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AN EXPLORATION IN SOUTH-EAST TIBET.

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

INTRODUCTION.

IN the following pages I propose to give a short description of an impromptu journey undertaken in 1913—the year before the war—with a view to proving the identity of the Tsangpo River of Tibet with the Bramaputra of the Plains of Assam.

Light literature on the subject of travel and exploration being somewhat alien to the austere pages of the *R.E. Journal*, it will perhaps be well to confess at the outset that this article is merely an account of a few personal adventures ; it contains no new contribution to the art of war in general nor a single suggestion for the improvement of survey methods in particular.

THE TSANGPO PROBLEM AND PREVIOUS ATTEMPTS AT ITS SOLUTION.

Before commencing my story it may not be amiss to recall the history and nature of the long-standing geographical problem presented by the Tsangpo River, and to explain briefly the circumstances which led up to its successful solution seven years ago.

The upper course of the great river from its source near the Manasarowar Lake to the town of Tsetang, south-east of Lhasa, was first made known to us through the journey of the Indian explorer, Pandit Nain Singh, C.I.E., who was trained by Capt. T. G. Montgomerie, R.E., of the Survey of India, and whose original journey in the years 1865–66 resulted in a reliable route map of the first six hundred miles of the course of the river.

With a view to tracing the lower course of the Tsangpo and of proving its identity with the Dihang branch of the Brahmaputra River of Assam, Capt. Harman, R.E., of the Survey of India, enlisted in the year 1880 a Chinese lama whom he instructed to proceed as far down the river as possible and to throw marked logs into the Tsangpo. Watchers were to be stationed at the junction of the Dihang and Brahmaputra to note the arrival of these logs. The lama took with him, as servant or companion, a native of Sikkim, Kinthup by name, who had previously accompanied another Indian explorer on a journey in the same neighbourhood. On arrival at a place called Tongkyuk dzong, near the borders of China, the lama, becoming apparently " fed up " with his errand, sold Kinthup into slavery and returned to his own home in China, never to be heard of

Part of NORTH-EASTERN FRONTIER AND TIBET showing the routes of CAPTAINS MORSHEAD and BAILEY 1913.

Scale 1:1,000,000 or 1 Inch = 15·78 Stat. Miles

10 5 0 10 20 30 40 50

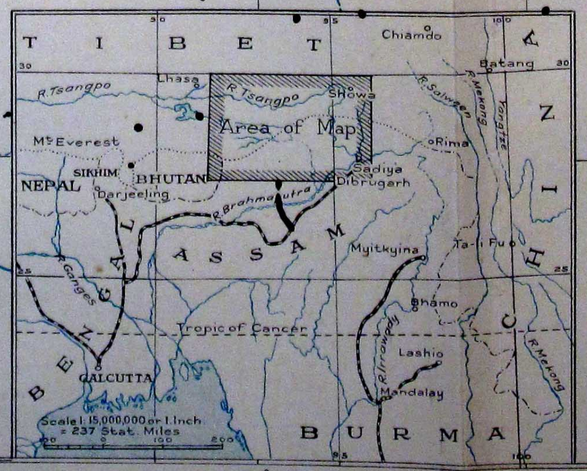
Symbols and Abbreviations.

- Author's Route
- Monastery (Gompa) ... Ga.
- Fort, or Headq^rs of Local Gov^t Official (Dzong) ... Dz.
- Mountain Pass (La) ... x
- Rest House ... R.H.

Heights in Feet.

Surveyed by the Abor Exploration Party

Surveyed by the Mishmi Exploration Party



NORTH-EASTERN FRONTIER AND TIBET
MORSHEAD & BAILEY

again. Kinthup managed to escape and returned to Darjeeling after an absence of four years—having traced the course of the Tsangpo nearly 100 miles lower than any previous explorer, until turned back by the savagery of the Abor tribes within some 40 miles of the Plains of Assam. He even carried out the programme of throwing 500 marked logs into the river, but Capt. Harman had in the meantime died—a victim to over-work—and the logs floated unowned and unnoticed into the broad bosom of the great river of Assam.

Kinthup being quite illiterate could only dictate his experiences from memory on his return, and his information not being based on any route survey added little to the map of South-east Tibet. One alleged statement of Kinthup's created considerable interest, namely, that "at a place called Sinji-Chogyal the river falls over a cliff from a height of about 150 feet, a big lake lying at the foot of the falls, where rainbows are always observable." Falls of such a height are absolutely unknown on any of the great Himalayan rivers and are, indeed, almost an impossibility in an area of such geologically recent formation, where the strata are largely composed of uncompacted shales. Yet without postulating the existence of falls it seemed difficult to account for the huge drop in the bed of the river from 12,000 feet in the neighbourhood of Lhasa to its emergence into the Plains of Assam at a height of 500 feet above sea level.

Harman's death marked the end of the era of native Indian exploration which had produced such grand results during the previous 20 years, and interest in the Tsangpo problem lapsed until the military and political expedition to Lhasa under Colonel Younghusband in 1904-5. This expedition was accompanied by a fully-equipped Survey party under Major C. H. D. Ryder (now Colonel Ryder, C.I.E., D.S.O., R.E., Surveyor-General of India) and it was confidently hoped that at the close of the campaign an opportunity might occur for a small survey party with escorts to return to India *viâ* the lower course of the river, and thus settle the problem once and for all. Political conditions, however, rendered this impossible, and the survey party proceeded up-stream instead of down—carrying out a rigorous survey of the Upper Tsangpo Valley and of the Northern Slopes of the great Himalayan range, and amplifying and confirming Nain Singh's route traverse of 40 years before.

Six years later various events on the North-east Frontier combined to focus attention on this little known area. A punitive expedition, accompanied by a Survey party, was sent into the Abor Hills in the cold weather of 1911-12; other survey parties under military police escort were at the same time organized for work in the neighbouring valleys of the Subansiri River (Miri tribes) on the west, of the Luhit River (Mishmi tribes) on the east, and of the headwaters of the Irawadi (Kachin and Shan States) from the Burma side, with a view

to the complete mapping of the Indian N.E. Frontier. As the work was not completed during the cold weather season, 1911–12, these parties were again sent out in the following season, 1912–13.

At the close of the second field season in May, 1913, the position was as follows:—The Abor Survey Party, under Capts. Trenchard and Oakes, R.E., had surveyed the basin of the Dihang River and its principal tributaries, as far north as latitude 29° 15′ approximately (*vide* accompanying map). The Mishmi Survey Party, under Major Gunter, R.E., and the present writer, had completed the survey of the whole basin of the Dibang River, which had been proved not to pierce the main Himalayan range to the north. During the course of the latter operations a colony of Tibetans from the province of Kham was discovered at Mipi village in the upper valley of the Matun branch of the Dibang River. These Tibetans, who proved friendly, volunteered much interesting information regarding their own native country, and offered to provide guides to point out the road thither. It was felt that a unique opportunity was thus offered for a small party to penetrate the unknown reaches of the Tsangpo in the neighbourhood of the great bend, and thence possibly to follow the hitherto unexplored Frontier westwards towards Bhutan.

By great good fortune the Assistant Political Officer with the Mishmi party was Capt. F. M. Bailey, I.A., a man of boundless physical energy, a born naturalist and explorer, and possessing an intimate knowledge of the Tibetan language and customs.

Our Journey—Pemakö, Pomé, and the Great Bend.

On the conclusion of the Mishmi Survey Operations, Bailey and myself, with ten picked coolies remained behind in Mipi, where we had been able to store a two months' supply of rations and a complete outfit of warm clothing for our small party.

Having spent the first half of May in laying out depôts of rations, as far in advance along the road as the now rapidly receding snow-line permitted, we finally quitted Mipi with our ten coolies and three local guides, in pouring rain, on May 16th. The going was extremely bad, as the incessant rain and the rapid melting of the snow on the hills had combined to render the whole country a morass. Our marches were therefore short; we had, moreover, to make several halts while our coolies returned to fetch up the reserve of rations; so that it was not until 24th May that we reached the "Latsa," or hut, at the foot of the Yönggyap Pass. The next day snow fell heavily all day and our guides declared that it would be madness to attempt the Pass. On the 26th, the weather having slightly improved, we started early—ourselves carrying guns, plane-table, etc., so as to have every possible coolie available for carrying rations. Owing to a thick mist, our guides had great difficulty in finding the

Pass, which is reached by a toilsome ascent of some 1,500 feet through deep snow, and it was dark when we reached the "Latsa" on the north side of the Pass. Here we had to halt for a day, as four of our coolies were totally incapacitated by snow-blindness. There had been no apparent glare on the snow, owing to the dense mist all day, and the possibility of snow-blindness had not occurred to us. However, we received a lesson thus early by which we were not slow to profit. We were now in the valley of the Shümo, or Yonggyap River, a tributary of the Dihang, or Tsangpo.

A peculiar Tibetan characteristic may here be mentioned, namely, that of giving the same name to the two streams which flow in opposite directions from the two sides of a mountain pass. Thus from the Yonggyap Pass, one Yonggyap stream flows S.E. to join the Dibang River, while another stream of the same name flows W. to join the Dihang River.

Since leaving Mipi, not a single triangulated peak had been visible through the cloud and mist, and I began to realize the impossibility of carrying on any system of connected triangulation, or indeed, of executing any more rigorous method of survey than a route traverse by "time and compass."

One march from the "Latsa" Camp brought us to Yonggyap Da, where the streams from the Yonggyap and Pungpung Passes unite. The combined waters of these two streams join the Dihang under the name of the Shümo River. There is, however, no road down the Shümo Valley, and in order to reach the Dihang it is necessary to cross the Pungpung Pass, and follow the Chimdro stream to its confluence with the Dihang near Kapu. Just above Yonggyap Da there is a shallow lake, some two miles long by half a mile wide, formed by the damming of the stream.

On the 30th May we crossed the Pungpung Pass (14,310 feet by hypsometer), which, like the Yonggyap, was under 20 feet of snow, and next day reached the village of Gudam in the Chimdro Valley—the first human habitation which we had seen since leaving Mipi fifteen days before. From Mipi to Chimdro is a distance of nearly 100 miles through uninhabited country in which no supplies of any kind are procurable. The journey, moreover, involves the crossing of two passes which, though not exceedingly high, are yet dangerous on account of their proneness to constant snow storms and mist. The necessity of providing food for the whole party for this portion of the journey had greatly curtailed our carrying capacity; though we were able largely to supplement our food supply by shooting pheasants—three varieties of which, munal, tragopan, and blood pheasant, were very plentiful just below the snow-line.

At Chimdro, Bailey succeeded in inducing the local "dzongpon," or Tibetan official, to provide us with coolies and supplies for our onward journey. This was a most important achievement, since our

title to supplies and transport, thus once admitted, served as a precedent for the whole of our journey.

On the 5th June we reached Kapu in the Dihang Valley, and heard that the Abor Column were some 6 marches down stream. This portion of the Tsangpo valley below the great bend is known as Pemakö. It was originally inhabited by wild Abor tribes, but the latter were ousted 100 years or so ago by immigrant "Mönbas" or Bhutanese. The latter are, of course, Buddhists by religion, and still like to consider themselves Bhutanese subjects, though actually they are subjects of Pomé. From Kapu I sent a letter by native runner to Trenchard informing him of our arrival, and asking for the co-ordinates of any triangulated points which he might have fixed. While waiting for a reply we traversed leisurely down the Dihang Valley, halting at Makti (where a brief interval of clear sky enabled me to observe N. and S. stars for latitude) and finally ascending a side spur to the monastery of Rinchenpung. The river is here some 120 yards wide and the current very fierce. It is spanned here and there by single-rope bridges of twisted cane which have to be crossed "hand-over-hand" in monkey fashion—the weight of the body being supported by leather thongs fixed to a wooden saddle which slides over the rope. The river level at this point is about 2,600 feet, and the densely-wooded sides of the valley rise steeply on either hand to a height of 6,000 or 7,000 feet. Villages occur every few miles along the lower slopes of the valley on either bank. The moist, damp heat of the valley at this time of the year is most trying; combined with the perfect plague of mosquitoes, leeches, and gadflies, life would have been rendered almost unbearable were it not for the very excellent quality of beer which is brewed here in large quantities from millet.

After vainly waiting three days for a reply to my letter, we retraced our steps to Kapu, and thence continued up the valley *viâ* Kemteng and Tsangrang to Lagung, where we found the "Nyerpa," or Prime Minister of Pomé, Namgye by name, waiting for us. Namgye was returning from a winter tour in Pemakö, and had been in correspondence with the Abor Column, who had informed him that they did not intend to penetrate into Pemakö. He was, therefore, inclined to view us with considerable suspicion, regarding our arrival in the country as a breach of faith. Finally, it was settled that we were to abandon our intention of following up the valley of the Tsangpo, and were to accompany him over the Sü Pass to Showa, the capital of Pomé, where a council would be held as to our disposal.

We halted two days at Lagung. The Nyerpa came to see us on the morning of the second day, bringing a present of rice, tea, etc. He was less on his dignity than before, and had a long conversation with us. He had with him a number of Chinese matchlocks, and in the afternoon, by way, apparently, of impressing us, he fired off a

number of rounds at a mark. We joined in with a round or two from our own rifles. In the evening he came again to see us—very friendly, but as drunk as a lord.

We crossed the Sü Pass on 23rd June, and by judiciously lagging behind the Nyerpa's party, I was able to fix accurately the position and height of the Pass (13,445 feet) by trigonometrical interpolation by means of a surreptitiously observed sun-azimuth to the two previously triangulated peaks of Namcha Barwa. The crossing of the Pass involved a climb of 2,900 feet over snow which was quite hard and easy to travel over, though in places the leading man cut steps with his sword.

On the Pass we saw "munal" pheasants, and another strange game bird resembling the "ram-chukor," which we were unable to identify as unfortunately the only specimen which I shot fell 500 feet down the hillside and was lost under a snow-drift.

We reached Showa on June 25th, and were kept more or less prisoners in the travellers' house for three days, during which time Bailey spent many hours pressing our case before the Council, who affected to believe we represented a Southern flank attack on the part of the Chinese who had been expelled eastwards out of the country 18 months previously. Matters were eventually settled satisfactorily, and we were given a mounted guide and promises of supplies and transport to take us to the Tibetan border; though, at the very last moment their suspicions were again aroused, and the negotiations imperilled, at the sight of the Chinese writing on the tablet of Indian ink which I was using in inking up my plane-table.

In the Pomé valley one first began to notice a change in the type of scenery and vegetation from that of the Abor and Mishmi Hills. The dense tropical jungle of the lower Dihang valley gives way to tall pines and cypresses growing from a carpet of lush grass and vivid-coloured wild flowers; while the substantial stone-built houses, terraced fields, and avenues of peach, walnut, and pollard, willow denoted a higher type of civilization than we had hitherto met. Showa, the capital of the country is a straggling village of perhaps 40 houses, situated on the south bank of the Po-Tsangpo. There are the remains of a large palace and monastery, which, together with the bridge over the river, were destroyed by the Chinese during the frontier fighting of 1911. A fine new cantilever bridge of 50 yards span had just been completed.

The Pobas, or inhabitants of Poyul (the Po-Tsangpo Valley) claim to be independent of Lhasa, although actually they apparently pay a small annual tax to Lhasa. This tax is paid in kind, in the form of butter, madder dye, and sulphur. The Pobas have the reputation amongst their neighbours of being a tribe of wild robbers. They certainly raid the countries bordering their own frontier, and the Tibetans of Kongbo subsequently told us that we were extremely

lucky in getting through Pomé alive, as they usually kill all travellers who are worth looting. This is no doubt an exaggeration, but it shows the feelings entertained towards the Pobas by other Tibetans.

We were much struck by the immense volume of water carried by the Po-Tsangpo, which is here some 80 yards in average width, deep, and with a very fierce current. We were very anxious to explore this river to its sources on the Chinese frontier, but this the Nyerpa flatly refused to countenance—alleging as a reason that the inhabitants of the upper valleys were bandits and robbers.

Up to this point I had endeavoured, as far as possible, to conceal the fact that I was making a map; for which reason, and also owing to the incessant rain, I had avoided using the plane-table, contenting myself with a rough prismatic compass traverse, which was plotted in the evenings. Having now made friends with the Nyerpa, I explained my business to him, showing him the whole of my instruments, etc., to which he made no objection. He remarked, indeed, that once many years previously a Chinaman had come from the west, and had attempted to march through the country counting his paces and writing the numbers down in a book, but that in accordance with the custom of the time, he had been bundled out of the country by the way he came, with the intimation that such things were not done in Pomé. This may have been the Chinese monk referred to on a previous page, who decamped after selling Kinthup into captivity.

I may here remark that the policy then initiated of absolute openness in regard to the object of our journey, and the making of the map, proved completely successful. No serious objection was ever made to our operations, and we had the priceless advantage of being able to work openly and with an easy conscience.

Having meantime received Trenchard's reply to my letter, we left Showa on the 28th June, and in two days reached the villages of Tang-Tö and Tang-Me (Upper and Lower Tang), where our journey down the Po-Tsangpo was stopped by a broken bridge over the Yigrong affluent, necessitating a two days' excursion up the valley to a ferry on the Yigrong Lake. The story of the formation of this lake as told us by the natives is worth recording. Some 13 years previously the Tralung stream, a small tributary of the Yigrong ceased to flow for three days, while rumblings were heard up the valley. Suddenly, at 2 or 3 o'clock in the afternoon an immense mass of mud and stones came down the valley completely engulfing two villages at the mouth of the stream, as well as two more on the opposite bank of the Yigrong, and forming a dam across the river some 350 feet high and 1¼ miles in width. For a month the Yigrong remained completely dammed, while a huge lake gradually formed; finally the dam was topped, and the pent-up water was released to form the famous flood which was noticed in Assam in the year

1900 as carrying the corpses of strange men and pine-trees of an unknown variety. Fourteen miles down stream from the lake, we were shown the site of an old village, 170 feet above the present river level, which was washed away in this flood. The lake to-day is nearly 10 miles long and $\frac{3}{4}$-mile in average width, and though the Yigrong is still cutting away the dam, it is probable that the lake will have filled with silt before the original level of the river bed is reached. Many villages and fields were submerged by the rising waters of the lake, the owners of which, wandering southwards in search of new homes, founded the colony of Mipi in the Mishmi hills.

The hills on either side of the Yigrong Lake contain iron ore. A vein at the S.E. corner of the lake is worked by means of a horizontal adit extending some 600 feet into the hill-side. The ore is smelted on the spot, and made into swords which are traded in Kongbo and Pemakö.

We camped for a day on the edge of the lake, in order to enable us to map its northern extremity. Bailey took advantage of the opportunity to go off shooting and returned to camp in the evening with a new species of "Gooral," which has subsequently been named "Nemorhaedus Baileyi."

On July 9th we reached Trulung. Here the road down the valley to Pemakö crosses to the left bank of the Po-Tsangpo, but the single-rope bridge which spans the river had been carried away a few days prior to our arrival, and we were consequently unable to carry out our intended programme of making good the section of the river down to where we had left it at Lagung. It may be here remarked that the bridges of Pemakö and Pomé, which are all of the "single-rope" type, are usually carried away when the rivers rise in June, and are not renewed until the following cold weather, so that travelling is only possible during the winter and spring.

From Trulung we therefore followed the Tibet road up the Rong River *viâ* Tongyuk dzong (the site of Kingthup's captivity) and the Nyima Pass (15,240 feet) to the village of Pe, on the Tsangpo, which we reached on July 13th. The river is here broad, deep, and placid, and we were rowed across to the south bank in a ferry boat. We were now in the Tibetan province of Kongbo. We were informed that two officers (whom we afterwards ascertained to be Capts. Trenchard and Pemberton, R.E., of the Abor party) and some Gurkha Sepoys had arrived here from Pemakö seven days previously *viâ* the Doshong Pass, and had returned after a halt of one day. We met the dzongpen of Tsela and other officials who had hurried to Pe on hearing of the arrival of the strangers, and from them we were able to obtain passports, which helped us materially for the remainder of our journey in Tibet.

Having collected a supply of rations we followed down the right bank of the Tsangpo to Gyala. This is the last Tibetan village of

any size on the Tsangpo during its course in Tibet proper, and is the headquarters of a "depa," or sub-official, subordinate to the dzongpen of Tsela.

Hearing some pheasant calling just outside our camp at Gyala, Bailey rushed out with his gun and a few cartridges and presently returned with half a dozen specimens of the extremely rare "Harman's pheasant." This bird is named after the late Capt. Harman, R.E., of the Survey of India, who in 1880 obtained from one of his Tibetan explorers a single imperfect skin of an unknown " eared " pheasant. This he sent to the British Museum, where it was described under the name of *crossoptilon harmani*, and remained the only known specimen of its species until Bailey's lucky find 33 years later. The bird is large and of a uniform slaty-blue colour, with red back, legs, and eye-patches.

Across the river on a small side stream are the falls of Shingche Chogye. The limestone rocks which from the bed of the stream have been hollowed out into curious caverns by the water, which falls n three successive cascades of some 50 feet each, into the Tsangpo below. A demon who gives his name to the falls is popularly supposed to be chained behind the falling waters, but is only visible at times of very low water.

Below Gyala the valley narrows and the Tsangpo gradually changes from a placid river into a roaring torrent. Pemakö-Chung which we reached on July 21st is the last Tibetan habitation. It consists merely of a humble monastery and one other occupied house. A mile or so above the monastery the Tsangpo falls over a cliff some 30 feet in height, and from here onwards can only be described as a seething, boiling mass of water. I was able to fix in the position of these falls accurately by trigonometrical interpolation from the peaks of Namcha Barwa which towered overhead 5 miles to the south. While I was working on the edge of the falls, four huge " takin " were gazing and basking in the sun on the opposite (north) bank of the river not 80 yards away. Only three specimens of this extremely rare animal had at that time ever been shot by any European, and the temptation to empty my rifle into the four ungainly unconcerned forms was almost irresistible. However, to collect their bodies would have involved at least 10 days' delay in returning up-stream to the nearest bridge at Gyala and down the other side, and as we could ill afford the time I spared their lives.

We were told that there was absolutely no road down the valley to Pemakö ; we determined, therefore, to cut a road for ourselves as long as our rations lasted, and succeeded in reaching a prominent spur, 13 miles further down the valley from which I was able to trace the general alignment of the Tsangpo for the next 30 or 40 miles of its downward course, as well as to fix the general position of the high, snowy range round which the Po-Tsangpo flows N.W. of the Sü Pass.

Returning to Pemakö-Chung we found that during our absence a party of "Mönbas" from Pemakö, escorting a holy lama on a pilgrimage to Lhasa, had cut themselves a road up the Tsangpo Valley, following the water's edge. This was said to be the first time for 20 years that there had been any direct communication through the gorge of the Tsangpo River, between Kongbo and Pemakö. Our rations were unfortunately now almost exhausted, so I returned to Gyala, while Bailey with a single coolie followed some of the returning escort and succeeded in getting a few miles below our previous limit when the Mönbas deserted him at an almost impassable precipice, and he was compelled to return, after taking a hypsometer reading at the lowest point reached on the river. In going through the thick jungle at this spot, Bailey had the misfortune to lose his camera—the only one we had with us—and we have no photographic record of the remaining portion of our journey.

Bailey questioned numerous natives regarding the portion of the river unvisited by us, whose length we estimated at 45 miles. They are unanimous in asserting that it continues the same seething, boiling current, but that there are no actual waterfalls as large as the falls at Pemakö-Chung. The following table A exhibits the heights and gradients of the Tsangpo River in the neighbourhood of the great bend. Table B gives similar information for the lower reaches of the Po-Tsangpo.

TABLE A.

Places on the Tsangpo.	Height in feet.	Fall in feet.	Distance in miles.	Gradient in feet per mile.	Remarks.
Nyuksang	8732				
Pemakö-Chung (top of falls) ...	8381	351	14½	24	
Sanglung confluence	8089	292	3	97	
1½ miles below confluence... ...	8010	79	1½	53	
2 miles below Churung confluence	7477	533	11	49	
Gompo-né (assumed)	5700	1777	20*	89	Confluence of Tsangpo and Po-Tsangpo
Chimdro confluence	2606	3094	75*	41	

TABLE B.

Showa (river level)	8312			
Tangmé (river level)	6751	1561	31	50
Trulung (river level)	6424	327	10½	31
Gompo-né (assumed)	5700	724	25*	29
Yigrong Lake	7301			
Tangmé	6751	550	17½	31

*Assumed distances. Of the seventy-five miles between Gompo-né and the Chimdro confluence, 45 miles were mapped and the remaining thirty miles filled in from native information. Diplomatic reasons prevented our obtaining a hypsometric observation of the river-level and Lagung where we quitted the Tsangpo valley.

In this table a height of 5,700 feet has been assumed for the junction of the Tsangpo and Po-Tsangpo at Gompo-né, on the assumption that the gradient of approximately 30 feet per mile deduced for the latter river, continues as far as the confluence.

Fortunately, while we were at Pemakö-Chung a spell of bright sunny weather occurred, which enabled me to survey this portion of the valley by accurate fixings from Namcha Barwa and the neighbouring triangulated peaks and also to fix the prominent groups of snows on the opposite bank of the river which culminate in the magnificent peak of Gyala Peri (23,460 feet) never before seen by any European. The stupendous nature of the Tsangpo gorge may be realized when it is remembered that the peaks of Gyala Peri (23,460 feet) on the N. and Namcha Barwa (25,445 feet) on the S. are less than 14 miles apart in a straight line, while the level of the Tsangpo River, which flows midway between them is only 8000 feet—thus on either hand the mountains rise 15,000 feet in a horizontal distance of less than seven miles.

Bailey having rejoined me at Gyala on August 3rd we crossed the river by a single-rope bridge and returned by the N. bank to Pe. There had been a ferry boat at Gyala in additon to the bridge, but unfortunately just before our arrival a woman had attempted to ferry herself across alone in the boat and was carried down-stream ; neither the boat nor the woman were ever seen again ; they had doubtless been dashed to pieces in the rapids below. The bridge consisted of a single-rope 150 yards long, and 50 feet above the water in the centre ; the sag in the middle was so great as to render the pull-up on the far bank a considerable acrobatic feat, and the hauling across of all our baggage piece by piece was a heavy task.

Our Journey (*continued*)—S.E. Tibet, and the Head Waters of the Subansiri.

From Pe to Tsetang, which we reached on 29th August, the road calls for little comment. With the exception of two large bends in the river, which the road avoids by short cuts over spurs *viâ* the Kongbo-Nga and the Putrang Passes, there is a good riding road for the whole 300 miles on both banks of the river. We followed the N. bank as far as Tu, in the hope of obtaining a view of the triangulated peaks of the main Himalayan watershed to the S. ; this, however, was not possible owing to the dense clouds due to the Indian monsoon.

Harvesting operations were in full swing in the villages through which we passed. The barley, which is the only crop grown at these altitudes, is threshed at once and parched whole on large flat iron plates, after which it is ground into a dry ready-cooked powder called " tsampa," which, mixed with tea or beer, forms the staple food of the country.

For some 80 miles above Pe the Tsangpo flows in a broad placid stream with numerous sandy islands and spits. Further upstream the valley again narrows, and from Orong and Gacha to within a

few miles of Tsetang the river is broken and rapid. The Gyamda Chu, a large river flowing in a wide alluvial valley, joins the Tsangpo at Tsela, and is noteworthy as being the only important exception to the remarkable observed fact regarding the Tsangpo, namely, that its tributaries join the main river at an angle opposed to the direction of flow of the main stream.

Tsetang, which had previously been visited by Pandit Nain Singh and other Indian explorers, is a town of 200 or 300 houses. We found here a small colony of Kashmiri Mohommedan traders from whom we were able to buy a fresh outfit of boots and clothes for our coolies, as well as a few luxuries, such as brick tea, soap, and sugar for ourselves.

From Tsetang after a two days' halt we followed the road of Nain Singh and others southwards up the wide fertile Yarlung Valley, and crossed the Yar-tö-Tra Pass (16,700 feet) to Chumda Kyang. We were now in the typical "*Chang tang*," or elevated plateau country of Tibet, far above the level of trees or fuel, and where no crop will ripen, save a little stunted barley. Villages here are few and squalid, and the undulating stony plains are void of all detail, except where a few black yak-hair tents and scattered flocks of sheep and yaks mark the presence of a "*drok*" or grazing camp. Fierce, icy winds sweep the surface of the ground continuously.

Continuing eastwards we reached Kyekye on 4th September, *viâ* the Pu La (a pass on the boundary between the Tibetan provinces of Ü and Takpo, and also on the watershed between the Tsangpo and the Subansiri River). Here we saw numbers of Tibetan gazelle, of which I shot one. On awaking the following morning we found that the box containing our store of money had been stolen from our tent during the night, and that three of our own coolies were missing. Though we sent letters to all the neighbouring "dzongpens," we never discovered any trace of the three culprits, or of our missing property. We also wrote to the head of the Kashmiri community in Tsetang, Qazi 'Ata ulla, informing him of our plight. This man very obligingly agreed to cash us a cheque on Calcutta, himself travelling all the way to Lhontse dzong with the money.

Meanwhile we continued our journey down the Char River nearly to Sanga Chöling ; turning up a side valley eight miles west of this place and crossing the Kamba Pass, we found ourselves again in the Tsangpo drainage, at the head of the Trulung River. Following down the western and up the eastern branch of this river we crossed the Kongmo Pass (17,520 feet) into the head-waters of the Tsari River, another branch of the Subansiri. This valley which we followed as far as Migyitün, is remarkable for its very heavy rainfall, which is reflected in the denseness of the jungle growth on the hillsides; in this respect it differs widely from the other Tibetan head-waters of the Subansiri, namely, the Char, Nye, and Loro or Chayal Rivers, all of

which, down to the point at which they pierce the main Himalayan axis, traverse dry arid valleys.

The Tsari valley contains the sacred shrine of Chikchar, and the entire district is considered so holy that not only is no shooting or killing of animals allowed therein, but from the Kongmo Pass downwards the ground is not allowed to be broken by plough, or tilled in any way. Food is correspondingly expensive. The Buddhist religion, of course, forbids the taking of life in any form. The Tibetans, however, only apply this principle to wild animals, though they ordinarily made no objection to our shooting as much wild game as we wished for food or for sport.

Below Migyitün the road is only used by the semi-savage tribesmen from the southern slopes of the Himalayas, who come up to trade in salt, in the cold weather. At the time of our visit, the bridges had been carried away in flood and the road was impassable.

On the return journey, Bailey followed the route of the Tsari pilgrimage, starting from Chikchar, while I proceeded *viâ* the Cha Pass (16,610 feet) direct to Sanga Chöling. Here I had a most hospitable reception, and halted a day to visit the large and well-appointed monastery. I then completed the survey of the remainder of the Char River down to the point where it enters the gorge of the Himalaya at Lung. The last inhabited Tibetan village is Drü, below which the scenery changes with startling abruptness. On rounding a bend in the valley, at the deserted village of Raprang, the placid river suddenly becomes a foaming rapid with a fall of 300 feet in a mile, while the bare Tibetan hillsides are succeeded in the course of a few miles by the dark leech-infested jungles of the Himalaya.

I returned to meet Bailey at Charmé whence we crossed the Le Pass to Nyerong on the Nye River. Eight miles below Nyerong the Nye River unites with the Loro River to form the Chayul, which in turn joins the Char River at the Lung gorge to form the main branch of the Subansiri. We followed the Chayul down the extreme Tibetan village of Drötang, below which there was said to be uninhabited country for five or six marches before the first "Lopa" village is reached. "Lopa" is the Tibetan name for the semi-savage inhabitants of the Subansiri valley on the south side of the main Himalayan range. These "Lopas" come up the valley in large numbers to trade when the road is open during the cold weather, but no Tibetan ever visits the "Lopa" country, so that it is not easy to obtain information from the Tibetan side. At the time of our visit the valley road was closed and a large stretch of the middle course of the Subansiri had still perforce to remain unsurveyed. The "Lopas" will not accept money, and the trading is all done by barter, madder dye being exchanged for salt. A curious custom prevails of adulterating the salt with large quantities of a kind of dry moss which grows on the

Tibetan uplands, three parts of moss being mixed with one of salt before exchanging with the "Lopas." We failed to ascertain the precise cause or origin of this custom; it is not apparently done merely with the object of cheating the "Lopas," since the latter seem to be fully aware of the practice. One man informed us that were it not for the moss, the salt being "hygroscopic" would liquify and escape from the sacks in the damp climate of the "Lopa" country.

Returning to Chayul dzong, we followed up the Loro Valley to Trashi Tongmé. Here I recognized a group of triangulated snow peaks to the S.E., and was able to check my position by the method of "latitude and azimuth."

Two streams, the Loro Karpo and the Loro Nakpo (White Loro and Black Loro) here unite. We ascended the valley of the latter, and on 2nd October crossed a high pass, the Pen La (17,330 feet) into the head of the Seti Chu, in the drainage system of the Manas. The Seti Valley is uninhabited, and the river cuts through the Himalayan range in an impassable gorge. The road after rounding a spur crosses the main Himalayan axis by the Tulung Pass (17,250 feet), and follows a steep narrow valley down to the curious twin villages of Nyuri and Dyuri which together form the remote little district of Mago, situated in the heart of the mountains. Immediately below Mago the river enters a gorge down which there is no communication, and the only other road is one over the Chera Pass. From the top of this pass two roads diverge, one going westwards to Tawang, and one which we followed crossing the Tse Pass (15,550 feet) into a branch of the Dirang River—itself a tributary of the Bharoli River of Assam. After crossing the Pöshing Pass, the road descends a spur to the last Tibetan village of Lagam. From our camp below the Pöshing La, the plains of Assam were clearly visible in the early morning, but clouds soon obscured the landscape.

We were now amongst the Bhutanese again, and although the heat of the low-lying "Mönba" valleys was somewhat enervating, yet the verdant hill-sides had neatly cultivated fields, forming a pleasant contrast to the barren landscapes of Tibet. Millet, buckwheat, tobacco, chillies, and maize appeared to be the chief crops. The two latter were being gathered as we passed, and the red chillies spread out to dry on the roofs of the houses formed a pleasing dash of colour. The Indian madder vine (*rubia cordifolia*) grows wild in this country, and the madder is exported in enormous quantities to Tibet, for dyeing the gowns of the monks.

Three marches from Lagam brought us to Dirang dzong, where we were again on Nain Singh's old route, which we followed over the Se Pass (13,940 feet) to Tawang. The weather at this period was execrable, and I was very glad to have Nain Singh's fixed position of Tawang from which to start my traverse afresh.

All this time we had been entirely subsisting on the 70 rupees or so which we had in our belts and pockets when our money was stolen in Kyekye six weeks previously; and although we had sent two of our own servants to receive the money from Qazi 'Ata Ulla, we had not been able to arrange any place for our servants to join us again. So, although we had now accomplished our mission, namely, the exploration of the Frontier from Pemakö to Tawang, we had to return once more to Tibet to pick up our servants and money.

Leaving Tawang on October 19th, we avoided Nain Singh's route, and descended the valley of the Tawang Chu, as far as the confluence of the Nyamjang. The latter is an important river 90 mile in length, which rises in Tibet and cuts through the Himalayan range in latitude 28° 0′—28° 5′, but it has not been shown on any previous map. The villages are Bhutanese as ar as Trimo, at which po nt we left the valley and crossed the Pö Pass (14,900 feet) to Tsöna. Here we found our two servants waiting with the money. We were now (October 23rd) once more on the Tibetan "Chang tang," and the cold was intense; but we wished to complete our survey of the waters of the Laro Karpo and the Nye Rivers before returning, so having expended our money in "Chubas" (thick blanket coats) for our servants and blankets for ourselves, we set out on the road to Trashi Tongmé. Bailey travelled *viâ* the Lagor Pass to Lhöntse, thence making an excursion down the Nye River. I halted a day at Loro to follow a herd of *ovis ammon*, out of wh ch I got two fine males, which kept us and our coolies supplied with mutton for the rest of our journey. I rejoined Bailey at Lhöntse, travelling *viâ* the Gyandro Pass.

Below Lhöntse the Nye River flows through a narrow gorge, but the upper portion of the valley consists of a wide stony plain, or "pamir," upwards of a mile in width and containing numerous fields and scattered homesteads.

On the 31st October we crossed our last high pass, the Hor La (17,680 feet), nto the head-waters of the Nyamjang Chu. The western descent from this pass is extremely narrow and steep; below Gyao, however, the valley widens and the river flows in a wide, shingly bed as far as Dongkar dzong, where it again enters a gorge. Opposite the village of Rong the slates and sha'es of Tibet give place to Himalayan granite and limestone, and jungle and pine trees begin to appear on the hillsides. The main Himalayan axis appears to be crossed between this village and the extreme Tibetan village of Rong.

At Trimo we were on our previous road, which we followed as far as the confluence of the Nyamjang and Tawang Rivers.

Just below th s we crossed the Bhutanese frontier, and on 9th November reached Trashigang, where we ound a "devil-dance"

in progress, and were hospitably entertained by the Bhutanese dzongpen. Here my survey ended, as the country between Trashigang and the Plains of Assam is already included in the trans-frontier series of the Indian survey maps. Owing to delays in collecting transport much of the last portion of our journey was accomplished by moonlight, so that surveying would in any case have been impracticable. Travelling *via* Diwangiri, we reached Rangiya junction on the Eastern Bengal State Railway at 2 a.m. on the 15th November after a journey estimated at 1,680 miles, through country which, with three minor 18th century exceptions referred to below, has never before been seen by any European.

PREVIOUS EXPLORATION IN S.E. TIBET; VINDICATION OF KINTHUP; SUMMARY OF GEOGRAPHICAL RESULTS OF OUR TRIP; CONCLUSION.

The valley of the Po-Tsangpo has not been visited by any previous explorer, and no explorer except Kinthup has previously traversed the district of Pemakö. Further westward, however, the country is better known.

The earliest record of travel in the province of Takpo appears to be that of the Italian Friars who established the Capuchin Mission at Lhasa in the year 1708. Two members of this mission diverged eastwards, crossed the Yarlung Valley, and eventually penetrated into the province of Takpo, east of Tsetang. Thence they appear to have travelled N.W. to join their brethren at Lhasa. Ten years later we hear of a branch of the Mission being opened at Drong-Nye in Takpo, which is described as near the borders of East Bhutan, about 14 days' journey to the S.E. of Lhasa* This is probably the village of Trong-Nyo on the Tsangpo just north of Guru Namgye Dzong. The Capuchin Mission finally collapsed in the year 1745. The only other European traveller in these parts was the Jesuit, Ippolito Desideri, who was commissioned to visit and report on the Capuchin Settlement at Lhasa. His sojourn in Tibet extended from 1716–1721, during which time he made numerous excursions to places S. and S E of Lhasa, visiting Samye, Tsetang and the Yalung Valley.

From the date of the final closing of the Capuchin Mission, no further additions were made to our knowledge of this region of Tibet until the era of the Survey of India Native explorers in the decade 1874–84 The first explorer to penetrate this country was late Nain Singh, C.I.E., then known as the Pandit, who reached Lhasa, on his second and last famous journey across Tibet, on the 18th November, 1874. Thence striking S.E. to Samye he followed the Tsangpo to Tsetang. Continuing up the Yarlung Valley over the Yartö-Tra and

* "The Exploration of Tibet: Its History and Particulars from 1623 to 1904" by Graham Sandberg, B.A., pp. 31—40.

Karkang passes into the Sikung district, which is drained by the Nye Chu, he crossed the highly elevated plains of Tengsho and Tsöna, and reached Tawang, where he was detained for some three months. Escaping in February, 1875, the Pandit crossed the Se Pass and travelling *via* Dirang dzong reached Odalgiri in the Plains of Assam on March 1st, 1875.

In December, 1875, the road from Tsetang to Tawang was traversed by explorer "L," who had followed the course of the Tsangpo eastwards from Shigatse, and who wished to follow Nain Singh's route to Assam. At Tawang, however, permission to proceed was refused, and the party after having been taken before the authorities, were imprisoned for a month in the public flour mill. Subsequently three mounted soldiers were told off to escort "L" back to Lhasa. Fortunately, some informality in the documents carried by the guard induced an intermediate official, through whose hands he passed *en route*, to release him, and he was able to make his way back to Shigatse.

In 1878, Capt. Harman, R.E., trained a Sikkimese monk, Nem Singh, and sent him to Tsetang with orders to survey the eastward course of the Tsangpo. Owing to bad weather, Nem Singh had to be despatched before his training was complete; while owing to fear of robbers for whom the province of Takpo was in those days notorious, he hurried over much of his work at undue speed, keeping his record on scraps of paper which were not properly entered in the Field Book. His astronomical observations were also vitiated by an error in his dates. He finally reached the village of Gyala, near Pemakö-Chung, to which he assigned a height of 8,000 feet and a longitude of 94°. Here his traverse ended "in air."

The next explorer is Kinthup, whose work has already been referred to. Kinthup's description of the country, given from memory after his return, is in general quite accurate; referring, however, to Pemakö-Chung, the following erroneous statement is attributed to him in his report:—"The Tsangpo is two chains distant from the Monastery, and about two miles off it falls over a cliff called Sinji-Chogyal from a height of about 150 feet. There is a big lake at the foot of the falls where rainbows are always observable." Actually, the falls near Pemakö-Chung, to which the Tibetans have not given a name, are only some 30 feet in height, though it is true that a rainbow is visible on sunny days in the spray which is thrown up in immense clouds. On the other hand, falls called Shingche Chogye of approximately 150 feet, do actually exist on a small side stream, which joins the Tsangpo on the N. bank opposite Gyala. It would seem that in the course of dictation and translation of Kinthup's narrative, the accounts have been confused of the two separate falls.

After our return to India, Bailey found that Kinthup was still alive, living in retirement in his native Sikkim. He was summoned to Simla in May, 1914, where Bailey questioned the old man regarding his assertion about the falls. His statement then agreed with our observations. As the result of our favourable reports on his work, Kinthup received an additional reward of Rs.1000 from the Government of India, together with a parchment certificate of honour from the Surveyor-General. He died on 3rd November, 1919.

The only remaining travellers who call for mention are two members of the Bengal Educational Service. Sarat Chandra Das in his interesting book* has given a graphic description of the Yarlung Valley, which he visited on his return from Lhasa in November, 1882. Lama Ugyen Gyatso, who had previously accompanied Sarat Chandra Das to Tibet, was again dispatched to Tibet on special duty by the Director of Public Instruction, Bengal, in June, 1883. Travelling *viâ* Gyantse, and the northern shore of the Trigu Lake, he reached the Yarlung Valley, whence he returned along the northern bank of the Tsangpo to Samye and Lhasa. His narrative, like that of Sarat Chandra Das, does not give much new geographical information, but forms an interesting record of Tibetan social and religious customs concerning which he has many quaint stories. He particularly dwells on the freedom accorded to women in Tibet; finally laying down the maxim, as the result of much varied experience, that a fair complexion amongst the gentle sex always indicates true kindness of heart.

A brief summary of the principal geographical results of our expedition may not be amiss. Climatic conditions militated against the discovery of more than a very few new snow peaks—indeed the only ones whose positions I was able accurately to determine were those of the Gyala Peri group on the N. bank of the Tsangpo, at the great bend opposite Namcha Barwa. Gyala Peri itself is 23,460 feet in height; while an eastern satellite of Gyala Peri, and the peak of Sengdam Pu at the opposite end of the same range are both over 20,000 feet. The magnificent peaks of Namcha Barwa (25,445 feet) had of course been previously fixed from the south, both by the Abor Survey Party and by my own observations from the Mishmi Hills. Our examination of the Tsangpo gorge on its northern flanks enabled us definitely to prove this to be another striking example of the extraordinary feature of Himalayan geography, noted by Colonel Sir S. G. Burrard† namely, that when a Tibetan river cuts

* "Journey to Lhasa and Central Tibet," by Sarat Chandra Das, C.I.E., pp. 297—307.

† "A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet," by Colonel Sir S. G. Burrard, K.C.S.I., F.R.S., R.E., and H. H. Hayden, B.A., F.G.S. Part III., pp. 160—186.

through the Himalayan range, it almost invariably selects the very highest portion of the range through which to pierce its gorge. We did not succeed in throwing much light on the course of the main Himalayan range east of Namcha Barwa. There is a very sharp range of snowy mountains in the curious loop of the Po-Tsangpo ; N.W. of the Sü Pass, but whether this is a true continuation of the Himalayan chain further investigation can alone decide.

Our map shows one glacier flowing southwards from the Gyala Peri range, and five flowing N. and W. from Namcha Barwa, while we were informed that a sixth glacier occupied the upper portion of the Pupa Rong Valley on its south flank. These glaciers all bear evidence of slow, but prolonged retreat. The Trilung glacier, which we visited, at present ends some two miles short of the Tsangpo ; the height at the foot of the " Chinese wall " being 11,400 feet. Pines of thirty years' growth were to be found a quarter of a mile below the present limit of the ice. The Sanglung glacier, which is the largest of the group, descends to within one mile of the Tsangpo, the height at the foot of the snout being only 9,030 feet.

The Po-Tsangpo and Yigrong had not been previously visited by travellers ; we were also able to obtain for the first time a fairly complete picture of the courses of the various Tibetan headwaters of the Subansiri, viz. : the Tsari, Char, Nye, and Loro Rivers, down to the points at which they pierce the Himalayan chain ; while further west we found in the Nyamjang Chu, a new and important Tibetan tributary of the Manas River, hitherto unmapped. It is noteworthy that the falls of 30 feet on the Tsangpo at Pemakö-Chung are higher than anything hitherto recorded on the big rivers of Tibet and the Himalaya ; indeed, the only other known instance of falls on a large Himalayan river is a 20-feet drop on the Indus near Bunji.

Hypsometric observations were taken on twelve passes of over 15,000 in height, while the approximate positions of numerous other passes have been indicated on the map from local information.

As has been previously remarked, I was only able in general to use the most rough and ready methods of reconnaissance survey. The system adopted was merely that of setting the plane-table by compass and estimating distances by time. As a check on the work, 20 observations were taken for latitude and seven azimuths. The instrument carried was a 3-inch theodolite by Casella, which screwed on to a light stand when required for taking astronomical observations. The same little instrument was also used, resting on the plane-table, as a clinometer, thus avoiding the necessity of carrying the latter instrument. My survey was on the scale of 8 miles to one inch. We took great care in regard to the orthography of place-names occurring on the map ; these were almost invariably spelled for us in the vernacular by dzongpens, or other local officials under Bailey's super-

vision. Some 500 names are believed to be new, while in numerous instances the spelling of old names has been revised. Bailey brought back a small but interesting collection of mammals, birds, and butterflies, each of which were found on examination to contain new species.

It only remains to add that throughout our journey we everywhere met with the utmost courtesy and hospitality from the Tibetans. We carried no food with us, and were entirely dependent on the goodwill of the Tibetans for supplies, lodging, and transport.

I cannot conclude without placing on record how largely the success of our undertaking was due to Bailey's energy and resource. To him was due the original idea of the expedition, and but for his thorough knowledge of the language and customs of the country, and his almost uncanny skill in winning the goodwill of the local officials it could never have been successfully carried out.

The TSANGPO falls, at PEMAKO CHUNG.

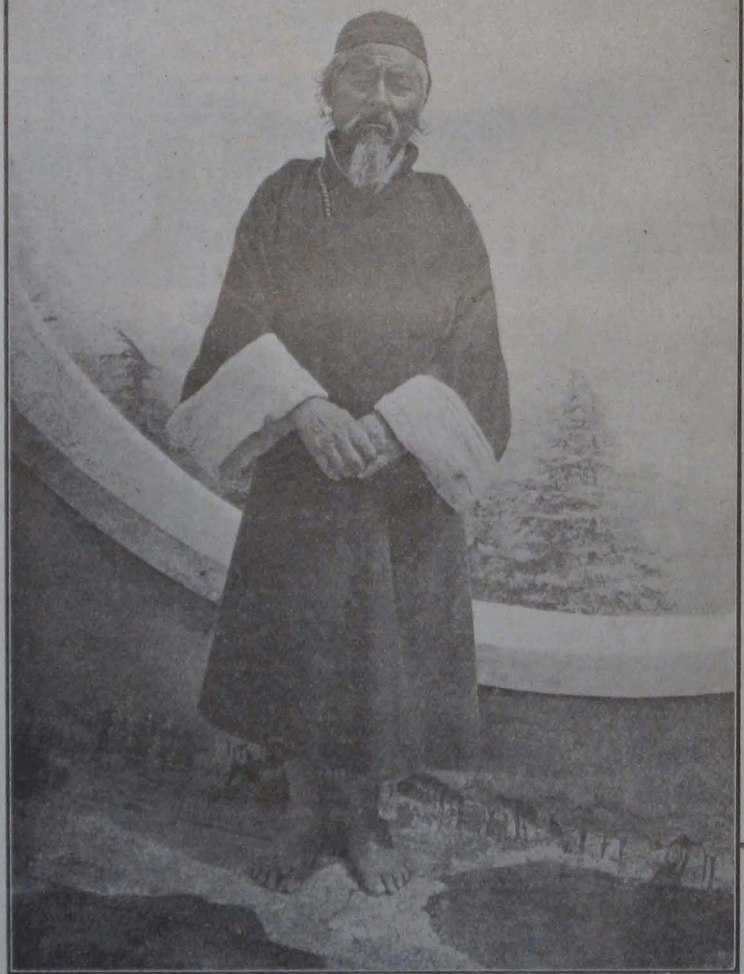
A Poba of Showa.

Group of Mönbas in Penakö.

The TSANGPO falls, from water-level.

Rapids on the TSANGPO, looking upstream from NYUKSANG.

View upstream from TSANGPO right bank near KYIKAR.



Explorer KINTHUP, who first traced the course of the TSANGPO below PEMAKO CHUNG.

From a photo by Lieut. G. Burrard, R.F.A., May 1914.

Part of NORTH-EASTERN FRONTIER AND TIBET showing the routes of CAPTAINS MORSHEAD and BAILEY 1913.

Scale 1:1,000,000 or 1 Inch = 15·78 Stat. Miles

10 5 0 10 20 30 40 50

Symbols and Abbreviations

- Author's Route
- Monastery (Gompa) ... Ga.
- Fort or Headq^rs of Local Gov^t Official (Dzong) ... Dz.
- Mountain Pass (La) ... x
- Rest House ... R.H.
- Heights in Feet.

Surveyed by the Abor Exploration Party

Surveyed by the Mishmi Exploration Party

NORTH-EASTERN FRONTIER AND TIBET
MORSHEAD & BAILEY

Part of NORTH-EASTERN FRONTIER AND TIBET showing the routes of CAPTAINS MORSHEAD and BAILEY 1913.

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Surveyed by the Abor Exploration Party

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TIBET

Area of Map

NORTH-EASTERN FRONTIER AND TIBET
MORSHEAD & BAILEY