13 miles from Bara Hoti.

The Survey of India quarter-inch map is very inaccurate between the Chor Hoti pass and *Daba* (Dapa), and I had great difficulty in identifying local features. The yak drivers from Niti again gave trouble, much to the distress of Kalian Singh, who felt partly responsible for them. They were the only really bad hill men with whom I have ever had to deal, and I resolved to be rid of them at the earliest opportunity.

We crossed the Jindu Chu, a fast-running stream about 3 feet deep, which seemed to rise somewhere near the Niti pass, and then climbed to a small pass on the north side called *Nershan*. This was not so much a pass as the edge of the flat Tibetan plain which stretches away to Nabra, Daba, and Toling. After this it was easy walking, over a plateau covered with pebbles and a kind of

[1] Jurassic fossils are found all along here.

flat thistle against which *chaplis* were useless and boots had to be worn. The villages of Lungi and Changlus, which are marked on the quarter-inch map, do not appear to exist, and are certainly not in the places shown. I asked all the Niti men about this, but they denied knowledge of any village nearer than Daba. After a short march of about 6 miles we camped in a deep nullah called the Changlus Nala. The next morning was magnificent and as we climbed up on to the plain again we could see the white dome of Kailas far away to the east and the Ladakh range to the north, while behind us the dawn had touched the Zaskar range and made the peaks very beautiful.

During the day we saw several Kiang (Tibetan wild ass) and some Tibetan shepherds who ran to meet us and seemed astonished to see our strange caravan. The distances were very deceptive and features which appeared to be about 10 miles away I later found to be more like 30 miles. The very clear air has no dust or moisture in it. I believe it was Mr. Wakefield who saw the Kuen Lun mountains from the Ladakh range, a distance of more than 400 miles. I myself saw from near Toling mountains north of the Indus valley in the area of Hanle, and they can hardly have been less than 200 or 300 miles away.

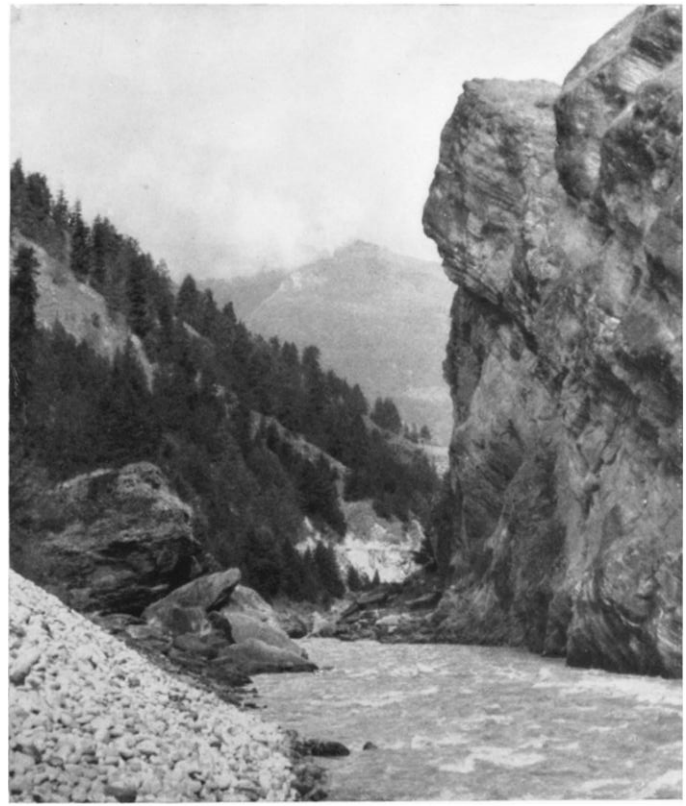
Daba lies in the valley of the Daba Chu, which is about 1000 yards across and 1000 feet deep, with very steep golden cliffs worn into fantastic shapes. Unfortunately my photographs of this area were destroyed and I have only one, in colour, of Daba. From Changlus to Daba is 13 miles and it is four marches from Niti by my route. The village is perched precariously up on the cliff sides and there are numerous caves, some inhabited, and others which are used as store houses. There is a Dzongpön of Daba but he was away at Kailas when I arrived. I had heard that harsh treatment and exacting bargains with the Indian traders had diminished trade here and diverted it farther east to Nabra and Taklakot; but the difficulties of the Niti pass may have had something to do with it.

The local lama visited me and brought with him a travelling lama from Lhasa. Kalian Singh and I secretly arranged a bargain with the lama about new yaks, and when this had been safely settled I paid off the Niti men and told them to go. The surprised indignation on their faces as they heard this news did much to console me for their bad conduct during the past few days.

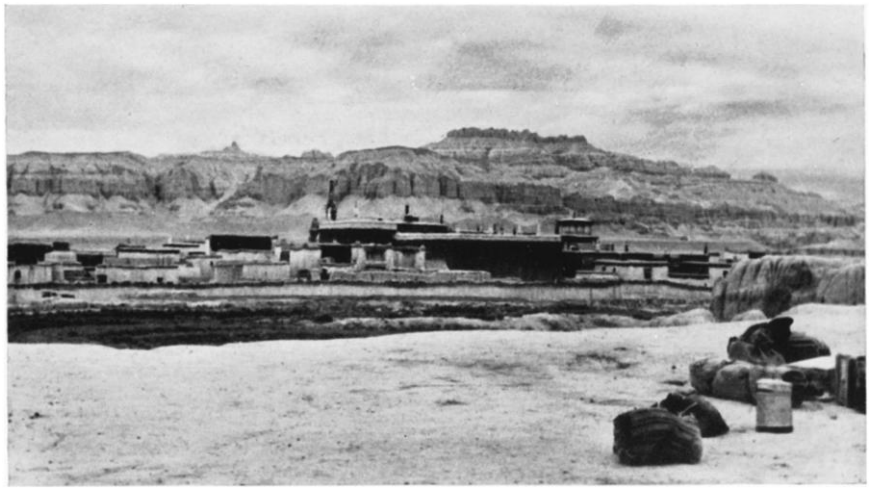
I rested here for a day and on June 24 yaks appeared in the care of two merry Tibetans. They were pretty wild yaks, and we had endless trouble loading and reloading them as they threw off their loads, but by holding each one down at all four corners we managed at last to get the loads secured and set out for *Manglam* (Mangnang). Between Daba and Manglam are two small villages where the lama's crops are grown. In a sandy nullah I found a large outcrop of a green and polished stone which I was not able to identify. There was no sign of the ruined village of Segge Dzong on the *Rankun Nala*, but as it was ruined in the days of the Pundit Surveys it may well have disappeared by now.

Manglam lies on the west side of the Manglam Tsangpo and consists only of a tiny monastery and a few willow trees. There are one or two good turf camping grounds in the middle of the Tsangpo, which is about 500 yards wide and has two fast streams about 2 feet deep in it. There were many red-

Leo Pargial



Dhauli river



Head Lama's house, Toling monastery

Toling bridge

View down the Sutlej

shanks and four bar-headed geese, the latter so tame that they allowed me to photograph them from about 20 paces. Transport was very cheap here, only 8 annas per animal, but very small donkeys and diminutive cows were among them.

I showed some of the Tibetans a few photographs that I had with me. They seemed to realize what they were, but looked at each one through a half-closed hand, as though through a telescope: perhaps because by doing this and shutting out the local countryside they were better able to concentrate on the picture and get an idea of the real size of the objects in it.

The next day (June 25) we set out to reach Toling, a dull march over completely waterless country. There are several streams marked on the map, but there was no sign of them either dry or running. I met a pilgrim to Kailas who had already been to Ling, as Toling is often called, and was then going on to the Manasarowar lakes. There is a small pass called the *Tseri La* (14,600 feet) half-way to Toling, and from here we could see the snow-covered mountains of Spiti, particularly Leo Pargial, quite easily. Then our road lay along the most awful labyrinth of eroded paths which descended the cliffs to Toling, on the south bank of the Sutlej. The cliffs here are fantastic in shape and sometimes resemble the roofs of an old abbey, so symmetrical are they. The old fort of Toling was built in the cliffs above the present monastery but was without water and therefore was unable to stand the siege of the Kashmir troops.

Toling consists of a monastery and the head lama's house. About a hundred monks gathered to watch us pitch our camp. There are about two hundred to three hundred monks here, I believe, and there are several women who till the small fields and draw water. It is the best-known monastery in Western Tibet, though the closely guarded Rudok and Kailas monasteries are perhaps as important. There is a head lama who deals with the teaching and religious side of the life there and also an administrative lama called the Shangjud who was very young and spoke good Urdu; he interpreted for me. The head lama was extremely courteous, and after an exchange of gifts and compliments and a certain amount of talk which was carried out in reverent whispers, he ordered the Shangjud to show me round the monastery and its library, with many old books that I was not allowed to touch.

Round the central hall of the monastery are small locked rooms, I think twelve in number. These are set aside for different gods and spirits, and there were a few that I was not allowed to enter. There was a vast figure of Badrinath, another depicting Kali or some such deity, others showing the Goddess of Flowers and Crops and Children; and in some rooms were cases full of small figures in brass or gold of the respective god. Some of the figures in the hall were about 16–18 feet high, but it was very gloomy and I was unable to get close enough to see if they were made of plaster, stone, or wood. Outside were enormous prayer wheels and gongs, and also those long horns which rest on the ground and are used for all purposes from giving a warning to the sounding of the calls to a service. The roof of the head lama's house had on it a small pent-house of Chinese design which was roofed with what looked very much like Thok Jalung gold.

My route from Toling to Gartok lay over the Bogo La, a pass of 19,220

feet. All the passes over the Ladakh range in this area are about 19,000 feet and very steep and rough on the southern sides. The normal route from Niti to Gartok goes to Daba or perhaps Nabra, then over the Choko La, a low and easy pass to the north-east of Nabra, and then follows the Gartang valley to Gartok. This route takes longer than the Toling route, but, except when the Gartang valley is full of water, is more practicable, as the other passes are quite often impassable in very severe weather. In no place is there much snow, as Tibet is cold but dry, with a snow-level of between 19,000 and 20,000 feet. The Tibetan snow is frozen as hard as ice by the extreme cold of the wind and altitude.

There were not many animals at Toling, but Kalian Singh at last managed to procure enough to carry my stores. There was the usual dice-throwing for choice of loads, although it was really quite unnecessary as the smallest animal always ends by carrying the heaviest load.

Shortly after leaving Toling on June 26 we crossed an old bridge which was suspended over the Sutlej by enormous wrought-iron chains. Then we travelled again in a narrow labyrinth, ever-ascending, until we descended at last to a stream where there was a small ruined village called *Biey*. The quarter-inch map between Toling and Gartok leaves so much to the imagination and is so inaccurate in the features which it does show, that it is here misleading. Two miles north along this stream is another small village where I saw a few people and some small fields of crops. It is called *Biey-tung-pu*. A little farther on is the village of *Dongpo*, which is larger and boasts several inhabitants and two enormous black poplars. It is 10 miles from Toling.

Here again transport was difficult to obtain, and the next day I was only able to march 7 miles before dark to a small camping-ground pronounced *Poor*, lying on the southern approach to the Bogo La at 16,000 feet. There were many birds here and I saw some Lammergeiers, redstarts, rosefinches, and what I believe to have been orange-fronted Serin finches. Marmots were particularly plentiful, and we continually heard their shrill cries as our caravan approached them. A beautiful sand-coloured hunting dog had attached itself to us at Dongpo and remained with us for many weeks. At Poor all the stones were bright green with occasional blue shades in them and a recent storm had freshened their colour. I believe that they were some kind of Serpentine but am awaiting a report from the Geological Survey of India.

From Poor there is a steep climb of about 4 miles to the Bogo La, and it was bitterly cold in the early morning. I had by now become acclimatized to the altitude, so the Bogo La did not worry me nearly so much as the Chor Hoti had done. From the summit we could see clearly all the country across which we had come and the Zaskar range from about the Untadhura pass in the east to Leo Pargial and the Shipki pass in the west. Northwards the Kailas range rose steeply and obscured our view beyond the Gartang valley. I climbed the hill at the side of the pass and found it to be 19,820 feet. The height given on the map for the Bogo La (19,220 feet) agreed with that shown by my aneroid, and this leads me to hope that my heights for the past few days were perhaps more correct than those given on the map, although often disagreeing with the latter by as much as 1000 feet. It took me some time to take my observations and photographs on the pass, and I was rewarded for

my foolishness in leaving off my gloves by a touch of frost-bite in one hand which troubled me for many weeks afterwards and finally left a scar.

The ground slopes gradually down for 5 miles to some fine pasture land, but after that the path lies along the Kinchung Nala. There are no bridges, and, owing to the steep sides of the ravine, progress can only be made by crossing and re-crossing the rapid stream. This is a slow, wetting, and extremely tiring process. There was a good deal of wild rhubarb growing here, and I found it excellent when stewed. That night (June 27) I camped at a small camp called *Bogol*, as it was nearly dark and Gartok was still 8 miles farther on. We had covered 14 miles during the day and had risen from 16,000 to nearly 20,000 feet and descended again to 15,900 feet. The next morning we continued along the *nala* until we came to the Gartang valley, a marshy plain about 5 miles broad at this point and bounded by the Kailas range on the north and the Ladakh range on the south. There are three or four deep streams running across the marsh and the local men state that these are impassable when the snow starts to melt. Gartok lies on the far side of the plain and we pitched our tents on the camping-ground a few hundred yards from the houses.

At Gartok there are two Garpöns (Viceroys from Lhasa) called Urgu Gong and Urgu Hog respectively. They are supposed to rank in that order of seniority, but I believe that in actual fact they have equal powers of government. They rule the whole of Western Tibet, and their main work seems to consist of squeezing as many taxes as possible out of the people. The money collected is certainly not spent in making any bridges or shelters for travellers and traders or even removing the stones from the main routes so that at least a passable road might in time be made. They live at Gartok (Gar Yersa) in the summer and move to Gargunsa in the winter as it is warmer there. There are about thirty permanent inhabitants at Gartok, but in September a great trading fair is held there and the plain is covered with hundreds of the traders' tents. Gartok and the rule of the Garpöns has been described in great detail by C. A. Sherring in his book 'Western Tibet.'

Both Garpöns were away at Kailas when I arrived, but they had recently had letters from the Government of India notifying them of my arrival, and they therefore sent their Chief Steward or Adjutant to Gartok at once to receive me. Soon after we had pitched camp some tea and a very smelly dried sheep's carcase was sent to me from the Garpön's house. I sent back some presents and asked if I could call that evening. After a while the answer came and Kalian Singh and I went to the house bearing some more gifts. He welcomed me in the courtyard, presented me with a silk scarf (a token of esteem in Tibet), and led me into the house, where we talked and consumed large quantities of rice, tea, and dried *kumanis* (hill apricots). The tea is made by stewing the cheapest China tea for hours and then adding salt, flour, and ghi in the required quantities. It resembles and tastes like the water of an oriental harbour, whatever others may say to recommend it. You have no control over the amount that you drink as it is rude to refuse more or to drink too slowly and your cup is refilled the instant that it is empty.

Like all Tibetans that I met, the Garpön was highly intrigued with my old gramophone which proved a passport to social success in Tibet, especially

with talking and singing records. Carriage on yaks and donkeys does not improve the instrument, and mine was held together with rubber bands and string and played only by a miracle by the time I reached Simla. He was astonished to find that I was only twenty-one, especially as Kalian Singh had told him before my arrival that I was a very important prince, that I drew 30,000 rupees each month, and commanded the Red Fort of Delhi (of which even the Tibetan had heard). All this was because I had casually mentioned to Kalian Singh one day that I had started my journey from the Red Fort where I was living at the time, and he had, Kim like, woven fantastic tales about it.

When he came to visit my camp he expressed a desire for hard-boiled eggs and jam, but when this extraordinary dish had been prepared, with the loss of two of my precious eggs, he vaguely declined it and asked for a biscuit with some jam on it. He was delighted with coloured pictures and photographs, but could not see "why a rich man like myself should forsake the comforts of India and come to Tibet and live in such hardship": here he pointed derisively at my small Meade tent. I tried to tell him that I was on a pilgrimage and only following The Way, like Kipling's Lama in *Kim*, but I do not think he believed or even understood.

Gartok to Shipki

On July 1 I left the capital of Western Tibet and set out for Simla. I had decided to go and look for bar-headed geese on a small lake called the *Tsamda* Gon Tso, 16 miles along the route to Leh from Gartok. My search was rewarded, as I found about four hundred on the Tso and some goslings which I caught and photographed in the Kiumba Chu early the next morning. Then, turning south-west, we joined the Amjung–Iming route from Gartok to Shangtse by crossing four passes which I believe have not been crossed before. They were the *Dakdum La*, 16,450 feet, the *Lalungkircha La*, 18,000 feet, the *Pialonglong La*, 17,550 feet, and the *Durcha Lapcha La*, 17,425 feet. The streams shown on the quarter-inch map in this district are not accurate and not all of them exist. We camped at a small place called *Nursum*, about 2 miles east of the Laoche La. The camp was bitterly cold, as it was 17,150 feet, and in the morning we found even the running streams frozen hard.

We climbed slowly to the Laoche La, 18,400 feet, the wind blowing very hard against us and chilling all to the bone. A very steep drop on the other side of the pass put us into the shelter again, but we had to cross several snow-bridges before coming down to a stream. After about 2 miles there is a camping-ground called *Palong Raru* (Phalang ralrol on the map), and farther on again was a larger one called Debling, just east of the Debling La, 16,500 feet.

From here we could see Kamet very plainly as it dominates the Zaskar range, although we must have been fully 70 miles north of it. Just west of the Debling La is a huge mani-wall called *Kusho Mantang*, about 300 yards long, 5 yards broad, and 5 feet high: the largest that I have seen in Tibet. By now we had come to the edge of a vast stony plain which slopes gradually down to Shang Fort, rather similar to the plain that we crossed after leaving the

Jindu Chu, on our way to Daba. There is a small camp here called *Dara*, 9 miles from Nursum.

The following day we marched for 4 miles across the plain to Shang Fort. Ahead of us we could see the rough desert country over which we should have to go, and beyond that Leo Pargial stood up very clearly. Shang Fort, although very dilapidated, was still inhabited, and there were also several caves in the cliffs bordering the nullah. After this the route lay along a wide nullah for $3\frac{1}{2}$ miles until a small cliff village called Chai was reached. Shangtse lies another 3 miles farther to the west and is the summer home of the Chuprang Dzongpön.

Here I went through more or less the same ceremonies as at Gartok. The Dzongpöns were just changing as the old one was going to Lhasa. There was a monastery with several houses round it, and the village reminded me much more of Toling than of Daba or Gartok. The Dzongpön was an amusing character and showed me two Revelation suitcases, a Mauser repeater, an automatic pistol, and a Winchester "under and over," which he said he always carried on journeys for protection from the many bandits that lived in his country. He insisted that I should take a photograph of him and his family.

He then discussed the route with me. He said that the normal route to Nuk (pronounced *Nū*), was not possible owing to the unfordable state of the Op Chu at this season, and insisted on sending us round by the north, which he said took the same number of marches, although they were rather longer. The normal route lay *via* Kyinipuk, Op, Luk, Nuk. I told him that I was hoping to reach Simla in twenty-two days, as I was several days behind my schedule; but he said that it was not possible in that time. In actual fact I reached Simla in nineteen marches.

We started off from Shangtse on July 5 and climbed to *Shangtse Lapcha*, 14,950 feet, and then on to another pass called *Tanglang Lapcha*, 15,300 feet. The country was very sandy and hard to walk on, and there was no vegetation except for some grass similar to Marrams, and a low-lying pea or vetch, the flowers of which the Tibetans ate greedily. A sharp descent brought us to the village of *Jokche* (Joktse), a fairy-like cluster of cliff dwellings culminating in a pinnacle, at 14,150 feet on the Rabgyeling Chu, where we changed animals. Then another climb followed to the *Depchi* Lapcha, 14,950 feet, and after that a level march across a sandy plain to Rabgyeling Gömpa, 14,300 feet, a pleasant camp lying in the *Sargung* Chu and overlooked by the monastery. Here transport had to be changed again and the next morning we climbed to the *Piridung Lapcha*, 14,950 feet, and the *Tunjin Lapcha*, 14,900 feet, before dropping to the village of Jangtang, which consisted of a few caves in a bleak and sandy nullah at 14,000 feet. Here I had to change animals again, and, as there were not enough to start with, I and An Singh went on with some of the baggage, leaving Kalian Singh to bring on the rest later. Jangtang is shown as being on a ridge, but this is not correct, and in any case no village in this area could exist on a hill owing to the shortage of water.

We climbed again to a small pass called *Kheri Lapcha* and across a plain to a small camping-ground called *Kheri*, where there was a very small water supply. We then turned almost due south, crossed the *Kheri La*, and dropped

down into a maze of deep nullahs. There was no water here, nor any sign of birds, animals, or plants. At last we climbed to the *Anari La*, 15,300 feet, and came down to *Sūmar* Gömpa (Somar G.) at 15,000 feet, which I estimated is about 3 miles south of the position that it is given on the quarter-inch map. There was a stream and a very small monastery here. Kalian Singh arrived with the baggage just before dark.

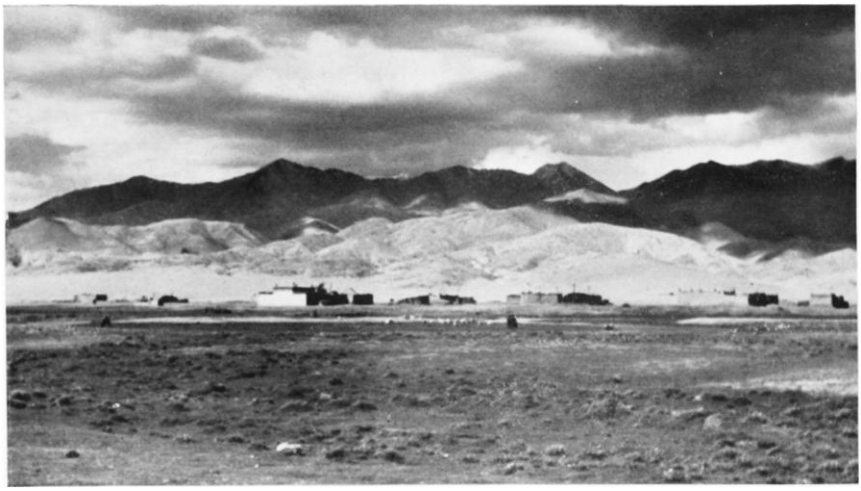
From Sūmar we climbed to *Tanga*, 15,800 feet, and *Dadu*, 16,000 feet. Then followed a very difficult drop of 3000 feet to the Op Chu. The stream was deep and very fast and was crossed by an almost natural bridge as the river here was practically subterranean. While climbing the other side of the gorge I saw two bandits with rifles who, I later learned, had robbed Kalian Singh of his money when I had sent him ahead in the morning to get more transport, but they did not attack us although they fired a shot at someone or something.

Both sides of the Op Chu presented great difficulties to the animals, who took over nine hours to cover the first 5 miles from Sūmar. The pass on the other side of the Chu is called *Dangi Lapcha*, 15,900 feet, and a little farther on is *Rupagong*, 15,850 feet. Although we had only covered 11 miles we had taken thirteen hours to do this, and I decided to stop for the night of July 7 at a small camping-ground in a deep nullah called *Sangtong*, 14,400 feet.

South-west from here the country became slightly less rugged and we crossed three small passes called *Dupgarh La*, 15,400 feet, *Puksum Lapcha*, 15,800 feet, and *Lajungma*, 15,900 feet. Soon after the last pass we came to a very large camping-ground called *Dongpara* (perhaps Dong parao, *i.e.* yak camp), where there were many tents. It is a trade post between India and Tibet, and I talked to many Indians there, some hailing from Dehra Dun, Mussoorie, and Simla. Kalian Singh met me here with new animals. After a small delay we went on to Nuk, which lay on the northern slopes of the Sutlej gorge, about 3 miles distant. I was now back on the normal trade route from Shangtse. I do not know what the normal route is like in comparison with mine, but it could hardly be worse than the arid desert over which I had travelled for the last four days, always on the look out for water and transport.

Nuk is a large village, far larger than Gartok, although from the imposing manner in which the latter is marked on all maps one is led to believe the opposite. There are several camps down by the village, but it is better to stay in the higher camps about 1000 feet above the houses as the next march starts with a long climb to the Rangmik La, 15,400 feet. There is an old fort perched on an incredible eyrie several thousand feet above the north bank over the Sutlej; it appeared to be so inaccessible that I felt that the defenders would have nearly as much trouble in reaching it as the attackers.

After the Rangmik La has been crossed the route lies over fairly open heath land to the foot of the Shiring La. Then it enters a rocky ravine where there was a lot of wild rhubarb growing, and ends with a steep climb of about 1000 feet to the pass, which is 16,800 feet. From here a good view can be obtained of Leo Pargial and the wild, rugged gorge of the Sutlej, roaring through the mountains to Shipki. The descent from the pass on the west side is very bad, as the track is never wider than 2 feet and often as narrow as 9 inches, and runs across an exceedingly steep shale slope. I feared for the

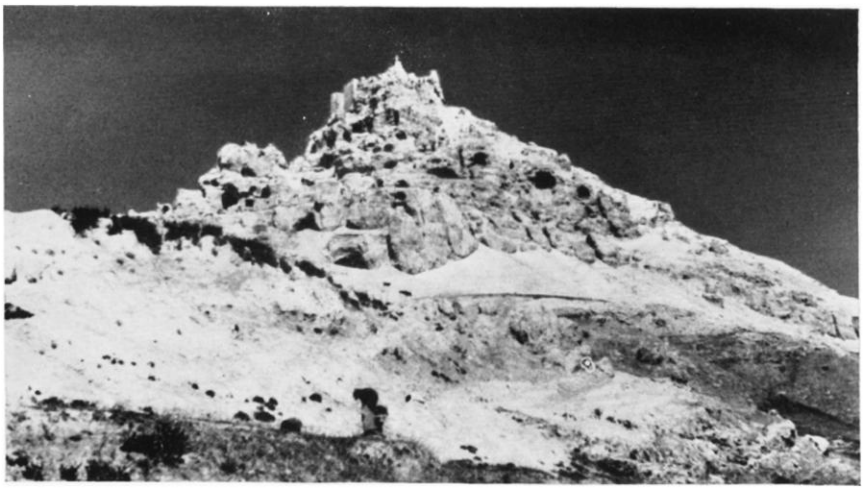


Gartok

Kamet and Himalaya from Debling La

Op Chu from bridge

Rabgyeling Gömpa



Jokche village

Shang Fort

safety of the animals, but they managed the journey extremely well, picking their way gingerly along the very edge of the path.

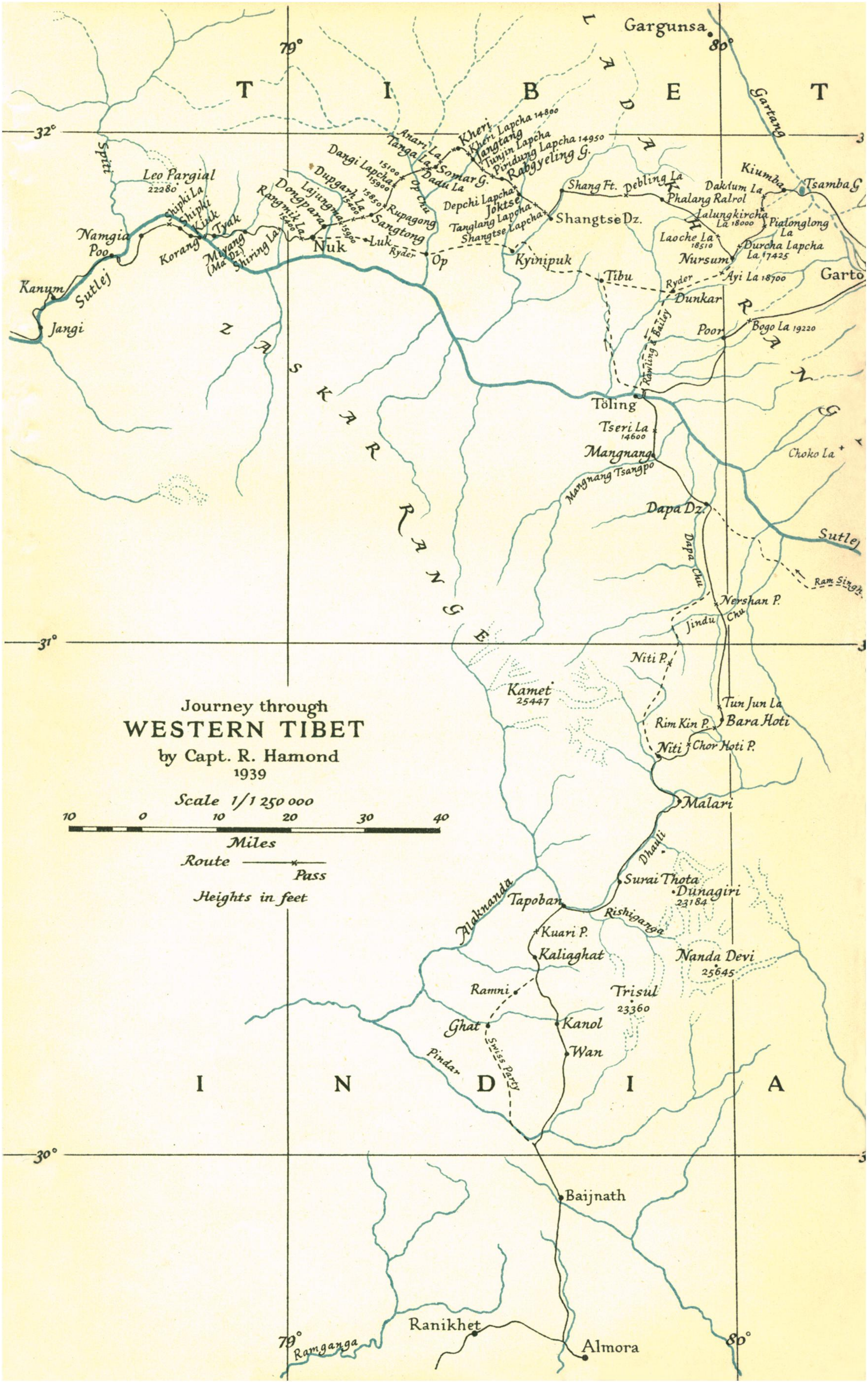
After a mile or two there is another slight rise and then a difficult drop of nearly 3000 feet down the end of a steep spur. *Miyang* (Ma Dzong) can be seen below. This is a pleasant village and has a few trees and masses of wild roses. The men were all away with sheep and goats, and all the yaks were up on the tops grazing and would have taken a day or two to collect, but the local women volunteered to take my baggage as far as Tyak, the next stage, 6 miles farther on. The next morning, after a great deal of talk, we started off, Kalian Singh obviously enjoying his new charges much more than mere yaks, and keeping up a flow of repartee with them all. They were very independent and rested when and where they wished, but the cheerful atmosphere was very amusing. The road is very rocky and rough and crosses and recrosses a fast stream. Above, the golden cliffs towered up for several thousand feet into the deep-blue sky.

At Tyak I had to get more porters, as I had decided to do a double march and go on to Shipki. It was a pretty village with a few fields and apricot trees and lay at the junction of our stream and the Sutlej. The road from Tyak to Shipki is very dangerous and precipitous, sometimes consisting of a rather insecure scaffolding on the face of the cliff, hundreds of feet above the roaring torrent, and is suitable only for porters or goats as the path is often cut into the cliff and one has to bend double to proceed. After 4 miles there is a small village called Korang, and the Sutlej is crossed by bridge, the first since Toling. A mile farther on is Kiuk and, 3 miles past that, Shipki. We did not arrive here till dark and camped on a very small terraced field as we did not know where the camp lay. The next day we found that it was the other side of the village, and we passed it on our way to the Shipki La. This is the border village and there is a *lumbardar* (headman) here who speaks Urdu and can be very helpful. The Shipki La is 13,420 feet and is the border between Tibet and Bashahr State. As far as I know it is the lowest pass through the Himalaya and is open for a large part of the year. On the pass I rested and looked back to Tibet, just turning golden-brown in the morning sun. Above me towered the Leo Pargial, below me roared the Sutlej, and ahead of us was home and civilization. But, tired though I was after the trials and rush of the past ten days, I felt very sad at leaving Tibet and wondered if I should ever again stand on the Shipki La.

Shipki to Simla

The path down to Namgia is good, as it is maintained by the P.W.D., but there is a terrifying drop of several thousand feet over the edge. I had bruised my foot badly the day before and, as no pony was available, was riding a large black yak. As my bridle would not fit it a small girl was ordered to lead the animal while I sat on its back. A black yak with an old hunting saddle, ridden by a bearded white man and led by a small Tibetan girl along the edge of a precipice must have been a strange sight even in this strange country. As I had no control over either the small girl or the yak, I folded my arms and resigned my fate to them.

At Namgia there is a new P.W.D. bungalow although it is still 194 miles



Journey through
WESTERN TIBET
by Capt. R. Hamond
1939
Scale 1/1 250 000
10 0 10 20 30 40
Miles
Route
Pass
Heights in feet
T I B E T
L A D A K H R A N G E
Z A S K A R R A N G E
I N D I A
Gargunsa
Gartang
Tsamba G
Garto
Sutlej
Spiti
Leo Pargial 22280
Shipki La
Shipki
Kiuk
Tyak
Namgia
Poo
Korang
Miyang (Ma Dz.)
Shiring La
Kanum
Jangi
Rangmik La
Dongpara
Lajungmai
Dupgarh La
Dangi Lapcha
Nuk
Luk
Ryder
Op
Sangtong
Rupagong
Op Chu
Tanga La
Anari La
Kheri
Kheri Lapcha 14800
Jangtang
Tunjin Lapcha
Somar G.
Dadu La
Piridung Lapcha 14950
Rabgyeling G.
Depchi Lapcha
Joktse
Tanglang Lapcha
Shangtse Lapcha
Shangtse Dz.
Kyinipuk
Tibu
Shang Ft.
Debling La
Phalang Ralrol
Dakdum La
Kiumba
Lalungkircha La 18000
Pialonglong La
Laoche La 18510
Durcha Lapcha La 17425
Nursum
Ayi La 18700
Dunkar
Poor
Bogo La 19220
Rawling & Bailey
Töling
Tseri La 14600
Mangnang
Mangnang Tsangpo
Choko La
Dapa Dz.
Dapa Chu
Sutlej
Ram Singh
Nershan P.
Jindu Chu
Niti P.
Kamet 25447
Tun Jun La
Bara Hoti
Rim Kin P.
Niti
Chor Hoti P.
Malari
Dhauli
Surai Thota
Dunagiri 23184
Tapoban
Rishiganga
Alaknanda
Kuari P.
Kaliaghat
Nanda Devi 25645
Ramni
Trisul 23360
Ghat
Kanol
Wan
Pindar
Swiss Party
Baijnath
Ranikhet
Almora
Ramganga
32°
31°
30°
79°
80°

from Simla. The *chowkidar* (caretaker) was delighted to see me and brought apricots and hot water; I had had no bath since leaving Gartok. The next day I walked 8 miles to Poo, which is a large village and has vegetables and fruit, and there rested for a day. From Gartok to Namgia it is officially thirteen stages, and I had done it in eleven days and by a longer and strange route. During this time I had covered 129 miles, crossed twenty-seven passes of which twenty-two are not named on the map and, as far as I know, have not been crossed before by a European, and put 55 miles of new route on to the map fairly accurately.

For the rest there is little to tell. I did three marches from Poo to Kanum (16 miles), Jangi (11 miles), and Pangi (15 miles). Here I met T. R. Glancy, who had obtained one month's leave and come to meet me. From Pangi we did seven marches to Narkanda, a distance of 116 miles, and finished the last 42 miles to Simla in one day on bicycles, as time was short. All this along the Sutlej valley with a good track and plenty of forest and P.W.D. bungalows. It was a rest after Tibet, but I often thought wistfully of the happy days I had spent in my windswept and cramped tent in that wonderful land.

This last part of my journey lay through the country where Kim and the Babu confounded the Russian travellers and stole their maps and notes before going into hiding with the Woman of Shamlegh. And many other stories such as 'Lispeth of the Kotgarh mission' and 'Namgay Doola' owe their origin to the inspiration of this wild and mountainous land. Kipling understood the Hills when he wrote "The last puff of the day-wind brought from the unseen villages the scent of damp wood-smoke, hot cakes, dripping undergrowth, and rotting pine-cones. That is the true smell of the Himalayas and if once it creeps into the blood of a man that man will at the last, forgetting all else, return to the hills to die."

Those who know and love the hills will remember this feeling, and for myself I also add the musty smell of Toling monastery, the cries of the men urging the yaks up to the pass, and the silence of the eternal snows. The beauty of such a memory outweighs all the discomforts and hardships that had to be undergone in its cause.

In a note at the end of his manuscript, Captain Hamond says: "Any place-name underlined in ink means that either it is not marked on the map or that the spelling on the map is, in my opinion, wrong. In both cases I have endeavoured to obtain the correct phonetical spelling." There are however indications that he has not in all respects followed the R.G.S.II system of spelling. Soon after his manuscript was received he was ordered overseas and there was no opportunity to discuss this matter with him. We have therefore in the text printed his underlined names in italic, and on the map have shown the Survey of India spelling where it differs from his, but his own spelling for places not on the quarter-inch sheets.—ED. *G. J.*

DISCUSSION

Before the paper the PRESIDENT (Sir GEORGE CLERK) said: Captain Robert Hamond is an officer of the Royal Norfolk Regiment, whose battalion was in 1939 stationed at Delhi, and he very wisely resolved to devote two months' leave to a journey into Tibet.

In the autumn of 1904, on his return from the mission to Lhasa, Sir Francis Younghusband detached four British officers to travel westward on the north of the Himalayan ranges, among their objects being to settle the question whether there was or was not any mountain in those ranges approaching or even surpassing Mount Everest in height. A second object was to establish a British trade agent at Gartok. They made the journey from Gartok westward to the Shipki pass and Simla in mid-winter.

Captain Hamond resolved to reach Gartok from Garhwal and to make the journey in the middle of summer by a different route, for few travellers had been that way since 1904 and there was little on record of the summer route. For this journey Captain Hamond received the MacGregor Medal. He has recently been ordered overseas and cannot read his paper himself as he had hoped, so Colonel Mason has very kindly undertaken to read the paper for Captain Hamond.

Lieut.-Colonel Mason then read the paper printed above, and a discussion followed.

The PRESIDENT: We are very fortunate to have with us Colonel Ryder who, I believe, will have something to add on the paper; but before I ask him to address us I should like Professor Mason to say, in Parliamentary language, those things which, I gather, he has to say in regard to certain observations by the writer of the paper.

Lieut.-Colonel MASON: It may be of some interest to recall that the first European explorers of these parts were those intrepid Jesuit missionaries, Father Antonio de Andrade and Brother Manuel Marques, who on 30 March 1624 set out from Agra to search for the Christians reported to be living in Western Tibet.

After considerable hardship they crossed the Mana pass, 17,890 feet, and reached Tsaparang on the Sutlej, some miles downstream of Daba, then the capital of Guge, a prosperous little kingdom in this part of Tibet. On 12 April 1626 a church was founded and for four years the mission flourished; but a revolution broke out in 1630 and the king and the two Jesuits in charge were carried off captive to Leh. The church and mission were sacked and the four hundred converts reduced to slavery.

When Francisco de Azevedo, the Visitor, reached Tsaparang in August 1631, he met considerable hostility from the new governor, and with John de Oliviera, crossed the plateau northwards, passing through Shangtse, Hanle, and Gya on their way to Leh—*i.e.* they crossed both Ryder's and Hamond's routes at right-angles. At Leh they obtained permission to preach Christianity in Western Tibet, but the mission seems to have eventually come to an end about 1640, Manuel Marques being last heard of as a prisoner in Tsaparang in 1641.

When Mackworth Young visited Tsaparang in 1912 he found a number of houses well preserved, but the only trace of church or mission, and that rather doubtful, was a weather-beaten wooden cross on the top of a *chorten*. The population then only consisted of four families.

In these bleak parts settlements rise, flourish, and fall very quickly; and it is not unusual for travellers to find very little trace of a place put on the map by their predecessors only a few years before. Daba, which Hamond passed through, had only a population of twenty when visited by Hugh Rose in 1931. The rest had cleared off owing to the cruelty and extortion of the Dzongpön, an ex-muleteer of Lhasa, who ruled as a tyrant.

I would have liked to ask Hamond whether his excellent companion, Kalian Singh, who met him at Niti, and who had been with Smythe, and Oliver, and

Osmaston on various expeditions, was a descendant of that "Third Pundit" explorer, Kalian Singh, a Bhotia of the same district, who is known in Survey of India Records as GK. I like to think that he is a grandson or great-grandson. For that old GK, with his famous brother Nain Singh, "The Pundit," and with his cousin Mani Singh, G.M. of our records, were the first three "Pundit explorers." It was these three who were sent out by Montgomerie in 1867, disguised as Bashahri traders to clear up the geography of the upper Sutlej. They visited the goldfields of Thok Jalung, mapped the main upper branches of the Indus, and traced for the first time the Sutlej course from Toling to Shipki. Their map had to be made rather surreptitiously and was based on route survey controlled by sextant latitudes at seventy-five points.

You will remember that Hamond met the Swiss climbing party under André Roch on his way up by Ramni. Some people would say that this party had a successful season. On July 5 they climbed Dunagiri, 23,184 feet. On August 8 they climbed Rataban, 20,100 feet, and on August 18 Gauri Parbat, 22,027 feet.

These were all fine climbs; but, like so many newcomers to the Himalaya, the Swiss were not satisfied, and began to take the sort of liberties that the Himalaya is always greedy to avenge. When attempting Chaukamba, 23,420 feet, on September 8, they pitched camp on one of the ice-terraces of its dangerous eastern slopes. As might have been expected after the previous few days of bad weather an avalanche broke away from the shoulder above and the whole surface on which they were camped started to slide. All three tents and their occupants were carried down between 1500 and 2000 feet, and two porters, Gombu Sherpa and Ajitia Dotial, were killed and others injured. The rest of the party escaped by a miracle, and through no skill of their own.

Colonel C. H. D. RYDER: As you will have gathered from some of the photographs, my journey was made thirty-seven years ago, and of the four of us on that journey, only two now survive. But I like to feel that the spirit of exploration is still strong, and I have listened to the description by Captain Hamond with the greatest interest. I suppose I am the only person in the room who has been in the part of the world he has described, and I can say his descriptions are very accurate.

It is curious that in a country of that type there should be a wealth of wild flowers at certain seasons of the year. At certain periods of the year you pass over howling and bare desert, and then, suddenly, in the spring you will find that transformed into a place carpeted with flowers of every description.

Then there are the animals. The marmot is a wonderful companion and an interesting little creature to watch. Marmots are nervous, but they have one most obvious etiquette. A marmot, when frightened, may run to another marmot's hole as hard as he can go, but immediately he gets there he must come up to the top of the hole and look round to see whether the danger is really urgent; if not, he must immediately go on to his own hole. You will see twenty, thirty, or fifty of them all running to holes, and at once they come up, look over the top, and about three-quarters of them run off to their own holes, leaving the rest as they were.

My journey over the area we have had mapped was made at the end of a long and arduous journey to Lhasa under Sir Francis Younghusband. The four of us were all rather tired. We collected what stores we could for our journey, while the rest returned to India and reached there in plenty of time. We had to face the problem of being caught by the weather and having to winter in Tibet. Our supplies were very meagre; the cold very intense. I can now look back with a certain amount of amusement on what was far from amusing at the time.

For instance, our journey was practically due west up to Rampur and, as you

all know, being geographers, when you are travelling due west and riding a pony your left leg is in the sun on the sunny side of the pony, your right is in the shade of the pony. The cold was so intense that it was necessary after ten minutes on the pony to either get off and walk or sit with your back towards the way the pony was travelling so as to get the right leg warmed up in the sun.

Our expedition actually went up to Gartok to establish a trade agent there. That we did, and then we had only one idea, to get back to civilization as fast as we could, over that ghastly country we have seen in the photographs, country cut up by ravines running in every direction. There was one advantage we gained from the extreme cold. Many of the streams which in summer when the snow has melted are roaring torrents were frozen hard, and we could cross them with ease. To that extent we had an easier time than Captain Hamond had when there in the middle of the summer.

One of the items that interested me most in the paper was the statement that Captain Hamond is only twenty-one. I like to think that the men of the younger generation are also explorers. I did not know until I came here this afternoon that he was in the Royal Norfolk Regiment, the regiment one of my sons was in. I like to feel that the spirit of exploration that took my son away to the Antarctic also made Hamond a good explorer.

The PRESIDENT: Our thanks are due to both the writer and the reader of the paper for a most interesting afternoon. We also thank Colonel Ryder for his contribution. We have spent a very profitable afternoon, and I am sure we are grateful to all three for what they have told us.

THE TALI DISTRICT OF WESTERN YUNNAN

C. P. FITZGERALD

Meeting of the Society, 5 January 1942

IN the far south-west of China, among the tangled mountains of western Yunnan, there is a long blue lake lying at the foot of snow-topped mountains, between them a strip of fertile rice land. This is the district of Tali, just north of the Burma Road. The road actually passes through Siakwan, which is the subsidiary township of the Tali district, and a short branch connects the city of Tali 10 miles farther up the lake. The topographical features of this region are sharply defined: the plain, narrow and flat but intensely fertile and closely cultivated for rice; the lake, Erh Hai, which forms the eastern boundary of the district; and lastly the massive wall of the Ts'ang Shan range, one of the highest in Yunnan proper, which shuts off the plain from the west.

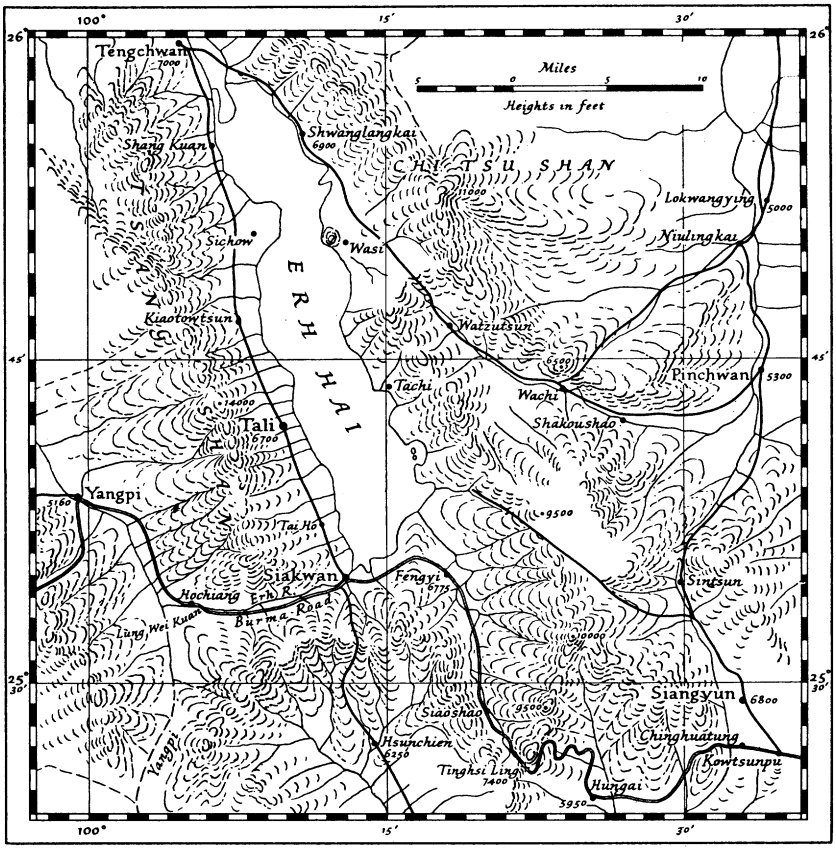
Beyond the lake to the east and south there are other lower ranges which are in fact the watersheds of the Yangtze, Red river (Yüan Kiang), and Mekong. The Red river, which flows out at Haiphong in Indo-China, actually rises in these southern ranges. The Erh Hai, the Ear Lake, fed by the northern Erh river, drains by way of the southern lower Erh into the Yangpi, which is a tributary of the Mekong, and the Tali district is thus within the basin of the latter river.

This is so unexpected, in view of the configuration of the ranges in this area, that many maps still show Erh Hai as draining into the Red river. When the height of Ts'ang Shan to the west compared with the relative insignificance of the ranges east of the lake is considered this would indeed appear to be the natural course of the river. In fact the lower Erh breaks out round the southern end of the Ts'ang Shan range through a very narrow gorge called Lung Wei Kuan, the Dragon's Tail Pass, where the stream at one point is actually bridged by a huge boulder wedged between cliffs. This gap has recently been widened to permit the construction of the Burma Road, which follows the line of this gorge and thus avoids a crossing of the Ts'ang Shan range. These mountains, although they attain 14,000 feet, and are thus the highest for many miles in any direction, are not a watershed of any importance. They divide the Erh Hai from the Yangpi river. Across the lake the low eastern mountain is the watershed of the Yangtze and Mekong, one of the main divides in south-eastern Asia.

I do not know whether the geological cause of this anomaly has been ascertained, but an untrained observer may remark that whereas all the ranges east and south of the lake are limestone formations, Ts'ang Shan, alone among the mountains east of the Salween, is granite. The exceptionally precipitous character of its slopes, particularly on the western side, suggests that it represents an upheaval of underlying rock which has broken through the limestone cover of the Yunnan plateau. The character of the forest which covers the upper part of the mountain is also different from that found on the nearest mountain of comparable height on the eastern side of the lake, the 11,000-foot Chi Tsu Shan, which is covered with chestnut woods but has few rhodo-

dendrons and cedars, whereas Ts'ang Shan has no chestnuts and is thickly overgrown with rhododendrons and conifers.

The plain of Tali, 30 miles long, but never more than 3 miles wide, penned in between the mountain and the lake, can be reached on land only from three points. The northern entrance is at Shang Kuan, the Upper Fort, where the slope of Ts'ang Shan is riven by a deep narrow cleft running down almost to the lake shore, here only a few hundred yards from the foot of the mountain. The gap between the cleft and the lake is closed and defended by the old walls



of the decayed fortress. Shang Kuan was always the weakest spot in Tali's defence, but the other entrance to the plain, at Siakwan, seems to be designed by nature to render the Tali plain almost impregnable. From the west the traveller, or invader, must pass through the Dragon's Tail Pass, which two men could have defended, since the old track was only just wide enough for one laden mule to pass, and twisted round sharp bends. From the east access was easy until Siakwan itself is reached, but there the actual entrance to the plain was barred by the swiftly flowing Erh river at the exit of the lake, and the single bridge is defended by the double fortress of Siakwan built on both banks of the river enclosing the bridge.

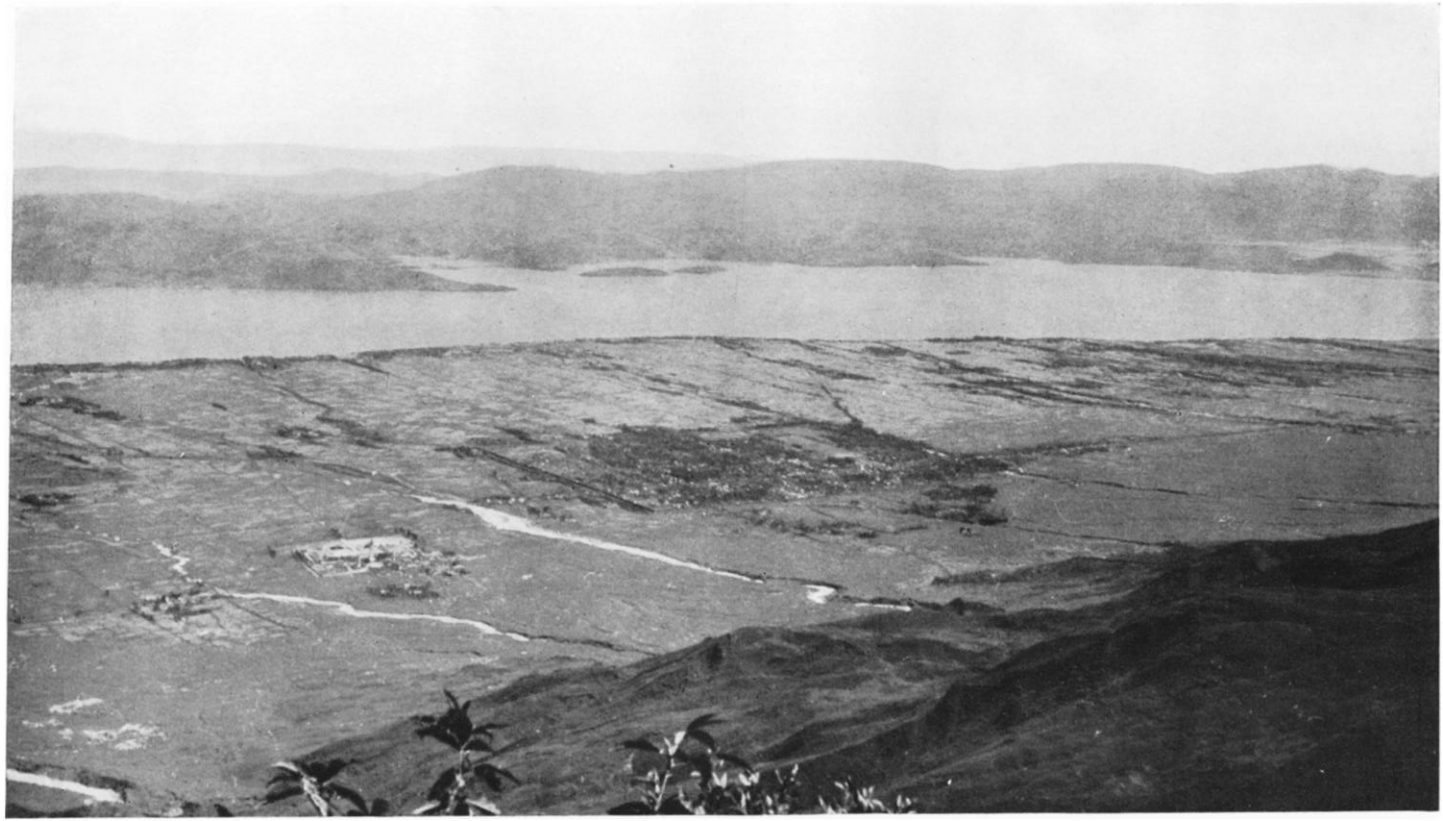
Ts'ang Shan itself is crossed by only one difficult mountain path, impassable in winter, and never fit for mules or horses. This little-known woodcutter's track is in fact now hardly ever used, and yet tradition says that it was by this third route that the Mongol army of Kubla Khan, long baffled by the defences of Tali, finally broke into the plain and conquered the ancient kingdom of Nan Chao, of which Tali was the capital.

Although so inaccessible by land, the Tali plain is everywhere open to communications by the lake, and indeed a large proportion of the commerce of the district is carried by boat. The shores of the plain are flat rice fields fringed with willow thickets, occasionally with still lagoons or narrow creeks. Many of the villages are built on the shores of the lake on newly reclaimed land so that the greatest possible acreage of old fertile land may be left free for the all-important cultivation of rice. For the same reason the villages farther from the shore are built along the lowest rock-strewn slopes of the mountain, a wide expanse of unbroken cultivation dividing the two groups of settlements.

With the exception of Siakwan at the southern end of the plain Tali city is the only town in the district, although the large village of Sichow near the northern end is almost to be ranked as a market township. The large number of villages, more than two hundred in all, are connected with these market centres and with each other by winding paved paths useful only for pedestrians or mules, for there was no wheeled traffic anywhere in western Yunnan until the recent building of the Burma Road. These villages, the homes of the Min Chia people, a non-Chinese race with a distinct language, vary in size from small groups of five or six houses to large settlements with three or four hundred inhabitants. They are entirely agricultural or fishing communities, all shopping and marketing being done at Tali or Siakwan or at certain markets held on fixed days at convenient points in the countryside.

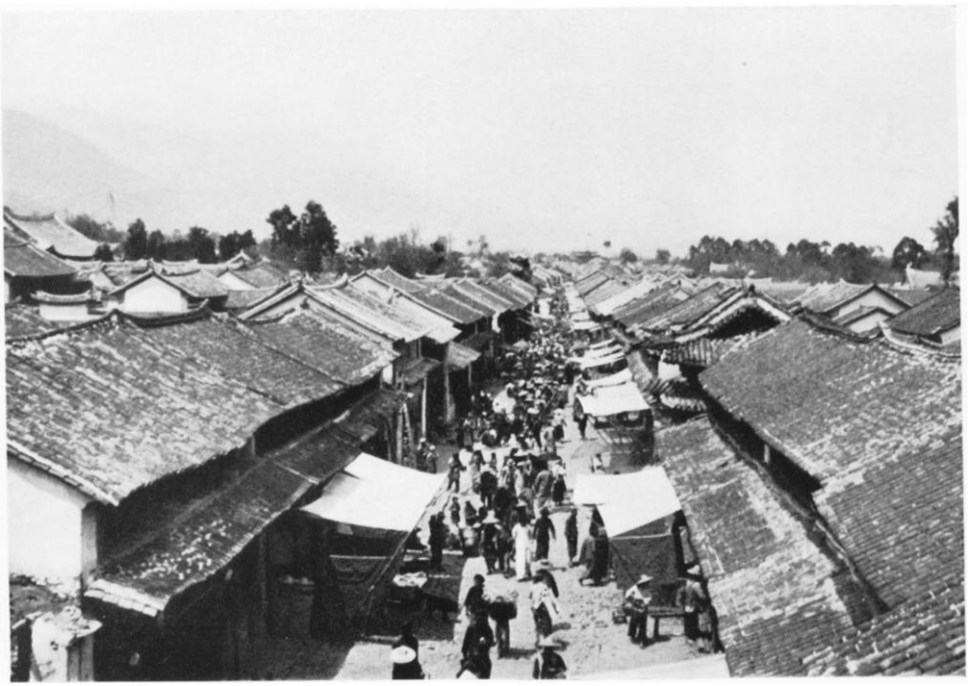
Although seen from the mountain the plain appears absolutely flat, it is in fact a gentle slope from the mountain base to the lake shore, very carefully graded so that each field nearer the lake is a little lower than the next, permitting the canalized mountain streams to be diverted into innumerable small channels which irrigate every field on the plain. Rice, as is well known, has to be planted out when the fields have been flooded, and as the Min Chia lack any pumping apparatus, and the level of the lake in spring is well below that of the plain, this flooding of the fields is accomplished by using the water from the mountain torrents which are swollen by the melting snows of the Ts'ang Shan. The Min Chia are therefore largely independent of the monsoon, which often does not break until the end of June. In point of fact the water supply from the streams is not really quite sufficient for the whole plain, so that the fields nearest the lake, which at first sight seem to be the most desirable, are of less value than those nearer the mountain which get the first use of the stream water.

There is no record of when this vast work of scientific irrigation and terracing was first undertaken. For more than a thousand years the Min Chia have certainly cultivated their rice in these fields, but whether they originally entered the plain as conquerors who then established a planned system of irrigation, or whether the original marsh was slowly reclaimed and terraced



Tali plain and Erh Hai from Ts'ang Shan

Eastern shore of Erh Hai and Tachi village



Tali City

as the population expanded, cannot now be determined. There is some evidence to show that the waters of the lake have slowly receded, and some tradition pointing to the present lakeside villages being later settlements than those inland, but the absence of ancient and accurate maps make this at best uncertain.

The Tali plain has certainly been inhabited for thousands of years. The city of Tali, itself founded in the seventh century, was preceded by the older city of Tai Ho, the site of which can still be seen near the village of the same name on the road to Siakwan. Above Tali, on a spur of the mountain, there are ancient earth and stone works in which small pieces of a primitive pottery, probably neolithic, have been picked up.

The eastern shore of the Erh Hai is not part of the administrative district of Tali, but it is both geographically and economically, as well as ethnically, part of the same region. In sharp contrast to the flat western shore, the bare rocky hills rise steeply out of deep water along the whole eastern side of the lake. Only at four or five points where small valleys drain into the lake are there any settlements, or any cultivation. These eastern limestone hills are dry and largely denuded of soil. The rainfall is much less, and the hours of sunlight much longer, for the immense wall of Ts'ang Shan shuts off the sun at four in the afternoon in winter at Tali, and at six in summer. Where there is soil the sheltered valleys of the eastern shore produce some of the finest fruit in China, several kinds of pears, peaches, and mandarin oranges, which are brought by boat to Tali and the villages of the western shore, where they are often bartered directly for rice, which is very little grown on the eastern side of the lake.

The inhabitants of this area being unable to get a sufficient livelihood as farmers, have turned to what are subsidiary occupations for the Min Chia of the Tali plain. The men of the eastern shore are the boatmen, boat builders, and fishermen of the lake. Although their bare hills produce no timber, they fetch this from the Tali side or from the wooded hills beyond their own range, and they have established a virtual monopoly of boat building. The Min Chia boats, some of which have a length of 40 feet, and a beam of 6 feet, are peculiar craft, evolved during the centuries by a people absolutely remote from any other stretch of navigable water. There are boats of an inferior and different pattern on the Kunyang lake at Kunming (Yünnanfu), 300 miles and more from Tali, and there are of course boats upon the Irrawady at Bhamo, also more than 300 miles from Tali. These are the only and nearest neighbours to the Min Chia boats of the Erh Hai.

The Min Chia boats are not caulked, or nailed together, but built of fitted grooved planks which are cemented over to make them watertight. They have no keel, but a very large rudder which projects far below the bottom of the boat and has to be shipped when approaching shallow water. They are propelled by sails made of grass mats similar in design to the sails of Chinese junks, but all rigging, sheets, and cordage are made of raw cow hide. These boats can sail fast, fairly close to the wind, but are helpless without a wind, since the oar has never been developed beyond a rudimentary paddle. When wind is lacking the Min Chia, to whom time is no object, either drift idly in deep water, or pole slowly along the shallow western shore until enough

breeze springs up to cross the lake. The weather in summer is admirably suited to these methods, since there is usually a light breeze from some direction, but in winter there are sudden and very violent squalls from Ts'ang Shan which are highly dangerous and much dreaded.

The lake has made the Min Chia a race of watermen, but oddly enough although they live among and under the shadow of great mountains this people show very little aptitude for the life of mountaineers. The characteristic occupations of the mountain dweller are ignored or underdeveloped among the Min Chia. They have very few flocks of sheep, and these are grazed only on the lower slopes where the pasture is not so rich as it is farther up. The woodcutting industry is also largely neglected and despised. The Min Chia get most of their building timber from across the lake by purchase, not from their own mountain forests. Stone and marble is indeed quarried from the mountain, and in the opinion of the inhabitants of Tali, that is its sole value. This is the more curious, as any one who climbs the Ts'ang Shan mountain can see that for a people who have only limited natural resources at their disposal the mountain holds many possibilities.

The Ts'ang Shan rises like a wall above the plain of Tali. There are no foothills, hardly any gradual slopes, at best only a half-mile or so of rock-strewn uneven land before the steep ascent begins. Consequently all the small valleys soon become inaccessible. As soon as the foot of the real mountain is reached these valleys become narrow gorges down which the streams drop in cascades and waterfalls, and none of these valleys can be followed for as much as a mile, usually very much less. Although these rocky valleys afford no road to the summit they are well worth visiting for their own secluded beauty and the rich growth of flowering shrubs and lesser flowers which grow along the stream banks. The ways to the higher levels lie up the ridges of the spurs which divide these gorges. The ascent is therefore everywhere steep and arduous. The tracks made by grass-cutters, women and boys, who go up to cut the rich grass of the mid-levels for fodder for the mule caravans in the city inns, are narrow and often deeply hollowed out by the summer rains. The lowest part of the mountain, above the grave-strewn rocky margin of the plain, is now covered with a pine forest mostly of quite recent growth, few of the trees appearing more than forty years old at most. The local people say that the ancient forest had almost wholly disappeared about half a century ago, and that the present re-afforestation, which has now clothed the first 1000 feet of the mountain with a thick forest of pines, has been accomplished by government action mainly since the establishment of the republic, that is in the past thirty years. The size of the trees would seem to confirm this. Wood may be cut on this part of the mountain only by licence from the city magistrate, and this regulation seems to be effective in checking the peasants' natural tendency to cut down trees.

The pine forest on the lower part of the mountain extends to about 8000 feet above sea-level, that is the first 1500 feet of the mountain itself. There is very little undergrowth on this part of the mountain except small white rhododendron bushes which have large blossoms, and the common pink and red azaleas which cover most of the mountains in Yunnan as thickly as heather in Scotland. Irises and gentians are the common flowers on these levels with

Lower Erh river below Dragon's Tail Pass

In the Dragon's Tail Pass

Dragon's Tail Pass at Siakwan: Burma Road on left

Estuary of Upper Erh river at Shang Kuan

Bridge over Upper Erh river near Shang Kuan

occasional wild tea bushes, rock orchids, and a white flowering thorn bush which is something like our blackthorn or hawthorn.

Near the upper limit of the pine forest there is a temple which is, so far as I know, the only habitation anywhere on the Ts'ang Shan mountain proper. The Min Chia would appear to have such a strong aversion to living on the mountain that even those who earn their livelihood by woodcutting or as shepherds, for whom it would be much more convenient to be near their work, invariably live in the villages at the foot of the mountain and make a daily ascent to work of several thousand feet, returning down the steep paths every night. Chung Ho Ssu and Wu Wei Ssu, on the very lowest slopes of the mountain, are the only two temples now inhabited on Ts'ang Shan. The first is Taoist, the second Buddhist, but both have well-kept shrines to the mountain god, an ancient Min Chia deity to whom little clay shrines are raised at the points where every track begins to climb the mountain. There are also some ruined temples and rock shrines, all comparatively low down, which were destroyed by the Moslem insurgents in the great rebellion of the sixties. To the inhabitants of Tali of the leisured class the climb to Chung Ho Ssu, 1500 feet at most, represents the extreme of hazardous mountaineering. Very few Min Chia except the woodcutters have ever been any higher, and most are entirely unaware of the character of the higher parts of the mountain at which they have looked every day of their lives. It is only in quite recent years, indeed mostly since the arrival of Chinese students and university men from the war zones in eastern China, that the local youth has been tempted to venture into the unknown regions higher up.

At about 8000 feet the character of the scenery changes abruptly. The pine forest thins out and is succeeded by a long climb up grassy slopes almost entirely treeless. If it were not for the ever expanding view over the plain and lake and the lower ranges beyond, this would be a dull stretch of hard going. The sunken paths are very rough and in summer tend to be also very wet from rainwater which pours down them after every shower. This part of the mountain should afford excellent pasture for sheep, but as it is rather too high for the sheep to be driven up and down each day, and the Min Chia will not establish themselves on the mountain itself, all this fine grazing goes to waste, or is at best cut by the village women and carried down for mule fodder. Even at this higher level the stream valleys are still mostly inaccessible ravines in which one can occasionally glimpse fine waterfalls hidden among a dense tangle of rhododendron and other flowering shrubs. The paths still follow the spine of the spurs dividing these gorges.

The famous Tali marble quarries are found in this middle zone of the mountain. The vein is about 30 feet thick and is mainly pure white. This ordinary white marble is quarried for tombstones, paving, and ornamental building material. The fine polished plaques which make astonishingly beautiful pictures of mountain scenery are cut from a very small vein of grey and coloured marble which lies embedded in the main vein of white marble. All the quarrying is done by hammer and chisel without any explosives. When a block is to be cut the quarrymen drill a number of small holes in line and drive wooden wedges into them. The wedges are wetted and left for the hard frosts of a winter night. By these simple methods the skilled men can split off a

block of marble, or of the building granite quarried lower down, with astonishing accuracy. Some of the pieces are of great size. It is in fact on record that the great carved slabs of marble, 10 feet long and 4 feet wide, which adorn the steps of the Forbidden City in Peiping were quarried from this remote mountain side, and then carried or dragged by human labour over the hundreds of miles of savage mountain country which lie between Tali and the Yangtze. Thence by river these costly ornaments were slowly brought down to Nanking and by the Grand Canal a further 1000 miles or so up to Peiping. This story would seem incredible were it not fully recorded in the Tali District History. This interesting book gives details of the extravagant demand for large pieces of marble made by the early Ming emperors, who it must be remembered were the first Chinese dynasty to rule Yunnan. The power of the newfounded dynasty was irresistible, but the Chinese are in a real sense a free people who will not submit to anything wholly unreasonable. So, after the first four or five huge pieces had been cut and dragged to Pahsien (Chungking) or Changsha, places about 800 miles from Tali by the shortest routes, the Yunnanese staged a little sabotage. When further orders for more and even larger marbles were sent from the distant and indifferent court, they were obeyed, after a fashion. The pieces were cut, but were broken in transit before they had got very far. This method of passive resistance was followed until the court moderated its demands both for quantity and size.

To-day large pieces, though not on the imperial scale, are still quarried for the adornment of temples and for the tombs of the wealthy. But the largest pieces of stone still quarried are not of marble but of granite, for building and for millstones. Near Tali one may see these grinding stones 6 feet in diameter and nearly a foot thick, cut from a single piece out of a granite boulder. Pieces of granite 15 or more feet in length are cut to make ties for bridges and as edge pieces for the verandas which surround a Chinese house.

Seen from the plain the upper levels of Ts'ang Shan seem to be bare dark rock, but this is an illusion due to the clear air which annihilates distance and destroys the just sense of proportion. In actual fact the higher parts of the mountain are clothed in a dense forest of bamboos, and higher still of cedars, magnolia, and tree rhododendrons, so that where to the distant view the mountain seems barest it is really the most forested.

This forest is divided into two clearly defined zones, the bamboo thickets which begin at about 11,000 feet, and the true forest which covers the last 2000 feet of the mountain up to the crest-line itself. As far as the bamboo thickets there are still clearly defined tracks and paths; for the Min Chia come up here to cut bamboos for brooms and fencing material. The bamboos are not of the large, big-stemmed variety which are found in Szechwan and other parts of south China, but a densely growing feathery type about 7 or 8 feet high. The thickets are almost impenetrable where there is no path, and uncomfortable walking where there is one. This level of the mountain is in spring and summer almost always under mist and thin drizzle, so that the soaking bamboos shower the passer-by with a cold douche at every step. In winter this part of the mountain, indeed everything above 10,000 feet, is of course under deep snow and inaccessible to the Min Chia, who possess no clothing or footwear suitable for mountain climbing in snow.

Even as late as June or the end of May there are still big banks of unmelted snow in the shadowed hollows of the rain forest, and these provide the poorer Min Chia with a curious source of income. From about the beginning of April, when it is full hot summer on the plain, with day temperatures up to 80 degrees, the wayfarer is delighted to find women selling a delicious mixture of snow and honey at points along the dusty roads. The snow, packed tightly in mat baskets and wrapped round with loose woven palm fibre cloth, remains firm and frozen even in the warm air of the summer for a day or two, which is quite long enough for the stock to be sold out. The snow is scooped out with a rice bowl and then covered either with liquid honey or melted brown sugar, making a sort of primitive ice-cream which is very delicious and refreshing.

The last forest zone of the mountain, from 12,000 feet to the crest, is entirely different from the lower and middle slopes. All here is dense forest of cedars, ilex, magnolias, and above all many kinds of magnificent rhododendrons, red, white, pink, and yellow. Under this forest, which is hung with moss and lichen from the almost perpetual drizzle and cold mist which shrouds it in summer, there is a profusion of wild flowers, but of kinds which are perfectly familiar to us from an English garden. Here on a wild mountain top in south-west China there are pansies and violets, roses, crocuses, hyacinths, and primroses, and near the very crest of the mountain, among thickets of golden rhododendrons, I have feasted on delicious raspberries and black currants very like those at home. One seems at last to have climbed right out of China into a neglected English garden.

There is no real path through the rain-forest zone. Woodcutters who come here make their way through the thickets to find a suitable tree for felling, but as no Min Chia ever wished to go to the top of the mountain for its own sake, one has to find one's own way to the last and most unexpected beauty of the hidden forest, the Hsi Ma T'ang, the "Horse Washing Pool," a still, ice-cold mountain tarn surrounded by dense thickets of golden rhododendrons, and lying only a couple of hundred feet under the crest itself. The tarn takes its name from a legend which says that a divinity of the past made a road on the crest of Ts'ang Shan along which he galloped his horses and washed them in this tarn. No horse of mortal origin, needless to say, could ever be brought up to this inaccessible spot. The story about the road along the crest does at least show that some Min Chia must have wandered up to the summit, for when the crest-line is reached the source of the legend is plain. The crest of Ts'ang Shan is a relatively flat platform about 6 feet wide overlooking an almost vertical drop on the western side. This ledge makes an excellent and comparatively easy walk along the crest which could perhaps be continued for miles over the peaks which do not rise far above the general line of the summit ridge.

The view from the crest of Ts'ang Shan, when one can see it, is perhaps the finest in Yunnan. Eastwards, over the plain and lake lying like a map below one, there is the wild confusion of ranges which form central Yunnan, visible for nearly 80 miles to the An Nan Kuan pass above Yünnanyi on the Burma Road. The view to the north is bounded by the immense shape of Yu Lung Shan, the snow mountain of Likiang, which with its twin Ha Pa Shan over-

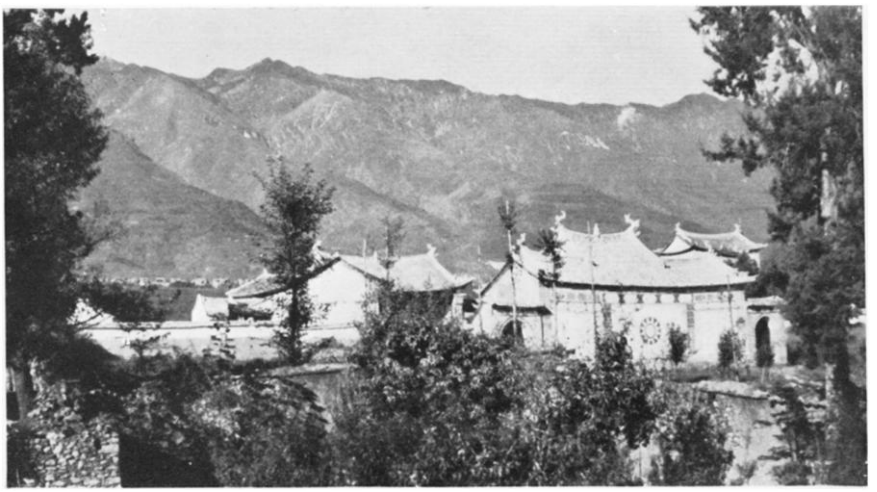
hangs the great gorge of the Yangtze. Yu Lung Shan is also about 100 miles from Tali. But it is to the west, towards the Mekong and Burma that the view is longest and most impressive. The western ranges are entirely dominated by Ts'ang Shan, which can be seen like a wall on the eastern horizon from the Salween–Mekong divide above Paoshan, nine days' journey from Tali, or more than 180 miles by road.

This panorama is very rarely to be seen in summer when the climate on the upper part of Ts'ang Shan is vile. Mist and cloud hang round the crest for most of the summer months, and as the upper levels are deep in snow in winter an ascent then is only possible if mountaineering equipment is available. It is therefore in the brief weeks of early autumn, after the monsoon rains have stopped, but before the snow has fallen, a season when the air is exceptionally clear, that the ascent of Ts'ang Shan should be made for the view; but the flowering shrubs and wild flowers are for the most part out of season so that for natural beauty the best time is early May or late April. At this time, just before the monsoon breaks, the skies are relatively clear, though there is not the sparkling crystal quality of the Chinese autumn. There will still be some snow, but not sufficient to hinder the climber. The flowers and shrubs are then at their best, and I know of no place more breath-takingly beautiful than the Hsi Ma T'ang shining in the May sun with the golden rhododendrons which surround it backed by great drifts of snow.

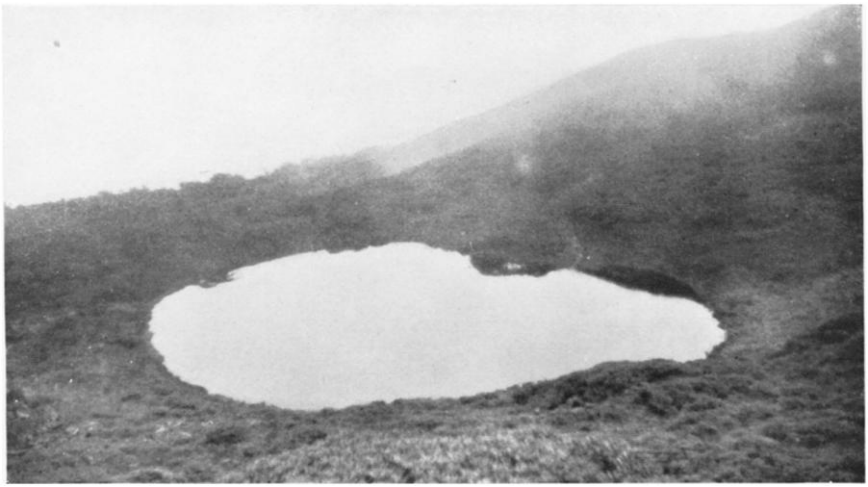
The question of the fauna of Ts'ang Shan is not one on which I can throw very much light. There are certainly deer, and also wolves, which do not hunt in packs, and are considered comparatively harmless to adults. I have seen these animals on several occasions, but they always seemed anxious to avoid man, even though none of the Min Chia woodcutters ever carry fire-arms. The Min Chia say there are no tiger left on Ts'ang Shan, which seems strange, for one can see no reason for them to have disappeared. Leopards are also supposed to be either extinct or nearly so. Personally I would take these opinions with caution. A few years ago a tiger was killed near the city of Fenyang in Shansi, north China, in a country which foreign sportsmen from Tientsin and Peiping were accustomed to visit year after year, and in which the presence of tigers was supposed to have been definitely disproved. Equally the Min Chia seem never to have heard of the giant panda, and foreign visitors have always considered that there are none of these animals in Yunnan, where there was supposed to be no suitable country for them. It always seemed to me that the bamboo thickets on the upper level of Ts'ang Shan, which extend upwards for 1000 feet or so, and along the range for nearly 30 miles, might be a stretch of country in which pandas would be found. The only evidence I can offer for this opinion is by an unfortunate chance inconclusive. Shortly before I left Tali in the autumn of 1938 I had to make a journey to Kunming, and on my return I was told by the resident C.I.M. missionary, Mr. W. Allen, that in my absence a Min Chia woodcutter had been to my house, and then to the Mission with two small cubs for sale. Mr. Allen's description of these cubs tallies in every way with pictures of the panda cub that I have seen, and he was convinced that they were giant panda cubs. The woodcutter's story was as follows. When cutting bamboo in the thickets which I have described he came suddenly

Ts'ang Shan in summer

Ts'ang Shan in winter



Ts'ang Shan from Tali



Hsi Ma T'ang

Rain forest near crest of Ts'ang Shan

Buddhist temple: Wu Wei Ssu

upon "a large animal which at once bounded away into the bamboo and vanished." It left behind it however these two cubs which the woodcutter put in his basket and brought down to sell. Hearing of me he had thought the foreigner a likely customer, and as the mission could not take the cubs he took them down to Siakwan and sold them to a Chinese medicine shop. They no doubt disposed of them through the ordinary trade channels, as it is in any case unlikely that the cubs could have been kept alive without proper care for more than a few days. Mr. Allen unfortunately, being a very busy man, did not remember to photograph the cubs when he saw them. One must add that the Min Chia woodcutter himself professed to have no idea what these animals were, and no other Min Chia seemed to have heard of the giant panda either. This would be more impressive negative evidence if one did not know that the Min Chia are not at all a hunting people and that those I knew were not even aware of the existence of deer on the mountain although these can sometimes be seen quite low down.

In conclusion I would suggest that a tract of country so remote and so rough as the Ts'ang Shan higher levels may contain many surprises both for the zoologist and the botanist. It must be remembered that Ts'ang Shan is not only very much higher than any other mountain for more than 100 miles in any direction, but is of a different geological formation from these neighbouring ranges, and therefore has a different flora.

Now that Tali is connected by the Burma Road with Kunming to the east and Rangoon to the west the trickle of western visitors who have hitherto passed by will in time grow to a steady stream. The course of the war in the near future may well bring many a British officer to the scenes which I have described, and if the calls of military duty permit, some of them may find relaxation in the rare beauty of the Tali district or investigate the possibilities of sport in the hidden ravines and dense thickets of Ts'ang Shan.

DISCUSSION

Before the paper the CHAIRMAN (Sir FRANCIS YOUNGHUSBAND) said: This afternoon we are to hear Mr. Patrick FitzGerald, who two years ago gave this Society a most interesting lecture upon the Yunnan–Burma Road. Mr. FitzGerald is an anthropologist, and during his long residence in Tali he learned much of the geography of that interesting region of Yunnan, in south-west China. This afternoon he is to deal with the interesting lake basin in which Tali lies.

Mr. FitzGerald then delivered the lecture printed above, and a discussion followed.

The CHAIRMAN: I hope you have all enjoyed the lecture as much as I have. It is fifty-four years since I first went to China, and it has been the greatest pleasure to get again in touch with that wonderful country. The Min Chia of Yunnan are not Chinese, but they remind me very much of them.

The Chinese are remarkable for their extraordinary contrasts; they are the most industrious people in the world, and they make use of every possible thing in the most economical way; and yet they have all sorts of odd prejudices, one of which is that they do not drink milk in any form. That is astounding in a people who economize in their food in every other way. And this afternoon we have heard of the Min Chia, with magnificent forests and pasture land within

easy reach, not making use of them. Then, again characteristically, you see them carrying by human labour an immense weight of marble an incredible distance for the temples at Peiping; and then showing independence in their own subtle way by not indeed refusing further demands for huge blocks of marble, but quarrying them and then gradually letting the blocks disappear *en route*.

Mr. FitzGerald hoped that some day officers or travellers on their way up the Burma Road or others might explore those forests and pasture lands for plants. There are plenty of plant collectors who would be delighted to go to that area after the war: indeed, I am sure it will be one of the great fields of the plant collector in future. And there is the possibility of finding the giant panda there. Some years ago General George Pereira spent a year or more hunting for the panda from Yunnan to Szechwan. It was almost his life's ambition to discover it. If his brother Sir Cecil Pereira is here perhaps he could tell us something more as to that.

Finally a word on the architecture. In that far-away part of south-west China you see pagoda-shaped roofs and buildings on a truly magnificent scale, showing the greatness of the Chinese people. That greatness is coming out in the present war. It is everything to us that we in this country should now be in alliance with a great people such as the Chinese. We hope that in future Asia, China, and India will always be pulling together.

Major-General Sir CECIL PEREIRA: All I can say is that my brother made several very hard journeys to most inaccessible mountains in south-west China under trying conditions: he had several toes and fingers frost-bitten during the period, in an endeavour to find the giant panda. He found traces of it and actually shot a panda cat, now in the Natural History Museum, a beautiful little red animal; but he never had a chance of shooting a panda bear.

Admiral Sir WILLIAM GOODENOUGH: Could we be told what the great Chinese characters on the buildings mean: are they the name of the place?

Mr. FITZGERALD: The inscription on the South Gate of Tali means "the tower of five glories."

The CHAIRMAN: I am sure you would wish me, on your behalf, to thank Mr. FitzGerald for his extremely interesting lecture, and to assure him that those of us who are younger than I am, whenever we get the opportunity, will go out to that beautiful part of the world and try to follow up the giant panda in the bamboo forests of Yunnan.

Not all the place-names in Mr. FitzGerald's paper can be found in the Chinese Postal Guide. Where possible names follow the Guide, elsewhere the Wade-Giles romanization.

A SURVEY OF ANCIENT SITES ALONG THE "LOST" SARASVATI RIVER

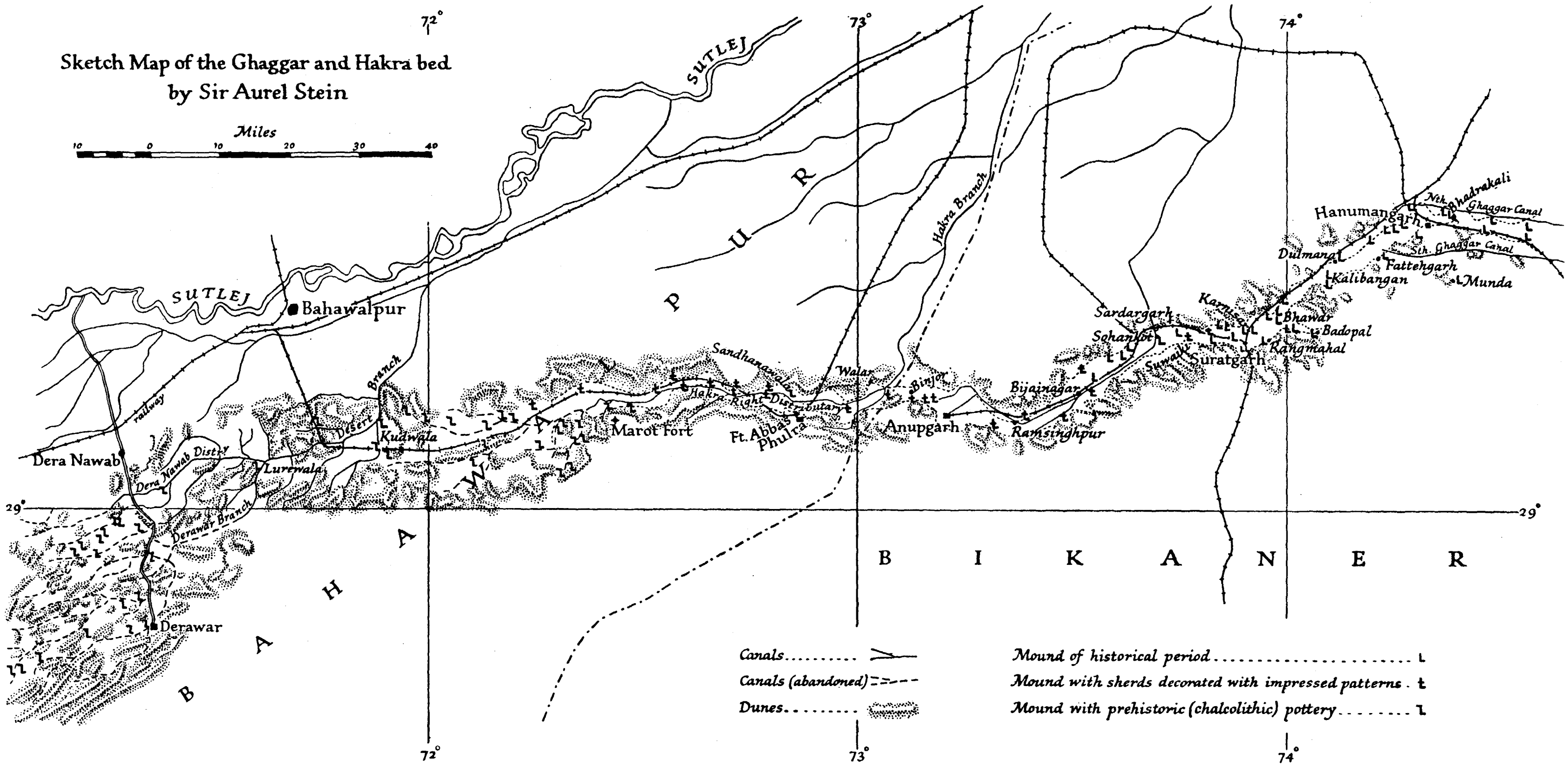
SIR AUREL STEIN, K.C.I.E., F.B.A.

ON my return to India from the explorations of 1938–39 along the Roman frontier defences of 'Iraq and Transjordan, a survey of any remains of ancient occupation along the dry river-bed of the Ghaggar or Hakra, which passes from the easternmost Panjab through the States of Bikaner and Bahawalpur down to Sind, seemed attractive. Traditional Indian belief recognizes in this well-marked bed the course of the sacred Sarasvati, once carrying its abundant waters down to the ocean and since antiquity "lost" in desert sands. There is no history of this great physical change. My Central Asian expeditions had shown me that where rivers have long ago ceased to carry their life-giving water, the chronology of important physical changes, as marked by remains of human occupation since prehistoric times, can be traced more easily than is possible elsewhere.

The climate of the Indian Desert, dry enough nowadays, is far removed from that extreme aridity of that true desert which in Chinese Turkistan has allowed relics of ancient life to survive in such remarkable preservation. But observation of topographical features along extensive stretches of that dry river bed, locally still well known, and the study of old sites on its banks, might throw some light on the period when water permitted there continuous agriculture and thus, perhaps, on the chronology of the process which led to water ceasing to flow in the bed. Any such indications would bear on the much discussed question of desiccation in Asia. Indirectly they might also be helpful to the student of early Indian history, still so much obscured by the want of reliable records and the inadequacy of archaeological evidence.

A tour in Kashmir in the autumn of 1940 did not allow me to start field work in Bikaner until the middle of December. The Political Department of the Indian Government helped to secure very generous arrangements for the survey from Maharaja Ganga Singhji, that remarkable ruler of the Bikaner State. Field work promptly started enabled me within less than six weeks to examine the large series of ancient mounds along the Ghaggar within Bikaner territory over a total distance of some 110 miles and to test two interesting sites by trial excavation. Proceeding thence through Jodhpur and Jaisalmer in Western Rajputana, the State of Bahawalpur in the Panjab was reached at its southern extremity. Thanks to the support kindly accorded by the Hon. C. P. Skrine, O.B.E., Resident for the Panjab States, very effective help was received here also from the State authorities, in particular from Mr. E. Anderson, C.I.E., Minister of Public Works and Irrigation, and Mr. H. Trevelyan, I.C.S., Deputy Commissioner. Within Bahawalpur territory still more numerous ancient sites, mainly prehistoric, were traced and surveyed for some 150 miles along the dry bed of the Hakra, as the continuation of the Ghaggar is known here, from the Bikaner border down to its deltaic portion below Derawar. Heat stopped field work by the middle of March.

Throughout the tour I was assisted on the topographical side by Surveyor Muhammad Ayub Khan, late of the Survey of India, my old travel com-


Sketch Map of the Ghaggar and Hakra bed
by Sir Aurel Stein
Miles
10 0 10 20 30 40
72°
73°
74°
29°
SUTLEJ
Bahawalpur
Dera Nawab
railway
Dera Nawab Disty.
Lurewala
Derawar Branch
Derawar
Desert Branch
Kudwala
Marot Fort
Sandhanawala
Hakra Right Distributary
Ft. Abbas
Phulra
Walar
Hakra Branch
Binjor
Anupgarh
Bijainagar
Ramsinghpur
Sardargarh
Sohankot
Suwalki
Suratgarh
Karnisar
Bhawar
Badopal
Rangmahal
Dulmana
Kalibangan
Fattehgarh
Munda
Hanumangarh
Bhadrakali
Nth. Ghaggar Canal
Sth. Ghaggar Canal
B A H A W A L P U R
B I K A N E R
Canals
Canals (abandoned)
Dunes
Mound of historical period
Mound with sherds decorated with impressed patterns
Mound with prehistoric (chalcolithic) pottery

panion on successive journeys in Iran. After leaving Bikaner willing help was afforded also on the archaeological side by Mr. Krishna Deva, a young scholar attached to the Archaeological Survey of India. Rao Bahadur K. N. Dikshit, its present Director-General, had before shown a very helpful interest in the object of the tour by a spontaneous offer of a grant of the Department towards its expenses. A detailed report has been prepared and will be published among the *Memoirs of the Archaeological Survey of India.*

The Ghaggar and its several affluents rise as torrent beds in the Siwaliks that fringe the outermost of the Himalayan ranges. After passing down to the Ambala district, they soon cease to be perennial streams. The easternmost, still known as the Sarsuti (the Hindi derivative of Sarasvati), passes the sacred sites of Kurukshetra near Thanesar, a place of Hindu pilgrimage; it is for the most part of the year only a modest rivulet. Farther down, some 50 miles below the town of Ambala, when the Ghaggar has gathered all its tributaries and has entered Patiala territory, it flows in its wide sandy bed for only some months. Where it approaches the Bikaner border, after passing through Patiala territory and the western portion of the Hissar district, the reservoir of Otu was constructed some forty years ago, with a weir to hold up flood water for feeding two small canals in Bikaner territory. But these suffice to irrigate only very narrow belts of land on either side of the Ghaggar for some 30 miles westwards, the available water each year varying greatly with the monsoon rainfall. The area thus irrigated down to near the small town of Hanumangarh forms even in good years but a small portion of the land shown by revenue records as cultivable within the *Tahsil*; what little water is left in the Ghaggar itself suffices only for a still smaller portion of ground in its bed. Its flow has stopped in most years above Hanumangarh; rarely is it known to have extended so far as 16 miles below.

The sketch-map based on the latest survey shows how great is the contrast between the very scanty volume of water brought down by the Ghaggar and the width of its dry bed within Bikaner territory; over more than 100 miles it is nowhere less than 2 miles and in places 4 miles or more. This bed is lined on both sides by dunes varying in height but gathered into continuous bands or ridges. Seen from a distance these might suggest river banks, but they show no marks of erosion.

Their interpretation was taught me in the Taklamakan and Lop deserts of the Tarim basin, where the river beds, whether still receiving some water or dead for ages, are always flanked by continuous ridges of high dunes. The wind-borne sand from adjacent deserts is stopped by the vegetation growing in riverine belts once reached by seasonal inundation. The gradually rising accumulation of drift-sand, usually protected by some growth of scrub, has prevented the onward move of fresh dunes and thus preserved the dry beds from being smothered. Exactly the same was often seen in the Tarim basin along the edges of cultivated ground, whether still tilled or abandoned for ages.

Within the riverine belt clearly marked by these high marginal ridges of sand the Ghaggar once carried its shifting course; but there is no reason to assume that it ever filled it completely. The bed shows a firm loamy soil, easily distinguished from the light sand on either side. Whenever it receives

adequate moisture it proves very fertile. The striking appearance of the marginal ridges, helped by this difference of the soil, accounts for the popular belief that the bed of the Ghaggar was once the course of a mighty river filling it completely. Both on the Ghaggar and its continuation the Hakra, I found this notion reflected in popular legends.

The scanty and very irregular rainfall lower down the Ghaggar is determined almost solely by the monsoon and subject to extreme variations. At the Bikaner Observatory for the thirty-five years 1879–1913 the annual average was 10·93 inches, yet that period included years as low as 5·80, 3·40, and 1·14 inches. Where irrigation by canals is not available the uncertainty of crops makes the rural population dependent largely upon a pastoral livelihood, and even this is precarious in years when wells and tanks dry up.

The special interest of the Ghaggar or Hakra arises from the fact that traditional belief recognizes in that dry bed the terminal course of the Sarasvati river mentioned in many hymns of the "Rigveda," the oldest surviving record in any Indo-European language. In later Vedic texts it certainly bears the character of a sacred river which attaches to the present Sarasvati in the classical Sanskrit literature and religious tradition of India. In at least three passages of the Rigveda mentioning the Sarasvati, a river corresponding to the present Sarsuti and Ghaggar is meant. For this we have conclusive evidence in the famous hymn, the "Praise of the rivers" (*Nadistuti*) which, with a precision unfortunately quite exceptional in Vedic texts, enumerates the *Sarasvati* correctly between the *Yamuna* (Jumna) in the east and the *Sutudri* or Sutlej in the west.[1] In a much larger number of passages of the Rigveda the Sarasvati is referred to as "the foremost of rivers," as flowing into the ocean, and otherwise extolled for its greatness in a way which seems difficult to reconcile with the Sarsuti and Ghaggar of the present day.[2] This difficulty induced Professor R. von Roth to recognize the Sindhu or Indus in the great river of these passages, and in this he has been followed by other scholars. The survey briefly described below may, perhaps, help to remove some of the doubts raised by that apparent discrepancy.

Taking first the Ghaggar bed above Hanumangarh, one notes that the number of mounds marking ancient sites long abandoned is here distinctly smaller than farther down the old river bed. Such mounds, known locally by the terms *ther* or *theri* (in the case of the smaller ones) are bare of all vegetation and covered with pieces of broken pottery; these mark prolonged occupation before the sites were abandoned. The long erosion by wind and rain has gradually brought to the surface sherds dropped at different times and embedded in varying levels. This thick cover of sherds makes these ancient mounds easily recognizable from a distance and well known to the people. It is not found where occupation has continued down to recent times or has been resumed later.

[1] For the list of rivers between the Ganges and the Indus, given in due geographical order, see my paper "On some river names in the Rigveda," *Journal of the Royal Asiatic Society*, 1917, 91–99.

[2] A careful synopsis of all Vedic passages which mention the Sarasvati and of the different views held by Indologists on their interpretation, is presented by Professors Macdonell and Keith, 'Vedic index of names and subjects,' ii. pp. 434 ff.

Such mounds are more numerous lower down the Ghaggar than near and above Hanumangarh, and also, I have reason to believe, farther up within the Hissar district; this is readily explained. Within the Hanumangarh Tahsil, cultivation is still facilitated by such irrigation as the two branches of the Ghaggar Canal and the periodical descent of flood water in the *Nali* within the Ghaggar afford. Hence there are here also more settlements still in being. Small as they are they are apt to cover up the traces of former occupation. The imposing ruined fort at Bhatner close to Hanumangarh, which figures in recorded history during medieval times and later, stands on a big mound, rising to some 100 feet, and is very early, probably prehistoric. But owing to later debris and refuse deposited on the slopes below the walls of the fort during continuous occupation, no specimens of those characteristic types of ceramic ware, common on all thers, were here on the surface.

At almost all the mounds which the map marks within the Hanumangarh Tahsil, fragments of that painted or relief-decorated pottery could be found which can be definitely assigned to early historical times down to the Kushan period or the first two centuries of our era. Some 4 miles to the east of Hanumangarh lies the mound of Bhadrakali, called after a Hindu shrine standing at its eastern end and attesting here as usual "continuity of local worship." The mound measures fully 300 yards long and rises to some 43 feet above the surrounding ground which, owing to occasional flooding from the Nali and thanks to intelligent protection, still bears thin tree growth. Here painted sherds of the early historical type could be picked up in plenty on the surface. At Fattehgarh to the south-east the mound which, though extensively dug into for manuring earth and for saltpetre, still rises on its crest to 47 feet, displays the same early painted ware both on its surface and deep down in layers exposed by these diggings. The great difference in levels affords proof of the prolonged period during which that ceramic type prevailed.

Clear chronological evidence regarding the time down to which this type remained in use was afforded by a short but profitable trial excavation at the small village of Munda, not on the Ghaggar but about 10 miles to the south-east of Hanumangarh in dune-covered ground known throughout Bikaner as *Dora*. Its people, mainly pastoral, carry on some precarious cultivation with the help of tanks and deep wells. A sandy spur, rising some 50 feet near the hamlet, carries on its top a small modern shrine of Hanuman, the monkey god. Remains of terracotta sculpture from a badly destroyed Hindu temple were found close by almost on the surface. Their style showing Graeco-Bhuddhist influence pointed to the Kushan period, and this was confirmed by the discovery of a *cache* of Kushan copper coins comprising several issues, lower down on the slope. A trial trench cut down from the level of the ruined shrine disclosed painted pottery of the above type for some 10 feet lower. The same date was subsequently derived from the Rangmahal site.

The definite dating of this painted ware with well-executed geometrical and floral designs has its special interest. It marks the period of occupation also for the sites surveyed above and below Suratgarh, the small town lower down on the Ghaggar bed. It is plentiful on all the numerous and mostly large thers traced along and within this stretch of the Ghaggar for more

than 30 miles. The large number of these ancient sites contrasts strikingly with the very few small villages still on the same ground. Apart from Suratgarh, which owes its size to being the trade and administrative centre for the whole district, the dwellers in these hamlets live far more on their flocks, cattle, and camels than on their small plots of precarious cultivation wholly dependent on the spasmodic rainfall. How limited the number of people living in these villages is can be realized from the statistical record of 1901, the latest accessible to me in the *Bikaner Gazetteer*. For the Suratgarh Tahsil, comprising an extensive desert area of Dora, the record of 1901 showed a total of eighteen thousand souls (including the town of Suratgarh) living in one hundred and twenty-six villages.

How much larger the agricultural population must have been in early historical times is shown by the number and size of the mounds proved more or less contemporary. Irrigation from the summer floods in the Ghaggar bed permitted agriculture to an extent quite impossible at present.

Among the twenty-four main sites which the sketch-map shows between Dulmana and Sohankot, Rangmahal is of particular interest. It is about 3 miles to the east of Suratgarh, where the Ghaggar bed makes a marked bend at the foot of a projecting high sandy spur on the south. The name Rangmahal, "the notable mansion," suggests the importance of the site. Several mounds along the foot of the spur and some structures on the northern slope of the latter have been repeatedly quarried for their burnt bricks, first about the year 1800 to build the fort of Suratgarh, and much later for metalling the permanent way of the railway. From numerous terracotta sculptures of the late Kushan period which have found their way into the walls of the fort and thence partly into the Bikaner Museum, it is certain that these structures comprised at least one Hindu temple. A small modern shrine on the slope of the sand spur indicates here also the continuity of local worship. The spur rising to fully 150 feet is connected with a chain of high sand ridges stretching east and west of Suratgarh. This shows how far back reaches the accumulation of dunes which accompany the bed of the Ghaggar and are now taken for its "banks."

The principal mound of Rangmahal is about 300 yards in diameter and rises to 35 feet, thickly covered with sherds. The plentiful painted fragments among them can be definitely assigned to early historical times ending with the Kushan period, and the numerous terracotta figurines on the surface and down to 15 feet below, all clearly show the influence of the Graeco-Buddhist art of Gandhara. The absence of glazed pottery here and along this portion of the Ghaggar points to abandonment long before Iranian influence was established through Muhammadan domination in the north-west of India. The large ancient tank lined with massive walls of burnt bricks near the principal mound suggests occasional failure of water supply even when the site was still occupied.

Among other sites along the Suratgarh stretch of the Ghaggar a few only need be noted. The Thers of Karnisar and Bhawar, both within 4 miles of Rangmahal, have a circumference of fully half a mile, the second one rising to some 40 feet. At both painted sherds of the same type as at Rangmahal, including also animal figures, could be picked up on the surface in abundance,

at Karnisar also a few Kushan coins. From the mound at Badopal, 7 miles east of Rangmahal, and fully a quarter mile long, terracotta relievos from a Hindu temple, somewhat later than the one at Rangmahal, had been previously removed to Bikaner. Two large mounds close together some 14 miles to the north-east of Rangmahal and not far from the abandoned hamlet of Kalibangan offer interest as marking an extensive site used mainly for burning bricks and for pottery. They measure together some 600 yards in length and 450 yards across, with a maximum height of 30 feet. They are composed almost entirely of kiln remains. The painted sherds found among them leave no doubt about the kilns having been worked down to the Kushan period, and the size of the area shows the demand for their produce. A large tank-like depression near the mounds marks the place where the clay had been dug and water kept.

To the west of Suratgarh down the Ghaggar the number of mounds diminishes. The ther close to the small village of Sardargarh, with a diameter of nearly 500 yards, still shows plenty of painted pottery, but this comes to an end at the mound of Sohankot, about 3 miles farther to the south-west and now much reduced by recent digging for manuring earth. The Ganganagar canal brought in recent years from a great weir constructed on the Sutlej below Firozpore has brought new settled life to the dry river bed.

South-east of Sardargarh at the two smaller sites of Suwaiki and Bhaironpurs, close together, flat patches of ground show, among debris of plain pottery, decorated sherds of a quite distinct type, unpainted and bearing coarsely impressed geometrical patterns with hachured or herring-bone designs. This type of ware, found also at certain sites lower down, unmistakably marks a different period of occupation.

The Anupgarh Tahsil begins where the new canal enters the bed; it takes its name from the only old village in it. Within this area no painted potsherds of the Rangmahal type could be found. The very few mounds of any height had indeterminate plain ware and scarce fragments decorated with simple black bands or coarsely impressed patterns. But a single small worked flint blade, the first prehistoric relic picked up along the Ghaggar, contrasted with the abundance of stone implements within Bahawalpur territory.

From the border of the Bikaner and Bahawalpur States the dry riverine belt is known as the Hakra. It becomes wider and near Walar, above the new colony of Fort Abbas, a distinct gap in the northern sand ridges brings the Hakra Branch of the great new canal system. This canal has brought water and cultivation along a portion of the Hakra bed which had long known no settled agricultural life, and also into the Cholistan, the wide desert belt north of the Hakra.[1]

Careful study of the large-scale levelling charts prepared by the Survey of India for the Sutlej Project when this important canal scheme was being planned by the Panjab Irrigation Department, has shown me that the Hakra Branch canal passes for some 104 miles across levels between the sand ridges

[1] It is of interest to find the term *chol* or *chöl*, meaning "desert," which is of Turki origin and common in Eastern Turkistan, localized as it were with the added Persian ending in this part of the Panjab. It was brought there, no doubt, by invaders from south-eastern Iran, the latest of whom are the Baluch, found also in Bahawalpur.

of the Cholistan which unmistakably represent an ancient winding bed of the Sutlej, that once joined the Hakra between Walar and Binjor.

The junction of the Hakra with a branch of the Sutlej must have meant a great increase in the volume of water, and accounts for the Hakra bed widening below the junction about Walar.

Archaeological facts prove cultivation, and with it settled occupation, to have been abandoned much earlier on the Hakra than on the Ghaggar. Prehistoric mounds with pottery of the chalcolithic period appear first near Fort Abbas. Thence they were traced right down the Hakra as far as my survey extended west of Derawar.

A trial excavation at Sandhanawala Ther, 3 miles to the north-west of Fort Abbas and rising to some 28 feet above the now irrigated ground at its foot, showed that remains of chalcolithic times are contained in its layers right through to the virgin soil of river silt. Here, as at other high mounds farther down, painted pottery closely resembled that of numerous chalcolithic sites explored by me in British Baluchistan and Makran,[1] and also that of the now well-known great Indus Valley sites. Fabric and designs clearly distinguish this ceramic ware from the painted pottery of early historical times found at the mounds up the Ghaggar. Some sherds with incised characters which appear on many inscribed seals from Mohenjodaro and Harappa, chief sites of the Indus Valley culture, assign the Sandhanawala deposits to early in the third millennium B.C. Worked flints are associated with the chalcolithic pottery at this and the very numerous prehistoric mounds traced farther down the Hakra, and there is close similarity in the shapes of vessels, terracotta, and shell ornaments.

For some 30 miles up to the Sandhanawala mound these sites of prehistoric occupation are interspersed with other mounds generally smaller and much lower, showing no painted sherds or worked flints, but with the same coarse ceramic ware with impressed or incised patterns, seen at some sites below Suratgarh. Now from varied evidence we may conclude that this unpainted type is later than the chalcolithic painted, but preceded the other painted type at most of the sites along the Ghaggar. I suggest that prehistoric occupation along the Hakra had stopped lower down after the branch of the Sutlej had ceased to join it, but for a time the floods of the Ghaggar may still have sufficed for cultivation in a stretch of the bed, until later settled agriculture became restricted to the Ghaggar higher up in Bikaner territory.

This must for the present remain conjectural. But it may be considered as certain that the riverine belt along the Hakra from about the assumed confluence with an old bed of the Sutlej down to Derawar knew no settled agricultural life during historical times. What small settlements existed near the Hakra before the modern canal system reached it were those of a very scanty pastoral population, maintaining itself partly by the supply of camel transport for caravan traffic following an old route much used until the advent of railways. It led from Multan and Sind towards Delhi and other main centres of northern India. A series of forts more or less aligned on the Hakra

[1] See descriptions and illustrations in my contributions to *Memoirs of the Archaeological Survey of India*. No. 37, "An Archaeological Tour in Waziristan and Northern Baluchistan," and No. 43, "An Archaeological Tour in Gedrosia."

from Derawar to Phulra served as stages on this route and for protection against raids.

Very numerous mounds are found all the way down from where the Hakra Branch enters the dry riverine belt to where the Desert Branch canal fed by the same main head on the Sutlej joins in from the north-west after crossing the Cholistan. On the sketch-map the prehistoric mounds with chalcolithic painted pottery are distinguished from those with plain ware and sherds decorated with coarse patterns. While these sites of presumably later occupation were traced only within the main Hakra bed, the prehistoric ones are both there and on branching side beds, now known as Dahars.

Into these have been conducted smaller channels, designated Minors by the Irrigation Department. But it was sad to note that all these as well as the terminal portion of the Hakra Distributary have had to be abandoned below Marot since their construction. The water in the Sutlej at the canal head had against expectation proved inadequate to irrigate so far down, and the sand was reclaiming ground recently tilled. The same applies also to most of the Minors which the Derawar Distributary of the Desert Branch was intended to feed.

It is probable that the Desert Branch canal follows an ancient bed of the Sutlej, which might explain two notable facts. From Kudwala onwards all the mounds to the west and south-west display both painted pottery of chalcolithic type and unpainted pottery with relievo patterns of a very characteristic kind. And these sites, prehistoric, as proved by abundant finds of worked stone implements, become particularly numerous to the north of Derawar.

Some eighteen mounds were examined over an area close on 100 square miles. This is to a great extent overrun by dunes between which long stretches of flat ground are recognizable as branching dry river beds. The whole looks deltaic. Floods descending the Hakra could not have made such a network of terminal channels. But if a branch of the Sutlej also flooded this flat ground beyond the great fringing sand ridges on the south, and thus made extensive irrigation here possible, its close occupation by prehistoric settlements is intelligible.

The great height and size of several thers indicate prolonged settlement. Thus the conspicuous mound of Kudwala rises to more than 50 feet and has a length of close on three-quarters of a mile. The mound of Lurewala, some 9 miles farther west, though somewhat lower, is larger. Only excavation could estimate the time of accumulation, or the chronological relation between them and the prehistoric settlements farther up the Hakra. But at only one site in this area has occupation continued beyond prehistoric times.

That is the great mound close to the much-restored fort of Derawar which from medieval down to modern times was a stronghold of those who ruled the desert now divided between Bahawalpur, Bikaner, and Jaisalmer. It was one of the border posts of the old caravan route along the Hakra. The ground was as barren then as it is now since the new canal failed.

The mound rises to more than 50 feet and measures about 1300 by 900 yards at its foot. Debris on the surface includes sherds from later times, but large cuttings made recently on the slopes under official orders in search of

"treasure" have disclosed prehistoric pottery in successive layers. We were fortunate to discover an ancient burial ground at the foot of the mound with remains, almost on the surface, which cannot be later than chalcolithic.

With this my work along the Hakra closed for the present. It would be hazardous to correlate the archaeologically attested changes of conditions along the Ghaggar–Hakra bed with the reference found in Vedic texts to the Sarasvati river; but the evidence shows that down to historical times the Ghaggar carried water for irrigation under existing climatic conditions much farther than it does now. This makes it intelligible how the Sarasvati has come in hymns of the Rigveda to be praised as a great river. The interval between the time when that notion found expression in Vedic poetry and the time when the Ghaggar was joined by a branch of the Sutlej, may not have been so great as to efface traditional knowledge of the entire river having once been large enough to make its way as far as the Panjnad and the Indus. The width of the Ghaggar–Hakra bed is so great that even now local folklore believe in its having once been completely filled by a large river.

A great change has affected the Sarasvati river or Ghaggar since reference to it was made in Vedic texts, which can scarcely have been composed before the second millennium B.C. at the earliest. This change may be attributed to two distinct physical causes. As regards the upper portion of the ancient bed archaeological evidence attests a drying up during historical times which is likely to have been at work in prehistoric. It might have been hastened by diversion of flood water for irrigation brought about by more settled conditions and the resulting pressure of population.[1] Lower down on the Hakra the main change was due to the Sutlej having in late prehistoric times abandoned the bed which before had joined the Ghaggar: the result of a law affecting all rivers whose course lies over alluvial plains. We have clear evidence that the drying up was gradual, at least in the historical period.

[1] In my paper "Desiccation in Asia, a geographical problem in the light of history" (*Hungarian Quarterly*, Spring Number, 1939), I have indicated instances, modern or comparatively recent, where physical changes which might suggest desiccation can be proved to have directly or indirectly resulted from human activity as attested by history.

THE BURMA ROAD

SIR HENRY CRAW

Meeting of the Society, 18 May 1942

IT was only after considerable hesitation that I agreed to prepare a paper on the Burma Road. I have not been over its whole length, though I know the Burma end well and have seen its working both at Kunming and at Chungking (Pahsien). I do not propose to say much about it as an engineering feat, but rather to examine its efficacy as a supply route. There have been many criticisms of the organization of the supply system on the road, some justified and some unjustified, and I hope to explain some of the difficulties which were met and how far they were solved during the three and a half years since the first convoy left Burma.

In the summer of 1937 Japan began her attack on China. Her object probably was to separate the northern provinces from the southern and to organize in the north a Government entirely subservient to herself, such as had been set up in Manchukuo, but in this her plans miscarried. Chiang Kai Shek and his supporters realized that submission would only be another step towards the complete domination of the East by Japan, and determined on resistance. Japan's military and naval preparations over a long period of years enabled her to seize the whole coast line and to drive the Chinese armies back into the interior, but this military superiority could not break the spirit of the Chinese patriots, and after five years of fighting the Japanese are supreme only where they have a sufficiency of troops to beat down the resistance of the local inhabitants.

The Chinese leaders of to-day take the long view. In the first year of the war they realized that their long coast line could not be defended against attack by the powerful Japanese navy and that an alternative route must be found over which the supplies they needed from the West could be brought in. The railway through French Indo-China gave them one line, but its capacity was too limited and its exit to the sea was too exposed to Japanese interference to make it either adequate or reliable. A safer line was necessary, and in the first place the Generalissimo turned his attention to Rangoon. About forty years ago the British Government had been interested in the continuation of the Burma Railway eastwards to Yünnanfu, now known as Kunming, and a detailed survey of the alignment had been made by Colonel Davies. At that time the Chinese Government was not enthusiastic over the project and British interests were also not too sure of its commercial possibilities; the scheme was abandoned. The survey however showed that such a line, though difficult, was possible, and the Chinese Government now began to plan its construction. A railway over steep mountainous country like Yunnan, with the formidable gorges of the Mekong and the Salween to cross, could never be ready in time to help China in her hours of greatest need. A road however was a different proposition. China's man power was enormous, and the Generalissimo could rely on it to carry out the formidable task of building those 600 miles of motor road. Mechanical aids to excavation and

construction were almost entirely lacking; nevertheless in little over a year, *i.e.* by the end of 1938, a road was made which has carried large quantities of valuable materials to China and has enabled her to carry on the unequal struggle with her powerful assailant. The Chinese by the end of 1938 had brought the road to the boundary at Wanting, and by that time the Government of the Federated Shan States had completed the link between Lashio and the boundary. The traffic began in January 1939 and it has continued and increased ever since, at least until the occupation of Burma by Japan cut off supplies at the source. As was to be expected the road on both sides of the frontier, as it was on 1 January 1939, left much to be desired; the alignment on the whole was good, though in some places minor changes have had to be made; but the surface was rough in the extreme. During the first season, on both sides of the boundary, it consisted of blocks of stone, hand-laid and covered with layers of sand and gravel. Points of stone soon protruded through the gravel layer and in many places the road looked like a well-filled pincushion with the pin heads 2 or 3 inches in diameter. It made a bumpy ride for the passenger and it was very hard on the vehicles, but traffic went on.

During the first rains the difficulties increased. The rains begin in May and go on till November with an average annual fall of from 75 to 90 inches; and with frequent downpours. Landslides and culvert washouts were common; deep potholes pitted the surface and a sea of mud in places hid them from the driver till his wheels went in. Difficulties were enormous, but still the lorries ploughed their way through. Gradually however conditions improved; in the dry weather of 1939–40 the Burma section was metalled and tarred and preparations for a similar improvement on the Chinese side were being made in 1941 when the Japanese war in the Pacific intervened.

All this time however the Chinese Government had by no means abandoned its plans for a railway construction. As much as could be spared of the old F.I.C. (French Indo-China) line was dismantled and used for the construction of lines leading both east and west out of Kunming; the bed of the new line towards Burma was cut and prepared, and throughout a great part of its length only awaited the supply of rails and other materials through Burma. The British Government was prevailed on in 1941 to agree to undertake the construction of the 100 miles to join up railhead to the boundary, and the work on this section was in progress when the Japanese attack came. It has of course been stopped, but when China regains control there can be no doubt that this railway line will be made and that China will insure herself thereby against future aggressions. On this point of future security she seems to be as determined as she has shown herself to be in her past resistance.

Not content even with this outlet to the sea through Burma, China looks further to the establishment of direct access to India by land. Such a road would present even more serious a problem than did the Burma Road. It would either have to cross the Tibetan plateau or cut across the mountain ranges of northern Burma. If the Burma line is chosen, passes of 11,000 or 12,000 feet must be negotiated, but the worst difficulties would probably be met within China's own territory where the three great rivers, the Yangtze, the Mekong, and the Salween, with their high intervening ridges, all have to be crossed within a distance of 150 miles. It seems an almost impossible

engineering task, but the Chinese are apparently unwilling to class anything as impossible if it is necessary for their future security, and we may yet see that road put through as the Burma Road has been.

These ambitious plans for the improvement of traffic facilities with the West are however for the future, and will depend on the outcome of the war in the Pacific; the Burma Road has on the other hand been a concrete fact for the last three and a half years and has well justified its construction. In the *Journal* for March 1940 Mr. FitzGerald gave a vivid description of the country through which the new road passed as far as Paoshan, at which point he left it to proceed *via* the old mule track to Tengyueh (Tengchung). The profile view of the road as far east as Tali gives an idea of the difficulties which had to be overcome. The heights and distances were worked out roughly by Mr. Nicholson, the engineer responsible for the Burma section of the road. Mr. FitzGerald pointed out that the new railway alignment leaves the road between Yünnanyi and Siangyün and follows an easier route, avoiding the crossing of three intermediate ranges. The railway alignment goes down the Red river, crosses the watershed between that river and the Mekong and then makes the greatest possible use of the valleys of tributaries of the Mekong and the Salween to ease the ascents and descents.

It seems curious that the Chinese engineers, who were anxious for as rapid construction as possible, did not select the easiest line for their road, but probably the reasons were that the alignment they chose runs through the most fertile and populous parts of western Yunnan where labour was easier to obtain than in the barren valleys to the south, and that the Yunnan Government may have had some say in the selection and may have been influenced by the wishes of the inhabitants of Paoshan, the largest town of western Yunnan. The traders of Tengyueh still farther west also made strenuous efforts to get the road brought through their town, but this the Chinese Government resisted; the difficulties of the crossing of the Salween gorge at this point and the fact that a line through Tengyueh would lead the road into Bhamo, which is not in the Burma railway system, were probably responsible for this decision, and the Chinese Government may have thought they had yielded enough to Yunnan in selecting the alignment through Paoshan. Nevertheless even up till the middle of 1941 the Tengyueh merchants were pressing for the construction and nearly persuaded the Central Government to undertake it as an alternative route.

When the Chinese Government had made its decision on the route to be followed the Government of Burma had two alternatives, either to construct a road north from railhead at Lashio or a road from Bhamo along the boundary. The Chinese wanted both roads so as to enable them to use both rail and river, but if only one was to be built they considered the Lashio connection most urgent. It will be remembered that when the plans were under consideration the F.I.C. railway was still open and there was no immediate prospect of its being closed. The Burma Road was intended to deal with the surplus which the railway could not handle, and as there seemed no probability that the traffic would be more than one road could cope with the Burma authorities concentrated in the first place on the provision of a good road to the frontier from Lashio. There was in 1938 25 miles of lightly

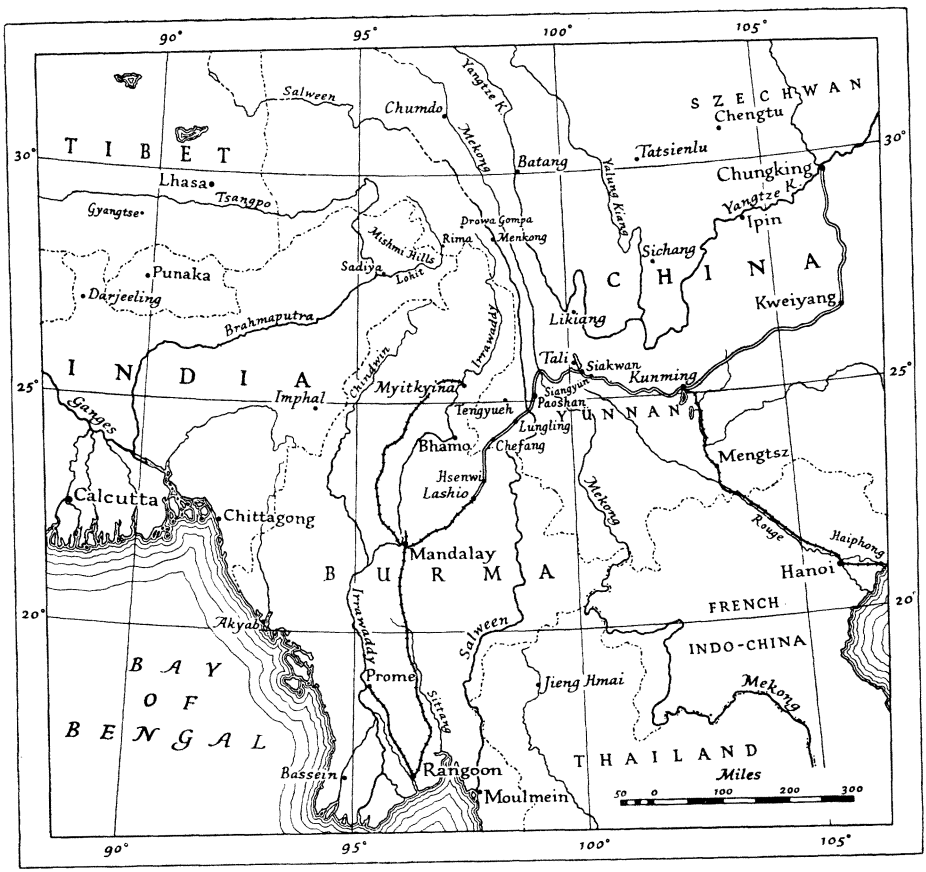
metalled road to Hsenwi, but from there onwards there was only a gravelled surface open for light motor traffic in the dry weather, and it took two open seasons—1938–39 and 1939–40—to bring this road up to a good all-weather standard. Later however when French Indo-China closed the railway and it became clear that the Burma railway and the single road were inadequate, the Burma authorities took up the construction of the Bhamo link, which was scheduled to be completely metalled by the end of 1941.

1937 and 1938 were occupied with the problem of alignment and construction, but the solution of these problems did not end the Chinese difficulties. The road was a means to an end, and that end was the provision of China's much-needed supplies. Until the latter half of 1940 the railway from Haiphong was carrying goods to China; its capacity was said to be about 20,000 tons per month and, though it is doubtful whether this total was frequently reached, its existence for the first eighteen months after the road was opened gave the Chinese Government a chance to organize its road transport for the heavier task which lay ahead, when the whole burden fell on the road. The work of organization was entrusted to a semi-Government company called the South-west Transportation Company, functioning under the direct control of the Ministry of War. This company too was in charge of transport operations at Haiphong and, though there had been serious complaints about its working there, it was the natural course to extend its control to the new overflow road. It opened an office in Rangoon with branches at Lashio and Kunming as well as at intermediate stations on the road. It entered into a contract for one hundred and eighty lorries to operate to a point just across the frontier at Chefang, and set about importing a fleet of its own. There was already a large number of lorries in China, and it was intended that the transportation of goods from Chefang onwards should be handled by these. As soon as the road was opened private traders also came in; prices of commodities in Kunming and Chungking were very high and the prospect of an extremely lucrative trade soon attracted between nine hundred and one thousand privately owned lorries. Some belonged to big business concerns like Steel Bros., who carried their own goods into China, but many were of the common carrier type owned by small contractors and dependent on freight rates. Transport worked more or less smoothly till the middle of 1940. During the first rains an average of about seventy lorries a day crossed the boundary carrying about $2\frac{1}{2}$ tons each, and this figure increased during the dry weather of 1939–40 to about two hundred and fifty lorries per day. This meant that at its maximum volume about 19,000 tons of goods a month were going into China. Of course this included a considerable volume of private trade goods, but the Chinese Government's share of the traffic was large, and up to this point there was no unwieldy accumulation of stocks in Rangoon or Lashio. It is true that the S.W.T. books showed big stocks on hand, but much of this consisted of heavy machinery, rails, and other articles which it was never intended to send up. A great deal of useless junk was sent over from Hongkong which only clogged up the clearing yards.

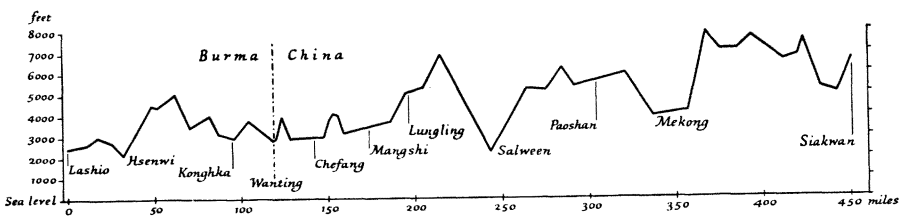
Towards the end of 1940 however the situation deteriorated. There were three main reasons: the rough surface of the road and the steep gradients had put many of the lorries originally employed out of action and replacement was

not rapid enough; profits of private trade were so large that traders, mostly Chinese, pushed up the freight rates to such a height that the Chinese Government was squeezed out; the S.W.T. Company charged other departments of the Chinese Government such high rates and were so slow in meeting their requests for transport that they had to go into the already over-crowded open market and compete with one another for the available lorries. The result was that freight rates reached the impossible figure of 1200 rupees per ton, which meant that a lorry owner very nearly got back the cost of his lorry in two trips. Towards the end of 1940 the Chinese Government found itself in a dilemma; it had to get all its requirements through Burma, as French Indo-China was then closed; it had not enough lorries of its own to meet the new demand, and private lorries could only be got at extortionate rates. It appealed for aid to the British Government and issued orders that the road was closed to private merchandise. The Burmese Government was interested in the prevention of heavy accumulations of goods either at the docks or in the depots, and after consultation with representatives of the Chinese Government issued a regulation establishing a road control and giving to the controller power to fix freight rates and to require users of the road to set aside a percentage of their fleet for the transport of Chinese Government goods across the boundary. This eased the situation considerably, and until the arrival of American lease-lend cargoes in June 1941 there was no further serious trouble in Burma.

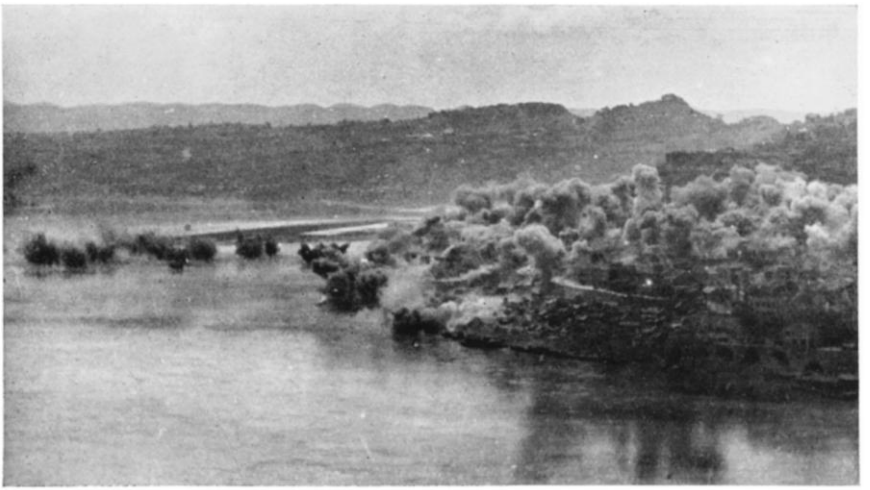
In the meantime however the transport situation within China was becoming serious. In spite of the very large number of lorries which was being imported into China the goods crossing the boundary were not going through. It was estimated that only 25 per cent. was reaching Kunming, the rest being dumped in depots alongside the road. America was interested as these goods were being paid for out of credits she was giving China and her interest was going to increase when lease-lend came into force. To clarify the position three American transport experts were sent over headed by Mr. Daniel Arnstein to examine the situation and make suggestions. Mr. Arnstein's report set out that the surface was bad; that half the Government fleet were out of action through lack of care in maintenance and shortage of spare parts; that unnecessary delays were common, and that there were no statistical records kept which would enable a supervisory officer to see what was being done. He recommended the employment of American road engineers, motor mechanics, and traffic controllers to train the Chinese, and promised the immediate supply of vehicles and spare parts and other necessary stores if his recommendations were accepted. The report was a scathing exposure of the weakness of the road administration, and probably all comments were true, but possibly it was hardly fair to the Chinese in that it did not take into account lack of experience of this kind of work and the financial difficulties under which they were labouring during the brief period of the working of the road. One of their greatest shortages had been in good mechanics and drivers; the country through which the road ran had never seen a lorry till the road was built, and local recruitment was not possible. Trained men had to be brought in from the coastal towns and were apparently not easy to get. There were certainly excuses which the Chinese Government could plead for



The Burma Road



Profile of the Burma Road between Lashio and Siakwan



Japanese bombing of Chungking, the terminus of the Burma Road

the shortcomings pointed out by Mr. Arnstein and his colleagues. Whether Mr. Arnstein was too severe or not his report had its effect. The Chinese Government apparently accepted his recommendations and appointed an officer with the rank of general, aided by an American adviser, to put them into effect. This was being undertaken when the Japanese attack on Burma came.

A survey of the working of transport on the Burma Road would be incomplete without some reference to the petrol situation. China produces practically no mineral oils, and when I was in Chungking last year I saw many vehicles running on vegetable oils, mainly obtained from rape seed. The price of petrol was enormous and it could only be got on a Government permit. At the opening of the road every lorry, or every convoy of lorries, had to take with it enough petrol to carry it to its destination and back. The poor surface and the steep ascents increased consumption and the normal calculation was that a 3-ton lorry starting out on the 700-mile trip from Lashio to Kunming had to carry 200 gallons of petrol on the basis of 7 miles to the gallon. This meant that of the 3-ton load one quarter had to be allocated at the outset for journey petrol. Later the Asiatic Petroleum Co. and some of the American oil companies set up petrol depots at the frontier and at several points on the road, but even as late as the end of last year most of the road users carried their own requirements. There were rumours of a plan to construct a pipe-line from Bhamo, and it seems possible that something of this kind may be done in the future; certainly if there is going to be any considerable volume of motor traffic on the road when peace is restored some less expensive method of providing petrol will be required. It should be noted that in addition to petrol for the conveyance itself large quantities of petrol for general use in the interior had to be transported. In a normal month petrol cargoes amounted to about half of the total tonnage entering China and sometimes the figure rose as high as two-thirds.

Another factor which affected the working of the Burma Road was enemy interference. After the Japanese occupation of French Indo-China the whole length of the road from Kunming to the Burma frontier was within range of their bombers; nevertheless on the whole the amount of damage done was less than might have been expected and certainly far less than was claimed by the Japanese. The most vulnerable points were the suspension bridges over the Salween and the Mekong, but as targets they were not very easy. There was no air defence near these bridges and the ground defences were not very strong, but the bridges were never out of use for very long, and when they were temporarily closed the Chinese set up rafts on which the waggons were ferried across. The area round Kunming was another favourite point of attack, and as that town is the distribution centre for all goods going into China considerable confusion resulted from the earlier attacks. Kunming is not like Chungking, a town which lends itself to A.R.P. It lies in a flat valley alongside a large lake and underground shelters are said to be impossible. Raiding in the open season took place three or four times a week and the only escape was to slip out into the low hills round the valley. This is what both the townspeople and the lorry drivers used to do, and as air-raid warnings were usually given in good time casualties among men and vehicles were

fewer than might have been expected. Other raids took place on towns where it was known that dumps had been set up, *e.g.* Paoshan and Chefang, but though the damage in some cases was considerable raids were few and could not be said to interfere seriously with the traffic. On the whole air raids were a nuisance and slowed up traffic to a certain extent, but the actual damage was far less than has been claimed.

Among other criticisms in Mr. Arnstein's report particular stress was laid on the numerous checks in the flow of traffic on account of tolls and other revenue demands. These exactions did not affect Chinese Government owned goods, but traffic blocks round toll stations at the frontier and in towns often caused serious delays. The Province of Yunnan possibly owing to its distance from the seat of the central Government had retained a good deal of independence both in financial matters and in other respects, and this independence it is still unwilling to surrender. It still keeps its right to impose taxes on goods coming in or passing through. It relinquished its claim to collect customs duties on the central Government goods entering from Burma but insisted on collecting on all others. A lorry registered for use in China would pay the central Government Customs Tax and would also be liable for the Yunnan Consumption Tax, which was nearly twice as much as the central duty. The cargo carried by such a lorry was liable in the same way to both taxes, which were collected by different agencies at different stations. Again the Highway Administration charged a wheel tax at a fixed rate per ton-mile while the Yunnan Government charged a similar road tax although the maintenance of the road was a burden on the central Government (these two taxes amounted to 230 rupees per trip from the border to Kunming and back). In addition there were smaller demands at Kunming and other places. An attempt was being made by the central Government to consolidate all these demands into a single payment, but the Yunnan Government was difficult to persuade and nothing had been arranged when I left Burma at the end of last year. The central Government taxes were fixed and presented no difficulties, but the Yunnan Government taxes were liable to frequent variation and will cause considerable interference with commercial traffic after the war unless the Chinese Government proposals for consolidation can be put through.

There is another question which has got rather closely mixed up with the Burma Road and which has met criticism especially in America. Under the Burma Constitution set out in the Government of Burma Act of 1935, while defence and foreign affairs remain under the control of the Governor, the internal administration was placed under a ministerial Government and taxation in general and the imposition of customs duties in particular come within their scope. Transit trade was non-existent before the China traffic began and the only legal provision which could lighten the customs burden for the Chinese was the clause in the Tariff Act which permitted of a refund of seven-eighths of the duty if goods were re-exported. This was recognized to be too high a charge and very early steps were taken to reduce it to a 1 per cent. *ad valorem* charge on all goods consigned to China. The Government of Burma had very considerable charges to bear in connection with this trade, the main items being the making of roads and their maintenance, the provision of armed guards over goods from the day of arrival in port till they

crossed the frontier, and the provision of additional customs posts and staff. So long as imports were on a comparatively small scale the Government's receipts just about covered its expenditure. This was in consonance with the terms of the Barcelona Convention which lays down that duties on transit trade should cover costs and no more. When however the trade increased after the closing of the F.I.C. railway, and still more so when lease-lend shipments began, the receipts did constitute a profit and that profit was likely to increase. The Burmese ministers were however in a difficult position. The opposition and the press clamoured for retention or even increase of the duties. The Burmese were, I think, really pro-China in their sympathies, but the opposition was unscrupulous and was willing to use any weapon to attack the Government. A general election was imminent and the Ministry was afraid to risk its political safety by sponsoring a reduction of duty. It argued that as neither China nor the U.S.A. had signed the Barcelona Convention Burma was not bound to observe it in this case, and it refused reduction. The decision was one which might cause friction with China and the U.S.A., and the British Government undertook to meet the cost of the tax. The charges against the British Government were unwarranted as in the first place the tax was not discriminatory but was imposed on all goods, secondly the Chinese did not pay it on lease-lend goods, and thirdly the British Government was in no way responsible for the levy, but on the contrary took the earliest possible steps to relieve the Chinese Government.

There is yet another question in connection with the Burma Road which seems to have given rise to a considerable amount of misconception, and that is the so-called closing of the Burma Road in 1940. The general view seems to be that the British Government stopped all traffic on the Burma Road for three months. This is very far from the truth, and in fact during these three months a larger volume of traffic went over the road than in any previous months of the rains. In September the daily average was two hundred and twenty-five lorries. The closure was limited to munitions, aeroplane parts, and petrol, but except for petrol very little of the barred commodities was awaiting transport up the road. As regards petrol, lorries going in were given enough to take them to their destination and back so that regular transport could go on, but no cargoes of petrol for other use were permitted; this was probably the worst feature of the agreement from the Chinese point of view. The practical effect of the measure should not be exaggerated; it was probably more psychologic than material.

Before closing this paper I may refer to a question which was raised at the end of Mr. FitzGerald's previous lecture, namely the future prospects of this road from a commercial point of view. Since that paper the railway scheme has been approved, and if after the war the Chinese Government carries out its declared intention to complete this line there will be a double avenue to carry what in the past has been only a small volume of trade. When I was in Chungking I discussed this question at length with both official and non-official Chinese; their arguments are that Yunnan has great mineral wealth, coal, wolfram, tin, gold being the main possibilities. They say that silk culture can be taken up west of Kunming and that there is good tea country alongside the line after it turns south at Siangyün. They foresee a large

THE HARAMOSH PASS

CAPTAIN EADRIC CLIFFORD FOUNTAINE, R.A.M.C.

Note.—Dr. Fountaine accompanied Mr. Eric Shipton's expedition to the Karakoram in 1939 as medical officer. An account of this expedition was published in the *Journal* for June 1940, in the last paragraphs of which there is a brief mention of the journey by Dr. Fountaine from Arandu over the Haramosh pass to Gilgit, which is related in greater detail below. The outbreak of war made it necessary to abandon plans for further work in 1940, and the party broke up. Dr. Fountaine returned to England to serve in the R.A.M.C. in places where his previous expedition experience must have been of special value. While still an undergraduate he had climbed in the Lofoten Islands; in 1935 he accompanied Courtauld's and Wager's expedition to East Greenland, and was a member of the party that ascended to the highest point of the Watkins Mountains. He was known to his companions as a first-rate traveller, with a useful knowledge of survey, and as a valuable medical officer. He was killed in a motor accident on 3 January 1942, while on active service in Iceland. He had been a Fellow of the Society since 1938.

The sketch-map has been taken from the Karakoram 1/750,000 map, and is only approximate in the region of the Haramosh pass.

LHAKPA TENSING and I arrived at the camp on the Snow lake at about eleven o'clock on the morning of 11 September 1939. It was snowing and the camp was completely deserted. A note from Russell explained that Mott was working on the Hoh Lungma glacier, Fazal Ellahi was finishing his survey of the Biafo glacier, and Russell himself had gone down to Makorum to get fresh stores and to try to get some news on the radio.

It was not until I read Secord's telegram from Srinagar, which had reached the expedition by runner from Skardu, that I understood Russell's sudden desire to get news from the outside world. It ran thus: "Srinagar September 3rd—German Polish war outbreak. Russo-German treaty. Campbell." That was all. It seemed impossible to believe that Great Britain might be involved in war, and I told Lhakpa to cook a meal. While we were eating our *chapattis* I tried to tell him that the news was bad, that perhaps Englishmen were fighting, and that if it were true then the expedition would not go on to winter in Shimshal. He replied that the news was probably not as bad as I thought and that in any case there was no reason why we should not go on to Shimshal. I saw that privately he had summed me up as a pessimist. I had not the heart, nor sufficient command of the language, to give him further details, besides he was probably quite right. I poked my head out of the tent, but the thick mist hid everything except that it was still snowing. It had been snowing now for nearly forty-eight hours. I withdrew into the tent again, but the mist enwrapping my thoughts was as thick and as grim as that outside.

Shipton arrived during the afternoon with Angtharkay and Kusang. In spite of the bad weather they had managed to complete the last survey station of the Panmah Basin. We had been exploring and surveying this basin for the last three weeks until three days ago, when I had held the rope at the

top of Dessio's col while Shipton and his Sherpas descended on to the Nobande Sobande; we had then each crossed over to the Snow lake by virgin passes. I congratulated Shipton on the completion of an exceedingly good and useful piece of work and then showed him the telegram.

Until its arrival no news of the outside world had reached us for nearly three months during which time we and the inestimable Sherpas had lived amidst some of the most impressive scenery in the world. The Snow lake, formed by the confluence of four huge glaciers at a height of 17,000 feet and overlooked by the magnificent peaks of the Latok Group, had become familiar ground. Its difficult topography now held no secret from us. We had first entered the Snow lake from the Hispar pass and had then explored its northern branch. Shipton and I had then left it by the Biafo glacier which took us down to Askole, whence we had travelled through the Panmah Basin and had each re-entered the Snow lake from the east by two separate passes, so that there seemed little about it in all its moods that we did not know.

Because of all this, and because we had had to fight to gain our knowledge and to accomplish what we had set out to do, it seemed fantastic that fighting of a different nature should be going on thousands of miles away in Europe; fantastic that at such a distance it should affect us there as eventually it did.

For the next two days it continued to snow without ceasing, and we remained inside our small light-weight tent, reading, sleeping, eating, and conversing on a multitude of subjects; but no matter what the subject might be we always reverted to the topic of war. Owing to the wide separation of the members of the expedition we decided to carry on according to plan until we all re-congregated in Gilgit some time in October; then all doubts would be dispelled.

The weather on the morning of the 14th showed signs of clearing, and I prepared to set off down the Biafo glacier to Askole, where Mott, whom I was to join to assist in the survey of the Hoh Lungma and Chogo Lungma glaciers, was to have left news of his whereabouts. Shipton was to remain behind at the camp until the arrival of Russell, when they would explore a pass on the north branch of the Biafo glacier.

I set off in poor visibility accompanied by Lhakpa Tensing and Kusang; we took next to no food with us as Russell had said in his note that he had left some *ata* (flour) about two hours' journey down the glacier, together with some firewood. The previous three days' snow and the bad visibility made the going extremely difficult as the glacier was badly crevassed, and every step had to be probed with the ice-axe. The majority of the crevasses were completely covered over with a light bridge of snow, and on several occasions a snow bridge broke under me; but somehow or other we managed to get through the day and past the worst of the crevasses without disappearing completely from sight. Once, about an hour before we camped, I trod on what looked like firm snow, but what was in reality snow resting on a thin veneer of ice, and found myself waist deep in icy cold water.

Owing to these conditions we had been travelling very slowly; at the end of eight hours' continuous going dusk was approaching and there was still no sign of the food dump which Russell had left. We were all very cold and I decided to camp while there was yet sufficient light; for our supper we could

boil some water on the Primus. We made for the rocks of the moraine and just as we were approaching them I suddenly spied the dump about 200 yards away. I sent the Sherpas to fetch sufficient food and wood for the night and pitched the tent. An hour later we were warming to a hot brew of *tukpa* (boiled flour and water with spices added) and talking of the chicken, potatoes, and eggs we should soon be eating at Askole. Nevertheless it was a cold night.

Two days later, on September 17, we arrived in Askole. But we soon discovered that there was to be no realization of our anticipations. Mott was to have left behind a supply of certain foodstuffs, including chocolate and cigarettes which Secord had despatched from Skardu; perhaps more important still he was to have left a sum of money for me in the care of the Lumbardar, but to my horror he had left nothing except a note informing me of his movements and that he had taken the whole of the supplies down the valley to Chokpiong, thinking to save me the trouble of conveying it myself. It was doubtless done with good intent, but our disappointment was intense. The Sherpas looked so glum that I had to laugh. I determined that nothing would make me have another meal of *tukpa* or *chapattis*, and I ordered forty eggs, which I had scrambled that night, and for breakfast the following morning. It was all that I could afford.

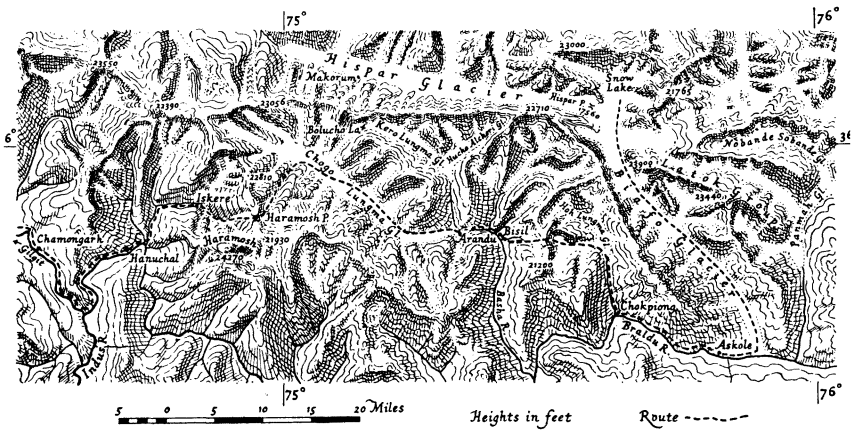
The following day we set off down the Braldu Valley towards Chokpiong which we reached the same evening, after a long and tiring day's march. The first half of the march was very pleasant through numerous small cultivated villages where the harvest was being reaped. We were accompanied by two of the Askole coolies, Marcoli and Corbolani, whom I engaged to carry our loads as some compensation to my two Sherpa companions for their disappointment of the previous evening, and also to give them a slight rest. Consequently we were able to appreciate to the full the attractive scenery through which we were passing. The 2-foot wide track along which our route lay was like a bowling-green compared with the rough moraine of the Biafo glacier down which we had travelled the day before. The second half of the day proved less pleasant, being hot and dusty. We lost the track once or twice, and consequently found some rather rough going, so that when at last we reached Chokpiong we were tired but very eager to taste some of the delicacies which had been left there by Mott. But no money awaited me.

On September 21, three days later, Mott limped into Nangmoni where, realizing by a note from him that our plans would have to be revised, I had spent three days resting. I had bought a sheep on credit for six rupees, although there had been a little serious haggling about whether I should or should not pay the extra eight annas for its transport from its abode about 2 miles lower down the valley. Mott had for some time been suffering from some form of allergic rash which recently had been giving him more trouble, and he now had one or two painful and swollen glands. It was obvious that he would be unable to take part in the rest of our programme, and it was therefore decided that he should return to Gilgit *via* Shigar as soon as possible, where he would be able to receive adequate treatment. Lhakpa Tensing, who was suffering from a dental abscess, was to accompany him and have the tooth dealt with at Skardu.

In the meanwhile I was to carry on by myself with the most important

remaining item of our programme, the exploration of the Haramosh pass; the survey of the Hucho Alchori glacier and another minor glacier would have to be abandoned. The Chogo Lungma glacier, off the head of one of whose branches lay the Haramosh pass, was almost completely unexplored; it had only once previously been visited—in 1903 by Dr. Workman who had sighted the Haramosh pass and made a rough survey of the Chogo Lungma. The problem before us was whether the pass has a feasible means of communication over the main range between Arandu and Gilgit. It was a question which Shipton and I had discussed frequently during our sojourn on the Snow lake; on the whole we had been rather sceptical. The pass we thought might well be accessible from this side, but from our knowledge of the topography and such contours as there were on the existing map, the descent over to the other side appeared to be exceedingly steep and there might well be no way down.

On September 22 therefore, with Gyalgin and Kusang and the two Askole coolies, I said good-bye to Mott, set off up the Hoh Lungma glacier, and over



the Hikmul pass (18,000 feet), hitherto uncrossed, to Bisil. We then continued about 4 miles up the Basha river towards Arandu, where we intended to replenish our food supplies for the next part of the journey. But whereas Arandu is situated on the right bank of the river where it emerges from the mouth of the Chogo Lungma glacier, we were on the left bank, but hoped to cross it at Arandu by a rope bridge which was marked on our map. When we reached the spot where the bridge should have been we found that it did not exist. We were now in the exasperating position of being literally within a stone's throw of the fields of Arandu, yet separated from them by the roaring torrent of the Basha river, straight off the ice of the glacier. Moreover we were also cut off from the glacier itself by the waters of the Kero Lungma river almost as turbulent, which here joined the Basha river. Although we were so near the village that we could see the colours and details of the natives working in the field, we were a very long day's march from them if we were forced to retire to the next bridge lower down the valley. The only alternative was to try to ford the Kero Lungma river; this proved impossible, and indeed our attempt so frightened the two Askole coolies, who were looking

on, that when we gave up the attempt they immediately demanded to be released from their contract. I was only too glad to find an excuse to pay them off, as I could not afford to keep them any longer. At the suggestion of the Sherpas we decided to camp there for the night and make the attempt again the first thing the next morning, when the night frosts higher up might have caused a diminution in the volume of water coming down from the snow line.

At daybreak I tied one end of the alpine rope to my waist and, while the Sherpas held the trailing length behind me, I pushed forward into the current. The flow was still exceedingly forceful, and above the noise of the rushing water could be heard the rumbling of boulders as the current carried them down. The water was waist high, and since it came directly from the glacier, was intensely cold; by the time I was approaching the opposite bank—the stream was about 70 yards wide—I had lost all sensation in my legs which would scarcely move. I had to judge when my feet were resting on the bottom and trust to luck that they were on a firm boulder, until finally I fell forward on to a protruding rock and pulled myself to shallower and gentler water and so to dry land. I then held the rope while the Sherpas crossed in a similar manner. A short while later we were in Arandu.

Finance was now becoming acute as I had only twenty rupees remaining. Should the pass be practicable this would be ample; on the other hand, should it fail I wished to cross by the Bolucho La to the Kero Lungma glacier and explore one of its tributaries before returning to Gilgit by following in Mott's footsteps, a journey which would take at least three weeks. In this case we should inevitably fare rather badly. I was therefore forced to exercise the greatest economy. Our food, until we knew the outcome of our wanderings, was to consist entirely of *ata*, tea, and a little *ghi*. I tried to engage a coolie to come with us for the first two or three days in order to ease us of our loads, which were considerable, but no one showed any willingness to help us unless I engaged a pair and would pay for their return journey. This I was unable to afford, and was contrary to custom, so accordingly we set forth by ourselves, the Sherpas carrying 80 lb. apiece, while I myself shouldered a modest 60 lb.

I was now in a hurry to push forward as I was afraid that the weather would break again and one more bad spell, such as we had experienced on the Snow lake, would have made the further crossing of high passes out of the question for the season; we had now had fine weather for ten days, and according to the law of averages, as established by us, we were due for a bad spell at any minute, if not overdue. The journey ahead of us, therefore, to add to the excitement of discovering a new and important pass, and to the state of our finances, became a race with time and the weather.

We left Arandu at about midday on September 26 and crossed over the rough lower end of the glacier to the ablation valley lining its left bank. After two and a half hours of pleasant easy going along this smooth wide valley, I decided to camp on a flat sandy stretch at the edge of a small thicket. There was plenty of wood here and I thought it would be a good opportunity to enable the Sherpas to convert our *ata* into *tsampa* as well as lightening

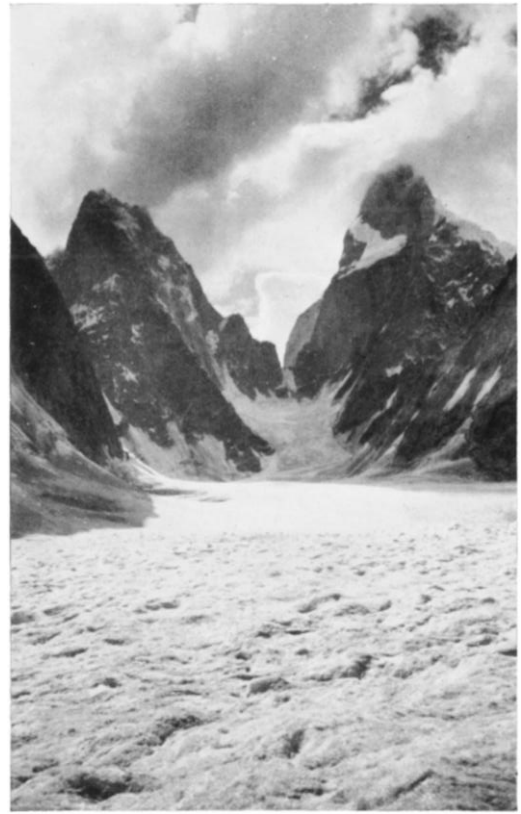
their loads by the amount of that evening's and the next morning's meals. *Tsampa* consists of flour which has been roasted and so made digestible; in this state it can be eaten raw, when it is inclined to be inhaled into the lungs and to cause much coughing and distress, or it can be mixed with sugar and sufficient water to give it the consistency necessary for moulding it into a sort of cake, or again it may be taken on a spoon and dipped in tea. It is in fact extremely adaptable, with the advantage that once it is *tsampa* it need never be cooked again, thus effecting a great saving in fuel, a point which we should have to consider.

The next day we continued up the pleasant ablation valley, although we soon got beyond the belt of trees, except for a certain amount of dwarf willow. On one occasion we disturbed a herd of *bharal* and I wished that I had brought the rifle with me. We passed a couple of valleys leading off from the opposite bank, and I determined that if the Haramosh pass proved a failure I would try to cross the range from the heads of one of these glaciers. That evening we camped at the extreme limit of the willows on the north bank of the glacier; from now on unless the willow belt were prolonged on the opposite bank we should have to use the Primus stove for cooking. But that night, after taking a round of compass bearings, I sat with the Sherpas round the fire and ate *tsampa* while they cooked the tea. I drank my tea lying in my sleeping-bag, watching the glow of the fire on the faces of the Sherpas, and then sank back to gaze at the stars and fall asleep to the drone of Kusang's prayers.

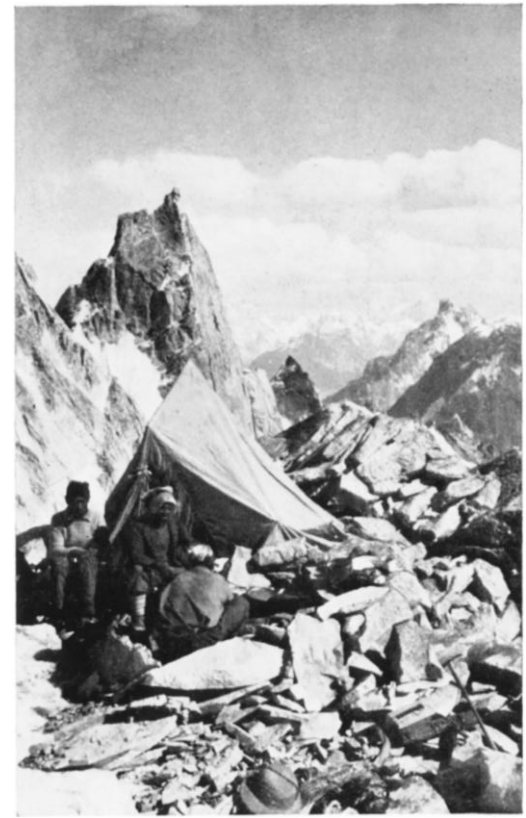
The next day we crossed over to the southern side of the glacier, and camped on a rocky outcrop at about 14,000 feet and 20 miles from Arandu, after experiencing a cold wind which had been blowing down the glacier for the last two hours of the march. No question at this camp of lying in a sleeping-bag and falling asleep under the stars; as I went to take my evening round of compass bearings I was struck by the autumnal tint of the fading willows on the mountain sides below me. We were now definitely back in the inhospitable regions where one has that feeling of having to fight, of everything being against one; a sort of claustrophobia which seems ridiculous, almost paradoxical in all that vastness. When the tea was ready, the Sherpas too came into the tent.

We awoke the next morning to a watery dawn and much low cirrus cloud, but my early morning pessimism later turned out to be unwarranted, and before long there was not a cloud in the sky. From now onwards we took to the ice, and after half an hour we came to a tributary glacier on our left; it appeared to run uniformly and fairly gently upwards into the distance for about 8 miles, where it ended in the Haramosh pass. It was an exciting moment, the first sight of the pass from this side. The pass was distant but inviting, and there were apparently not many difficulties to be anticipated in the ascent. A long snow slope, steepening in the last few hundred feet, ran up to the col which lay beneath the towering slopes of Haramosh itself on the left, while on the right it blended with a comparatively low rock ridge forming the right bank of the glacier. We were eager to push on, to look over the top and to get a glimpse of the promised land beyond. For the rest of the day we wove our way in and out of the intricate maze of crevasses and camped

Hikmul pass

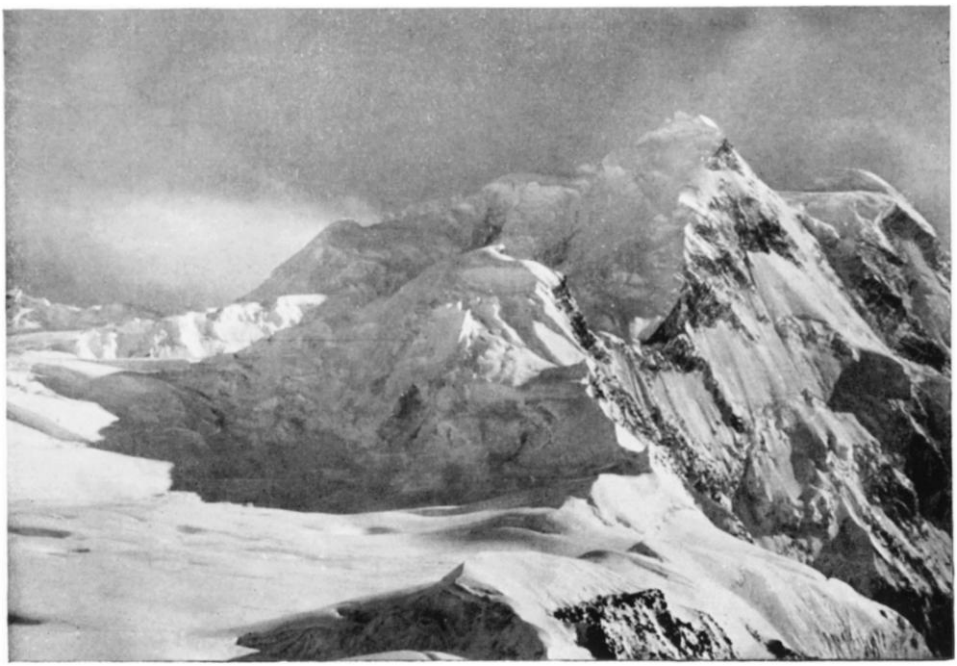


Panmah col



Dessio's col

Looking up Chogo Lungma from Hikmul pass



Haramosh from Haramosh pass

that evening half-way up the glacier on the bare ice at a height of about 15,000 feet. While a hot brew of *takpa* was being made I got into my sleeping-bag and put my socks outside to dry; when I put my head out of the tent to bring them inside it was obvious that we were in for a very cold night. My socks were frozen stiff and the full moon in a clear sky shone down on the mountains from almost overhead, casting scarcely any shadows yet cloaking the peaks in a cold and lifeless luminosity. The stillness was broken only by the sharp reports caused by the process of the evening freezing. Cold is curiously and insidiously demoralizing, and I thought with some trepidation of the snow-covered crevasses which lay before us on the morrow in contrast with the snow-free ones which we had encountered during the day.

I soon withdrew into the greater warmth of the tent, and we discussed the prospects of to-morrow, what lay at the summit and on the other side of the pass, until, the three of us huddled together for greater warmth, I at length fell asleep. But there was no doubt that the immediate future was as exciting to the Sherpas as it was to me. It was not the nearness of Gilgit and the flesh-pots alone which thrilled them should our endeavours succeed; they also were filled with the simple but indefinable urge to press forward.

It was a bitterly cold night and we all slept fitfully. Kusang was up at six o'clock the next morning of his own accord, cooking some hot tea, although normally it would have been no easy task to get him up at this hour and before it was light. But now we wanted the warmth of hot tea and the movement of the march. We struggled into our boots with difficulty, for they were frozen hard as iron and remained thus for the next six hours. At first we made excellent, rapid progress on a good hard frozen surface, but at the end of an hour the surface suddenly deteriorated and the pace became funereal. From now onwards for the next four hours we were knee and at times even thigh deep in snow at every step; such conditions at a height of 16,000 and 17,000 feet under the burden of 50 and 60 lb. loads were intensely fatiguing, and very frequent rests necessary. But though after a while I began to despair of reaching the summit that day, at last, after negotiating the giant crevasses at the top of the last steep snow slope, we reached the foot of the rocks and a few minutes later had scrambled to the top.

What lay beyond was the all-important question. It was a memorable and impressive sight which met our gaze, a sight which drew forth gasps and murmurs of wonder from the Sherpas themselves. Most of the high passes of the Karakoram Himalaya fall away gradually into the distance, or perhaps steeply for the first 1000 or 2000 feet, so that the varying bands of vegetation merge gradually into one another: first the grass, then the dwarf willows and juniper, followed by the deciduous and coniferous trees; the last two are often at such a distance as to be invisible and indeed the conifers are often lacking entirely. At eye-level further snow peaks and glaciers bound the horizon. The effect from the top of the Haramosh pass was entirely different. No gentle slope existed here; the rock face gave the impression of dropping almost sheer for 4000 feet, while the true valley glacier, forming the slopes of Haramosh itself, hung suspended about 200 yards away on our left until it also reached the smoother ground below, to bend suddenly into a gentle stream of moraine-covered ice and disappear round the corner into the

distance. At the foot of this precipice was a short stretch of grass which suddenly entered the golden belt of fading willows and silver birch; and just beyond this, as though luring us away from autumn to an evergreen country, was the thick rich dark belt of the conifers. In the distance lay a blue mass of hills, steep perhaps but gentle and warm and with no sign of snow. The whole scene was a superb mass of colour, inviting, safe, and hospitable. It looked, too, as though we had only to jump in order to be clear of all perils and find ourselves amongst those friendly trees. But it was this thought which made us pause: there was no obvious route of descent. I told Kusang to look for a route while Gyalgin mended my braces, which had come apart on the ascent, and I prepared to take bearings.

I turned to look back at the way we had come. This view too was beautiful but it was grand, austere, and vast, and it was because it existed that we had voluntarily undergone the privations of the last three months. As I looked back on it all, the clean white glacier sweeping in a gentle curve to join the Chogo Lungma, and the familiar peaks beyond, which every now and then were lost in fierce and threatening masses of cloud, a pang of regret shot through me, in spite of the triumphant sense of accomplishment. By the time I had finished taking photographs and bearings and making rough sketches, I discovered that the Sherpas, who were as thrilled and impressed as I was, had erected a cairn fully 5 feet high; I assisted them with the final stones.

It was now four o'clock in the afternoon, and high time that we were on our way. I looked at the route which Kusang had chosen and was not impressed by it. But at all costs we must reach that rich tempting valley below, and the alternative of having to retrace our hard-won steps convinced us that the route must succeed. I tentatively suggested to the Sherpas that we should camp the night up there, as I thought that at this hour we should be exposed to falling stones; but neither of them would hear of it, the temptation down below was too great. I looked at the gathering clouds, and we set off. For the first hour the going was very steep, over loose rock and patches of soft snow, and great care was needed as a slip would have been difficult to stop. Kusang, who had rushed ahead at the start, was some distance in front while Gyalgin lagged considerably behind. After a while, at a point where the slope seemed to be getting steeper, I began to wonder whether we should reach a camping site before dark and felt that we should be safer roped together. I shouted to Kusang, who was carrying the rope, to stop, and when I caught up with him he told me that the slope was beginning to ease off a little, and this appeared to be true. While I was talking to Kusang I suddenly heard the clatter of a tin falling from above, and looking up I saw a cigarette tin and cigarettes flying through the air; we watched them disappear out of sight, and then both Kusang and Gyalgin, off whose pack they had fallen, burst into peals of laughter and back-chat. But I was sorry for them as they had no more cigarettes, and I myself had only a little tobacco left.

We advanced more easily now, but before long real danger threatened us, falling stones induced by the evening freeze-up which was now starting. This was the danger I had foreseen while on the summit. Stones of all sizes were falling, whistling and bouncing continually all around us, as we were forced to travel down the small gullies, the natural catchment area of these missiles.

Summit of Haramosh pass

Descent from Haramosh pass

Looking east from Haramosh pass

Valley west of Haramosh pass, avalanche in foreground

Once, when cutting our way across a gully with one foot precariously placed in an ice-step which I had just made, I saw a large red stone about twice the size of a cricket ball hurtling down; I paused in my step-cutting to let it pass, which I judged it would do by a safe margin. But when about 5 yards away from me it bounced and split into two, one fragment made a bee line for my head, and only by hastily ducking did I avoid more than having my hat tilted by it. A short while later, on hearing an ominous whistle, I looked up and saw one of these missiles hit Kusang in the back, but he was saved by the padding of his rucksak, which was cut.

We now hurried on with all speed to reach our objective, the first grass bank and flat piece of ground we could see for a camp, before darkness fell. An hour later we were safe and had found to our joy that close at hand a clear spring was bubbling up through the ground as though it were a reward for our efforts, and an invitation to camp. We were safe and the pass was ours.

That night we slept peacefully under the stars before a fire of dwarf willow at the base of the pass till the sun rose upon us at half-past nine the next morning. As we breakfasted in the sun, for the fine weather still held in spite of threatening dawns and sunsets, we gazed up at our pass and the pure white Haramosh which formed its southern lip, and again I was touched by a pang of regret. As we gazed at Haramosh towering 8000 feet above us with her face covered by hanging glaciers there was a groan swelling to a long low roar as a glacier fell and the avalanche swept 4 miles down the valley. We were only 100 yards away from its course and felt its breath as it rushed past us and filled the whole valley with a dense cloud of whirling snow. After descending another thousand feet we entered the belt of silver birch where the birds and the Sherpas sang as we swung along at an easy pace on a track which soon brought us to the Guja village of Kortuwan. Here the natives were much surprised, for we appeared to them to have sprung from nowhere, and when we pointed to the pass they expressed astonishment; no one ever before had reached their village except by coming up the valley. We were given bread and milk curds. Soon after leaving Kortuwan we entered the pine belt and had a delightful walk through alpine scenery for the rest of the day; moreover I was now able to find and pay a man a rupee for carrying my rucksak.

In the evening we camped at the first real village we had seen, a place called Iskere, where we again caused surprise. I was presented with wild grapes, and some dried apricots, and we had the first vegetables we had tasted since leaving Chokpiong. About an hour or so after we had eaten, twelve rather superior, smart young men approached me, and pressed my two hands between their own which they then crossed and pressed against their breasts. One by one they squatted in a row in front of me and started talking to me in a buzz of Urdu incomprehensible to my limited knowledge of the language. However the Sherpas gave them an account of our travels while I occasionally put an elaborately worked out question. I should like to have slept in the open, but so great was our popularity that I was forced to use the privacy of our tent. Gilgit, I also discovered from them, was less than 60 miles away—a three-day march.

We left the fascinating pine belt soon after leaving Iskere and entered the

arid desert belt. About midday we reached the pretty little village of Daso, where we sat ourselves down for lunch under some apricot trees interwoven with vines and the Sherpas again gave an account of our travels—an account which I felt sure did not lose in the telling. Soon I was presented with a small but delicious melon and cucumber, which, together with some eggs which I was able to buy, provided an excellent lunch. Discovering my medical proclivities during their exchanges with the Sherpas, the villagers soon brought forth the chronic invalids of the place for me to cure, and I solemnly dispensed aspirin, bismuth, and opium to them, ringing the changes on the times at which, and with what foods the drugs were to be taken, until finally I had none left; and so great can human faith be that I have no doubt that some at least of my patients were relieved of their symptoms for a short period. But what faith is to the recipient so is gratitude to the donor, and I was touched, after this hypocritical dispensing, to be asked to stay the night in the village and to be fed free of charge. After I had declined and expressed my thanks, the *lumbardar* followed me to the boundaries of the village, and there stopped me; if I stayed the night, he said, I might then borrow his horse the next day for a nominal sum of 4 annas. I thanked him, for his gratitude as much as for his offer. We camped that evening at Hanuchal on the banks of the Indus.

We left Hanuchal at nine o'clock on the morning of October 2 and marched the whole day along the desert valleys of the Indus and Gilgit rivers. It was a long march of 25 miles in the course of which we never once came across a stream at which to quench our thirst; consequently, when we reached Chamongarh in darkness we were tired and thirsty. There was a Dak bungalow here, and I was provided with a table and chair and a red carpet. The Sherpas placed the usual enamelled mug of black tea in front of me with a plate of *tsampa* and I proceeded avidly to quench my thirst. While I was doing this the *lumbardar* came up to me followed by a servant bearing a tray, on which were laid out a refined china tea set and a couple of boiled eggs and bread and butter, so that I felt rather ashamed of my own ware. He was a most affable old man and politely offered to do anything that he could for me, and detailed a servant to massage my legs. Being only one day's march away from Gilgit, he knew of the expedition and therefore expressed no great surprise at the uncouthness of my condition.

While all this was going on I once again made the inquiry, "Is England at war?" And looking up to heaven and clasping his hands together, he called on Allah and told me the bitter truth. I felt dazed, bewildered, and anxious. While the rain fell I ate my supper of chicken. The weather had broken at last. How could it do otherwise?

I rose leaving the chair, table, and red carpet and carried the remainder of the chicken to the Sherpas where I squatted on the ground beside them and talked to them while they ate the last chicken I should ever give them. After discussing the incidents of the last three months I broke the news to them and told them that we should not go to Shimshal, but they did not understand its portent; it was all so far away.

The following morning we set out for Gilgit, and I was deeply touched at the *lumbardar's* refusal to accept any payment whatsoever for our night's

lodging. We covered the 17 miles to Gilgit in five hours and there confirmed the news. As I approached the station I felt that, although I had enjoyed the simple life which we had been living and did not want it to end, nevertheless it would be pleasant once again to live as I had been born to live. But I felt also a deep content in the accomplishment of a difficult task and in the knowledge that I had a host of unique memories which nothing that the future held could ever take away from me.

THE NATIONAL AIR PHOTOGRAPHIC LIBRARY OF CANADA

Contributed by the Mines and Geology Branch, Department of Mines and Resources, Ottawa

AIR surveys in Canada were initiated by the mapping organizations of the Dominion Government some twenty years ago. They were found to be so well suited to Canadian conditions that they were continuously expanded until they became the basic mapping method in Canada, to the virtual exclusion of older types of work, and various other uses for the air photographs in forestry and engineering were also developed. It was early decided to establish a central repository in which copies of all air photographs taken for any branch of the Federal Government would be filed and made available for the use of other branches and the public. This was the origin of the National Air Photographic Library, and the course of events has amply demonstrated the wisdom and foresight of those responsible for its foundation. It now includes some eight hundred and twenty-eight thousand prints from aerial negatives, covering an area of approximately 840,000 square miles, and constitutes an invaluable record of the topography, forest cover, and cultural features of this vast area.

Originally the Library was a division of the Topographical Survey of Canada. With the organization of the Department of Mines and Resources in 1936 it became a part of the Bureau of Geology and Topography, which carries out the topographical and air surveys of that Department.

The Library now comprises one print from all negatives exposed by the Royal Canadian Air Force and a print from each negative exposed by commercial flying companies under contract to the Dominion Government. In addition, a large number of prints have been obtained from Provincial Governments and from Departments of the Government of the United States whose activities have made it necessary to photograph areas adjacent to the International Boundary. The Library also keeps up-to-date records with regard to areas photographed by Provincial Governments and private enterprise. Details of the film used, filter, exposure interval, lens, elevation, date, time, and all other relevant data, are recorded for each roll of photographs.

Each photograph carries a serial number for the roll and an individual number for the photograph itself, and is indexed in its proper geographical position on a reference map. The key index to the Library's reference maps