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MOUNT EVEREST.

By MAJOR H. T. MORSHEAD, D.S.O., R.E.

THE following notes by one who had the privilege of serving as a member of the Expeditions of 1921 and 1922, have been written in response to a request from the Editor of the *R.E. Journal* for an article on Mt. Everest. It is hoped that the subject, though devoid of any technical or military importance, may yet, perhaps, prove of sufficient general interest to appeal to readers of the *Journal*.

Permission to use the accompanying maps and the illustration "Mount Everest at Sunset" has been kindly given by Mr. A. R. Hinks, C.B.E., F.R.S., on behalf of the Mt. Everest Committee, the owners of the copyright. It will be noticed that the spelling of place-names on the maps differs in certain cases from that used in the text—the latter being the form accepted by the Survey of India.

INTRODUCTION.

Mt. Everest is situated in latitude N.27°:59' and longitude E. 86°:56', on the main axis of the Great Himalaya Range which here forms the Indo-Tibetan frontier. A glance at the map of India will show that here, in the neighbourhood of Sikkim and Eastern Nepal, the Himalaya undergoes a marked change of direction; after trending for 1,000 miles in a general east-south-easterly direction, the mountains in this region turn due eastward, or slightly north of east, for a further 500 miles, towards the Chinese frontier. It is a significant fact that four out of the world's five highest summits* occur in the immediate neighbourhood of this bend in the axis of the range.

Mt. Everest, or rather its giant satellite Makalu, overlooking the gorge of the Arun river, provides an example of the curious law which has often been noted in the Himalaya, regarding the occurrence of high peaks in close association with deep gorges. The Arun river is an important tributary of the Kosi, itself a feeder of the Ganges; it carries the drainage of the Kampa and Tingri plains southwards through the Himalaya range, yet, with an available length of 200 miles along the range out of which to choose its passage, it has elected to pierce its gorge (at a height of 7,500 feet) within 18 miles of the summit of Makalu (27,790 feet.)

* Everest, 29,002 ft. ; Kangchenjunga, 28,150 ft. ; Everest S. Peak (Lhotse) 27,890 ft. ; Makalu, 27,790 ft.

On a clear day, Everest is visible from the plains of northern India at a distance of over 100 miles. It may also be seen, at a slightly closer range, from the neighbourhood of the hill-station of Darjeeling; but, owing to its great distance, it appears a comparatively inconspicuous object, and has consequently never been deemed worthy of a name by the natives of India.* Among the Tibetans, the mountain is known by the name of "Chomo Longma" or "Chhama Lungmo"—a phrase which has been variously interpreted as: "the liberal-minded fairy," "the goddess-mother of the country," "the place of the female eagle," and "the mountain which is so high that a bird is blinded by flying over it!" Personally, I prefer the first of these renderings!

Up to the middle of the last century, Kangchenjunga was believed to hold the supreme place among the mountains of the world. The discovery of Everest as the world's highest summit was made by an Indian computer when working out the results of some observations taken by the Great Trigonometrical Survey of India three years previously. About the year 1850, the field-work of the principal triangulation of India had been extended northwards over the whole peninsula, and was being brought to a close by a series of long rays to numerous "intersected points" along the snowy ranges of the Himalaya. The computation of the results of these observations entailed several years of work in the survey offices at Dehra Dun, and the story is on record in the office archives of how one morning the excited Bengali assistant rushed into the room of his chief, waving a sheet of paper and exclaiming: "Sir, I have discovered the highest mountain in the world!" The height, as then deduced from the mean of six rays averaging 111 miles in length, came to the now familiar figure of 29,002 feet. As the result of subsequent additional observations, combined with an improved knowledge of the laws of terrestrial refraction and of the deflection of the plumb-line at the stations of observation, this figure is now believed to be too low by approximately 150 feet.

In the absence of any native Indian name, the Surveyor-General, Sir A. Waugh, decided to christen the mountain after his distinguished predecessor, Colonel Sir George Everest, under whose direction the triangulation had been carried out which resulted *inter alia* in the discovery of the mountain. Mt. Everest thus forms the only exception to the accepted rule forbidding the use of European proper names for Himalayan peaks. The title has now been so long firmly established throughout the English-speaking world as to preclude

* On the expedition of 1922, General Bruce's Gurkha orderlies usually referred to the mountain as "Himal chuli" which may be translated as "the rocky snow-peak," but this cannot be regarded as a proper name.

the possibility of any change. It is noteworthy, however, that the name Mt. Everest has not hitherto been accepted by Continental geographers, who, relying on an erroneous observation made by the Schlagintweit brothers 75 years ago, still persist in calling the mountain Gaurisankar. Gaurisankar (called by the Tibetans "Chomo Tshering") has long been known to be an entirely distinct mountain, 35 miles west of, and 5,560 feet lower than Everest. It is regrettable that the publishers of a modern standard British work such as the new *Times Survey Atlas* should see fit in the year 1920, to perpetuate this confusion by labelling the world's highest summit "Mt. Everest, or Gaurisankar."

For a period of 60 years after its discovery, access within 75 miles of Everest was barred by its position on the frontier between Tibet and the Native State of Nepal, both of which territories have for the last century and a half been normally closed to European travellers.* About the year 1912, however, consequent on the decline of Chinese influence in Tibet, an expedition to Mt. Everest through Tibetan territory first began to appear as a practical possibility. Major Rawling of the Somerset Light Infantry, a well-known traveller on the Tibetan borderland and in New Guinea, was planning an expedition of reconnaissance for the summer of 1915, to be followed by

* It is worthy of record that in the 17th and early 18th centuries, both Nepal and Tibet appear to have been freely open to European travel. In both countries, Capuchin and other mission stations maintained a precarious existence for many years. The earliest recorded European travellers in the neighbourhood of Mt. Everest are the German Jesuit, Johannes Grueber, and his Belgian companion Albert de Dorville, in 1661-62. Grueber, who occupied the position of mathematician to the Court of Peking, received a summons to Rome early in 1661. The sea route being closed owing to war with Holland, Grueber was instructed to discover a route to Europe overland. Travelling by way of Sining Fu and Lhasa, he thence proceeded south-west to Katmandu and India *via* Kuti (Nyenam) and the valley of the Bhotia Kosi river—finally reaching Italy through Makran, Persia and Asia Minor. Grueber made sketches of his route, and also carried an astrolabe with which he took occasional observations for latitude. His results exhibit a general mean error of about half a degree.

During the first half of the 18th century there appears to have been frequent traffic across the Himalayan passes between the Capuchin mission then existing at Katmandu and the various branch establishments in southern Tibet. The only journey, however, of which a record exists is that of Cassiano Beligatti de Macerata, one of a party of ten Capuchin monks returning from Europe to re-establish the mission at Lhasa. Leaving Patna in December, 1739, the party remained at Katmandu (then only a provincial town) until after the rainy season of 1740. Their route led through Kuti and the Tingri plain to Sakya and Gyantse; Beligatti's description of the country and people might well have been written to-day.

It was while the Capuchin missions were still in existence, between

a serious climbing effort the next year. The war, however, intervened, in the course of which Rawling was killed as a Brigadier-General in France, and the project was, of course, temporarily abandoned.

Interest in Mt. Everest revived as soon as the war was over. During the summer of 1920, Lt.-Col. Howard Bury visited India at his own expense in order to enlist the sympathy of the Government of India towards an expedition. He also visited Darjeeling, and reconnoitred the routes through Sikkim as far as the Tibetan frontier. At the same time Dr. A. M. Kellas and myself undertook some investigations into the use and effects of oxygen at high altitudes on Mt. Kamet, in the Garhwal Himalaya.*

THE EXPEDITION OF 1921.

As the result of Howard Bury's mission, Mr. (now Sir C. A.) Bell, the Political Officer in Sikkim, who happened to be in Lhasa at the time, was instructed to ask the Dalai Lama for permission for a small party to enter Tibet for the purpose of exploring and climbing Mt. Everest. Mr. Bell being on the most friendly terms with His Holiness, the necessary permission was granted towards the close of the year, 1920, and thus the one great obstacle in the way of an approach to Mt. Everest was at last removed. The Mt. Everest Committee was at once formed, consisting of three representatives each from the Royal Geographical Society and the Alpine Club, under the able and enthusiastic chairmanship of Sir F. E. Young-husband. Funds were raised by means of initial grants from the two societies supplemented by public subscriptions, and the organization and equipment of an expedition were hastily put in hand.

The Mt. Everest Committee rightly decided that the whole of the first season must be devoted to a thorough reconnaissance of the mountain with a view to finding not only a feasible route to the summit, but what was without doubt the *most* feasible route. This was considered ample work for the first year's expedition, while the season of 1922 would be devoted to an all-out effort to reach the

the years, 1723 and 1736, that the adventurous Dutchman, Samuel Van de Putte, visited Tibet in the course of a remarkable 20 years' tour from Aleppo to Peking. He appears to have been an excellent Tibetan scholar as well as a skilled and competent observer, but on his death (in Batavia on his way home in 1745), his papers were all burnt under the terms of his will. His sketch map of southern Tibet, which is, however, still extant, gives the positions of Kuti, Tingri and the Phung Chu.

From the final closing of the missions in 1745, there is no further record of travel in this portion of southern Tibet until the period of the Survey of India trained native explorers, a century and a quarter later.

*An account of this trip appeared in the *R.E. Journal* for April, 1921.

summit along such route as the first year's reconnaissance should indicate as the best.

The members selected to form the first season's party were as follows :—

Lt.-Col. C. K. Howard-Bury, D.S.O., Leader of the Expedition.	
Dr. A. M. Kellas	} Mountaineers.
C. Raeburn	
G. H. L. Mallory	
G. H. Bullock	
A. F. R. Wollaston, Doctor and Naturalist.	

On arrival in Darjeeling early in May, the party was joined by Dr. A. M. Heron, of the Geological Survey of India, and by a small survey detachment consisting of the writer and Bt. Major E. O. Wheeler, M.C., together with three Indian surveyors. Wheeler, who is a member of the British and Canadian Alpine Clubs, had been entrusted with the task of making a photographic survey of the immediate environs of the mountain on the 1-inch scale, while the remainder of the detachment were to be employed on a general $\frac{1}{4}$ -inch plane-table survey of the whole area covered by the expedition.

The main body of the expedition, together with 100 mule-loads of stores, left Darjeeling in two parties on 18th and 19th May. A week's marching brought the party across the Sikkim frontier *via* the Jelep pass into the Chumbi valley of Tibet. At the head of the Chumbi valley is the village and *dzong* (fort) of Phari, the residence of the *dzongpen* or governor of the district. Phari is a bleak, dirty village, situated at a height of 14,300 feet above sea-level, and well above the tree-line. Transport arrangements here necessitated a halt of some days while the *dzongpen* was collecting fresh pack animals and supplies for the six days' journey to his colleague at Kampa, which was reached on the 5th June. Here I joined the expedition, having travelled from Darjeeling *via* Thango and the Serpo pass in order to superintend the revision of the map of northern Sikkim.

The arrival of the expedition at Kampa was saddened by the death of Dr. Kellas, from heart-failure consequent on severe gastritis. He had been unwell from the start, but with characteristic determination had refused to give in or to turn back. He was buried the following day on a spur below the *dzong*, in sight of the three great peaks of Chomiomo, Pauhunri, and Kangchenjau, which he alone had climbed. Raeburn, who was also unwell, was at this point compelled to return temporarily to Sikkim under Dr. Wollaston's care.

Resuming our march on 8th June, Tengkye *dzong* was reached in two stages, and here we first came into unsurveyed country. At Kampa I had started a chain of triangulation based on Colonel

Ryder's old stations made at the time of the Lhasa Mission in 1903-4. I realized, however, that with daily marches averaging 15 to 20 miles it would no longer be possible to keep this up, and that it was necessary to decide at once whether to delay the surveyors sufficiently long to enable a triangulation to be carried forward, or, alternatively, to allow them to keep pace with the expedition while merely utilizing the previously existing triangulated points, of which a fair number were visible. In view of the obvious signs of a rapidly approaching monsoon, I decided in favour of the latter alternative.

From Tengkye we marched in six stages to the next *dzong*, Shekar—crossing the broad, sandy bed of the Shiling river a mile above its junction with the Phung Chu. Owing to the prevalence of rinderpest in the Phung valley, the transport yaks and bullocks provided by the *dzongpen* of Tengkye had to be replaced by donkeys for the last two marches before reaching Shekar.

The Phung river is remarkable for the amount of mud which it carries in suspension; below Shekar it flows through a wide, open valley with occasional stretches of fertile marsh-land, and scattered clumps of a stunted species of *salix*, resembling sea-buckthorn, known in Tibetan as "lamdse." Flowering clematis is common, and a sweet-smelling valerian or candytuft—the latter is said by the Tibetans to be very poisonous, and is carefully avoided by cattle.

The town of Shekar is situated 5 miles north of the Phung Chu, on the edge of a level plain containing numerous irrigated fertile barley-fields, and scattered hamlets. The large monastery of Shekar Chote is finely situated on a commanding hill behind the town to which it gives its name—Shekar being an abbreviation of "Shel karmo" (white glass), in allusion to the numerous windows and conspicuous white-washed walls of the monastery, which glisten in the morning sun.

Resuming our journey up the Phung valley, Tingri was reached in two long marches. The village is built on the slopes of a low, isolated hill in the middle of an extensive alluvial plain. The hill is crowned by the remains of an old Chinese fort, now abandoned; just below is the former residence of the Chinese commandant—a building now used as a "circuit house" for Tibetan officials when on tour. This was destined to be the headquarters of the expedition for the next six weeks, and formed a convenient centre for various scientific excursions into the surrounding districts; a dark-room was installed in which were developed the photographs taken by the several members of the expedition.

After a few busy days spent in sorting and arranging stores, Howard Bury and Heron started on a hasty reconnaissance of the tracts of country known as Pharuk and Kharta, lying to the north and east of Mt. Everest, with the object of selecting a suitable site for the next headquarters when a further move should become neces-

sary. Mallory and Bullock set off to examine the north-west approaches of Everest, and to train the coolies in ice, snow and rock technique. Wheeler commenced his photo-survey in the neighbourhood of Kyetrak, two marches to the south. I spent a week with one of the surveyors exploring and mapping the western headwaters of the Phung Chu.

Early in July in response to an invitation from the *dzongpen* of Nyenam, Wollaston and I, with Surveyor Gujjar Singh and an interpreter, started on a visit to the district of Nyenam which lies four marches to the south-west of Tingri. Our first camp was at Lungkor, a small village on the western edge of the Tingri plain. Crossing the Thung La (17,980 feet) in a driving snow-storm, a long march of 22 miles brought us next day to the bleak village of Tulung, in the upper valley of the Bhotia Kosi river. Two days later we reached Nyenam, a large and very insanitary village which is known under the name of Kuti by the Nepalese, who constitute the majority of its inhabitants. These Nepalese traders (*newars*) have their own Hindu temple in the village; there is also a Nepalese magistrate, having summary powers of jurisdiction over Nepalese subjects.

I spent three days in exploring the neighbourhood of Nyenam, while Wollaston was engaged in his botanical and zoological pursuits. Below Nyenam the river enters a very narrow gorge, while pines and other forest trees begin to appear; the road, which here becomes impassable for animals, crosses the river four times in eight miles before reaching the village of Choksum, but owing to the vile state of the weather which rendered even the roughest attempts at surveying impossible, I abandoned any idea of further progress down the valley.

Returning up the valley to Trashigang, we next followed a rough track leading in a south-easterly direction over the Lapche range to the village of the same name in the valley of the Kang Chu. We were unable to reach the village by dusk, and spent a somewhat miserable night camping on boulders in drenching rain at 14,600 ft., with no fuel except a few green twigs of dwarf rhododendron.

Lapche is sacred as the home and birthplace of Mila Repa, a wandering lama and saint who lived in southern Tibet in the eleventh century, and whose collections of songs and parables are still among the most popular books in the country. His hermit-cell still remains under a rock on the hillside, and his memory is preserved by an ancient temple, the resort of numerous pilgrims, alongside which we pitched our tents.

From Lapche we crossed the Kangchen pass into the Rongshar valley. As we descended the hill into Trintang village, the clouds lifted momentarily, disclosing an amazing view of the superb summit of Gaurisankar towering magnificently above us just across the valley. Owing to the sacred nature of the Rongshar valley, the

slaughtering of animals is forbidden, and the large flocks and herds are only kept for sale in Tingri and Nepal. We were only able to buy a sheep on promising not to kill it until after quitting the valley.

On 27th July we marched 20 miles up the Rongshar valley to the village of Tasam (Takpa-Santsam="limit of birchtrees") which, as its name implies, is situated at the extreme upper limit of the forest zone. The headman of Tasam was too drunk on the evening of our arrival to send out the necessary messages summoning the village baggage yaks from their grazing grounds. In consequence, our baggage next day only got started at 11 a.m., and we were compelled to pitch our tents at a grazing camp after covering only nine miles. The weather showed signs of improvement in proportion as we receded from the Himalayan gorges, but dense banks of cloud still obscured all the hill-tops. An easy march over the Phuse pass brought us on 29th July to the bleak village of Kyetrak at the extreme southern edge of the Tingri plain. Four days later we rejoined the expedition headquarters which Col. Bury had just transferred to Kharta, in the lower valley of the Phung Chu or Arun river.

It is now time to turn to the doings of the mountaineers. Leaving Tingri on 23rd June, Mallory and Bullock—the only two now left out of the four climbers from England—turned southwards into the unknown, to explore the western and northern fastnesses of Everest. Approach was soon found to be barred from the west and north-west by the great peaks of Cho Uyo and Gyachungkang, and the climbers turned their attention without further delay to the Rongbuk valley which drains the northern slopes of the mountain. The great Rongbuk glacier, terminating five miles above the village and monastery of that name, was at once seen to be divided, higher up, into at least two important branches—the western branch swinging round from the southern slopes of Gyachungkang, and the main or central branch ending in a great coombe or cirque under the north face of Everest itself. These two branches were explored in turn, in the face of the most adverse conditions of weather, due to the monsoon season which had now become firmly set in; enough of the landscape was, however, visible to establish the following facts:—(1) That the key to the mountain appeared to be an important saddle—subsequently known as the North Col (Chang La), 23,000 ft.—situated at the head of the main Rongbuk glacier, about $1\frac{3}{4}$ miles north of the summit of Everest; and (2) that only in the very last resort could the main Rongbuk glacier be made use of as a means of access to this North Col, and that an examination of its further (*i.e.*, eastern) flank was the next essential requirement. Towards the end of July, therefore, the two climbers struck their tents, turned their backs on the Rongbuk valley, and hastened to rejoin Howard Bury in the newly-established base camp at Teng on the bank of the Arun river in the district of Kharta.

A broad glacier stream, the Kharta Chu, coming down from the west, and therefore, as it appeared, from Everest, joins the Arun river at Kharta. To follow this stream to its source seemed the next obvious plan, after a few days for rest and re-organization in the pleasant surroundings of Kharta.

Accompanied by a local Tibetan guide, Mallory and Bullock accordingly set out once again on 2nd August; following the upward course of the Kharta stream, past scattered hamlets and waving fields of barley, they camped for the night at a spot where a small tributary joined the main stream from the south. To their surprise the guide led them next day up this side stream, over a pass which he called Langma La, 4,000 ft. above their camp of the previous night. A long descent followed, leading them eventually, baffled and bewildered by continual cloud and mist, to the foot of an enormous glacier* draining in a south-easterly direction. Not until the third day did the clouds lift sufficiently to disclose for a few moments the gigantic precipices of Makalu towering above them to the south.

Altogether, a week was spent in exploring this Karma valley—a valley which is directly overlooked by three out of the five highest peaks in the world. At the broad head of the Karma valley were the two summits of Everest, and Everest South Peak (Lhotse); 10,000 feet below these lay a great basin of tumbled ice, fed by frozen tributaries pouring down between the almost perpendicular buttresses which support the mountain faces in this enormous cirque. Obviously no route to the summit was to be found here, but on climbing a peak on the northern side of the valley, the explorers fancied they recognized in the distance, away to the north-west and almost masked by cloud and intervening ridges, the outline of the elusive North Col, situated apparently beyond the head of the Kharta valley. Retracing their steps over the Langma pass, they succeeded on 18th August in reaching the Col at the head of the Kharta valley which we subsequently christened Hlakpa La, or Windy Gap (22,200 ft.). I was able to join the climbers on this last piece of reconnaissance. Looking westward from the summit of the Windy Gap, the lower slopes of Everest were dimly discernible through the clouds away on our left about $2\frac{1}{2}$ miles distant; directly in front of us, at a slightly greater distance, were the eastern slopes of what we judged to be the North Col; everything above our own level was concealed in a dense bank of cloud. Between us and the North Col, we looked down on a broad, smooth bay of ice and snow 1,000 feet below, draining towards the north—whether this represented a hitherto unsuspected eastern branch of the Rongbuk glacier, or whether it drained into the Rephu branch of the Dzakar stream, we were at the moment unable

* The Kangshung glacier.

to ascertain. Anyway, a possible route to the North Col had been discovered and we were now justified in returning to Kharta for ten days' rest and re-organization, prior to a final assault in which all were to take part as soon as the monsoon should begin to abate.

Howard Bury and Wollaston were already at the base, Heron arrived the following day, followed shortly afterwards by Wheeler, whose photographic survey of the Rongbuk glaciers had been greatly delayed by the appalling weather. Wheeler was able to confirm the important fact that the glacier* on to which we had looked down from the Hlakpa La, drained into the Rongbuk valley, through a narrow gorge which had been overlooked by the mountaineers in the mists and cloud during their first reconnaissance of the Rongbuk glaciers. It was now, however, too late to transfer our line of communications back again to the Rongbuk valley; for this season we were committed to carrying out our assault on the North Col *via* the Windy Gap.

After three weeks of tedious waiting in the upper Kharta valley, the weather improved sufficiently by 22nd September to enable us to establish a camp of six Europeans and 18 coolies on the summit of the Windy Gap. Mallory, Bullock and Wheeler, with ten selected porters, next day pushed forward a light camp to the foot of the North Col. On the 24th they succeeded in reaching the summit of the Col (22,990 feet) in the face of a terrific blizzard which rendered further progress impossible. Beyond the Col, an easy succession of rock and snow slopes could be seen leading to the north-east shoulder of Everest (27,390 feet.)

This closed the season of 1921. The results of the season's work may be briefly summarized as follows:—

- (1) The north, east and west flanks of the mountain had been thoroughly explored, and a practicable route of ascent discovered, the key to which was the North Col, which had actually been reached *via* the Kharta valley and Windy Gap, but which would, doubtless, be more easily accessible *via* the East Rongbuk glacier. From the time when we first viewed the mountain early in June until the end of the season it had presented an unbroken white surface of ice and snow; rock was scarcely anywhere visible.
- (2) High climbing between 15th June and 15th September had been proved an impossibility owing to the prevalence of monsoon conditions, while from the middle of September the monsoon was found to be succeeded by a series of terrific equinoctial gales from the north. The only hopeful season for climbing at extreme altitudes in the Himalaya thus appeared to be the months of May and early June.

* Since known as the East Rongbuk glacier.

- (3) 12,000 square miles of new territory were surveyed on the $\frac{1}{4}$ -inch scale, and 4,000 square miles of old $\frac{1}{4}$ -inch survey were revised. 600 square miles of the immediate environs of Mt. Everest were mapped photographically on the 1-inch scale.
- (4) The geology and natural history of the area were worked out with considerable thoroughness. Interesting collections were made of mammals, birds, butterflies and plants, all of which were found to include new specimens.

THE EXPEDITION OF 1922.

Howard Bury having become a candidate for election to Parliament, the charge of the 1922 expedition was given to Brig.-General the Hon. C. G. Bruce, C.B., M.V.O. (now President of the Alpine Club), with Colonel E. L. Strutt, C.B.E., D.S.O., as his second-in-command. The remaining members selected in England were:—

G. H. L. Mallory	}	Climbers.
T. H. Somervell		
A. W. Wakefield		
G. I. Finch		
Major E. F. Norton		
Dr. T. G. Longstaff, Doctor and Naturalist.		
J. B. L. Noel, Photo and Cinema Expert.		

The party were joined in India by C. G. Crawford of the Indian Civil Service and the writer, together with Captains Morris and G. Bruce, of the Indian Army.

An important addition to this year's equipment was a number of sets of oxygen apparatus, under Finch's special charge. Each set comprised a light carrier supported on one's back by a system of web belts and straps, and carrying four cylinders of compressed gas, which was delivered to the face mask by a system of flexible piping with a pressure-reducing valve and adjustable flowmeter. The weight of the apparatus was about 35 pounds, and each cylinder was reckoned to last about $1\frac{1}{2}$ hours at a normal flow of three litres per minute. Empty cylinders could be disconnected and replaced as required.

Leaving Darjeeling on 26th March, the expedition followed the route of 1921, in bitter weather, as far as Shekar, whence they turned southward over the Pang La pass to Tashidzom and Chobuk. The base camp was pitched at a height of 16,500 feet in the Rongbuk valley, just below the snout of the glacier and twelve miles distant in a direct line from the summit of Everest. In contrast to our experience of the previous year, the northern slopes of the mountain now, before the onset of the monsoon, proved, to our joy and surprise,

to be almost devoid of snow and ice, displaying a not too formidable-looking surface of black slabby rock.

The base camp was established by the end of April, and the next three weeks were occupied in reconnoitring the East Rongbuk glacier (the only portion of the route not fully explored in 1921), laying out the advanced camps, and stocking them with supplies and equipment. By 20th May, camps had been established as follows :—

- | | | |
|-------|------|--|
| No. 1 | Camp | —18,000 feet, just above junction of E. Rongbuk valley with main Rongbuk valley. |
| „ 2 | „ | 19,000 feet, half way up E. Rongbuk glacier, on moraine. |
| „ 3 | „ | 21,000 feet, at foot of North Col, on moraine. |
| „ 4 | „ | 23,000 feet, at summit of North Col, on snow. |

The time now appeared ripe for a serious attack on the mountain, so while Finch was still busy assembling his gas apparatus, Mallory, Somervell, Norton and myself with ten porters, left Camp III for the North Col (where, as just mentioned, we had already established a camp). Sleeping at the North Col on 20th May, we continued next morning the ascent of the northern face of the mountain over fairly easy going until the onset of a blizzard at midday compelled us hurriedly to camp at 25,000 feet (Camp V), and send the coolies back to the North Col. The hillside was composed of flat slabs of rock of varying sizes, the strata having an outward (northerly) dip ; and it was a matter of some difficulty to scarp out with our ice axes a couple of level terraces sufficient to hold our two small mountain tents. We finally succeeded after a fashion, and spent a tolerably comfortable night, the temperature dropping to minus 20° F.

Next day broke fine, with a powdering of freshly fallen snow on the ground, and after hastily warming up a light breakfast over the spirit stove we were roped up ready to start by 7.30 a.m. The first hundred yards sufficed to assure me that for some reason I had not that day the pace of my three companions, so rather than keep them back, I felt my duty was to unrope, leaving them to carry out their climb untrammelled. In the result, while I remained smoking my pipe in camp, they succeeded in attaining a height of 26,850 feet, just below the north-east shoulder of Everest*, before the lateness of the hour compelled them to turn back. They had reached a point within one mile of the summit, and there appeared to be no serious obstacle in this last remaining lap—only, it was more than could be accomplished in one day from the camp at 25,000 feet. One more intervening camp would be necessary, at about 27,000 feet, and this we had not the immediate means of achieving.

* The N.E. shoulder is marked 27,390 feet on the sketch-map.

It was about 4 p.m. when Mallory and his two companions rejoined me at Camp V, and after hastily melting down sufficient ice to give us each a mouthful of drink, we decided to make at once for the North Col. Instead of benefiting by my day of idleness in camp, my physical incapacity had now become almost complete; and, leaning on my companions' arms, I could scarcely find the energy to descend the easy slopes up which I had gaily led on the rope less than thirty-six hours previously. It was 10 or 11 p.m. and pitch dark before we finally reached the shelter of the North Col camp, too tired even to hunt out some supper.

Next morning, as we wearily made our way down towards Camp III, we met Finch, Geoffrey Bruce and a Gurkha N.C.O., Tejbir, starting on their high climb, with oxygen masks already adjusted and in use. They were being accompanied for the first few miles by Dr. Wakefield who carried a thermos flask filled with hot tea and brandy which remains one of the happiest recollections of my life. Shortly afterwards, on nearing Camp III, we came to the first spot at which a little trickle of water had been melted by the midday sun. Lying prone, I lapped and lapped until I had absorbed, perhaps, a quart of this icy beverage. Instantaneously my strength returned, and I then realized that my whole trouble had been simply due to the impossibility of obtaining sufficient liquid at the high altitudes. All four of us proved to have been more or less frost-bitten during our descent to the North Col the previous night; in the case of Mallory and Somervell the damage was limited to a few skin blisters on the extremities. Norton's beauty has been permanently impaired by the loss of the top of one of his ears, and I had to undergo, five months afterwards, the amputation of the top joint of three fingers of my right hand.

Finch, G. Bruce and Tejbir, with their string of coolies, after sleeping at the North Col, carried a camp to 25,500 feet, at which point the onset of a blizzard compelled them as it had us, to pitch their tent and send back their coolies. For thirty-six hours the storm raged with unremitting violence; the ceaseless flapping of the little tent was afterwards compared to the noise of a machine-gun in one's ear, while the three occupants dared not stir outside for a moment lest the whole frail outfit should be carried bodily away by the force of the wind. On the third day, still supported by their remaining supply of oxygen, they reached a height of 27,250 feet before being compelled to return—being then about half a mile in horizontal distance from the summit of the mountain.

By the end of May, all the climbers were back at the base camp, and all of us were to a greater or less degree *hors de combat* as the result of our experiences. A universal symptom was the loss of one or two stone in weight during our sojourn above the snow line, combined with a strong feeling of disinclination for further exertion.

Early in June, Mallory, Somervell and Crawford gallantly organized a third assault, but the monsoon had meanwhile set in and the mountain sides had become dangerous. An unfortunate avalanche occurred on the steep ascent to the North Col, carrying away one whole rope of coolies, all seven of whom were killed instantaneously. This disaster closed the climbing season of 1922.

The results of the 1922 expedition were :—

- (1) Heights of 27,250 feet and 26,850 feet were attained, with and without oxygen respectively, and it was ascertained that no serious physical obstacles exist between the highest points reached and the final cliff of 100 or 200 feet which marks the actual summit. Camps were made at 25,500 feet and 25,000 feet, but from these heights it was found impossible to reach the summit and return in one day.
- (2) The months of May and early June (before the arrival of the monsoon) were definitely proved to be the only possible season of the year for the climb—thus confirming the deductions made from the experiences of 1921. Further, at this time of year the whole northern face of the mountain was found to consist of bare rock.
- (3) Oxygen was tried for the first time in actual use at extreme heights, and gave proof of its value.
- (4) Further collections were made of the natural history and geology of the regions traversed.

CONCLUSION.

The question is sometimes asked : why steps have not been taken to explore the southern (Nepal) faces of Mt. Everest before definitely accepting the North Col route as being the best : and, in any case, why do successive expeditions follow the long roundabout road to the base camp through the Chumbi valley and the plains of Tibet, instead of taking a direct route northwards from the plains of India through Nepal, and thus reducing the distance of the outward and homeward marches from 350 miles to one-third of that distance. These points demand a few observations. Firstly, the Nepal Government do not favour European travel in their territory, and, although their attitude towards the enterprise may be inferred from their generous and spontaneous contribution of 3,000 rupees (£200) towards the funds of the first year's expedition, yet it is uncertain whether or not they would give the necessary permission to traverse their country if such were asked for.

More cogent is the consideration that the routes leading northwards through Nepal are known to be mere coolie tracks swarming with leeches during the monsoon, and where any form of pack transport is an impossibility ; whereas in Tibet, and more particularly on the

Sikkim-Chumbi Valley trade route, unlimited yak and mule transport is obtainable at cheap rates of hire.

Thirdly, arguing from the analogy of other known portions of the Himalaya, it may be stated with some confidence that the unknown southern slopes of Everest, exposed as they are to the full brunt of the monsoon precipitation, will be found far more deeply eroded, rugged and inaccessible than those on the northern face of the mountain. Further, the summer snow line on the sheltered northern slopes of the Himalaya is roughly 2,000 feet higher than that on the south.* Mention has already been made of the fact that the whole northern face of Everest was found to consist of almost bare rock in May, 1922. The reflected glare, always an important consideration at extreme altitudes, is also less on a northern than on a south-facing slope.

The next attempt on Mt. Everest is to be made in 1924. The third expedition will probably be a climbing affair pure and simple, but among the scientific problems whose solution is still desirable it must suffice to mention that the whole southern slopes of the mountain await an opportunity for survey, while a small area of country still requires elucidation at the head of the West Rongbuk glacier; further research is also desirable into the glaciology of the area (advance and retreat of glaciers), and into the problems of mountain physiology, with particular reference to the phenomena of acclimatization to altitude.

A very desirable addition to the next expedition would be the presence of a competent artist who might portray in oil or water colours a few of the many striking and gorgeous effects of sun, snow, cloud and rock which even the most efficient camera or cinema in the world cannot wholly reproduce.

A fifth high camp will be necessary somewhere about 27,000 feet. In 1922, it was found possible to camp and sleep in comparative comfort (barring blizzards) at 25,000 feet, where the barometric pressure is 10 inches; there should not be any further appreciable discomfort in camping at 27,000 feet, where the barometric pressure has only dropped another half-inch. The real difficulty is one of organization, and of the carrying capacity of human beings at these extreme altitudes.

Another great difficulty lies in the incalculable and uncertain nature of the weather from day to day, and it is here that the importance of oxygen comes in. Starting from No. III Camp, without oxygen, it would take three days to establish a camp at 27,000 feet; one day would then be required to reach the summit, and two days for the return to Camp III. Total six days. The

* Approximately 20,000 instead of 18,000 feet in the latitude of Everest.

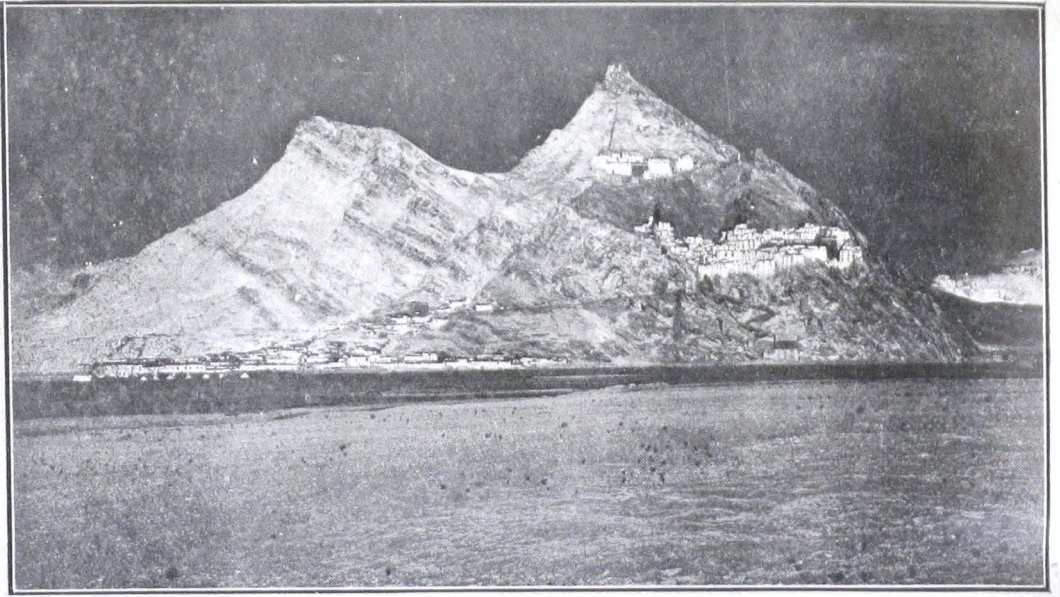
use of oxygen may, however, enable a party to accomplish in three days what would otherwise take six, and three days is possibly the longest interval which may ever occur between successive blizzards. The problem of establishing a depôt of spare oxygen cylinders at a height of 27,000 feet is, however, one of immense difficulty.

One hopeful element in the problem, on which these notes may be fittingly brought to a close, is the wonderful keenness and endurance displayed by the coolie porters of the expedition, to whom is due a very large measure of such success as has hitherto been attained. These hardy hillmen—known in their own language as *Sharpas* (or “Easterners”)—born and bred under the shadow of Everest itself, showed a spirit which was beyond all praise. On the return to Darjeeling, after the death of their seven comrades, every single remaining man asked to have his name registered as a volunteer for the next expedition. With such splendid and willing assistance on the side of the attackers, it will, indeed, be a matter of surprise if Mt. Everest remains much longer unconquered.



MOUNT EVEREST AT SUNSET, from 20,000 ft. Camp, Kharta Valley.

(Reproduced by permission of the Royal Geographical Society, from a photograph by Mr. A. F. R. WOLLASTON).



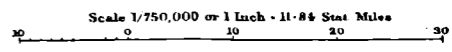
Shekar Village and Monastery.



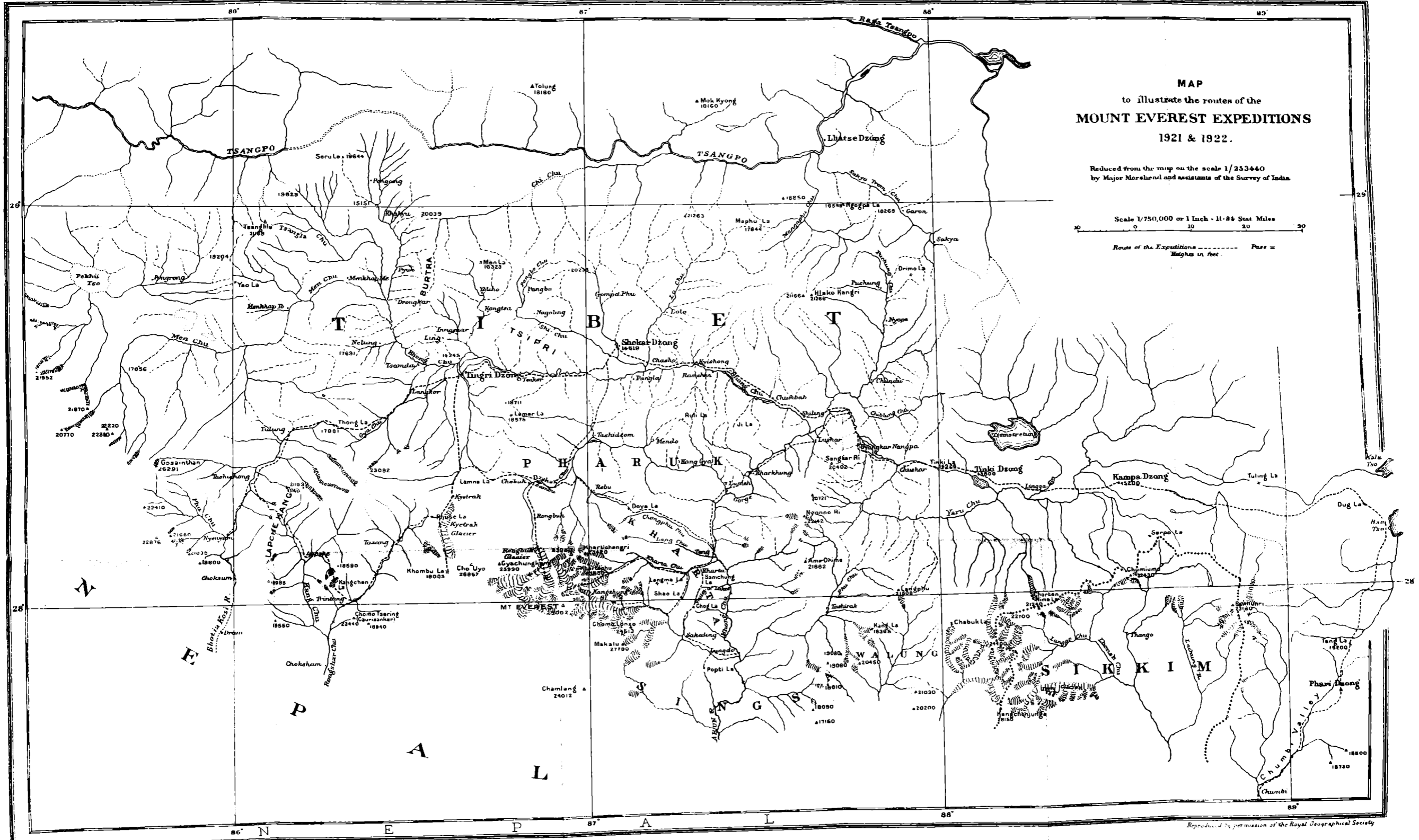
Cho-Oyu from above Kyetrak.

MAP
to illustrate the routes of the
MOUNT EVEREST EXPEDITIONS
1921 & 1922.

Reduced from the map on the scale 1/253440
by Major Morshed and assistants of the Survey of India



Route of the Expeditions - - - - - Pass =
Height in feet



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