the stratigraphy, and remains another year with us to make a special study of Erebus and Terror. Nelson has been busy with the marine plankton, chiefly in connection with hydrographic changes, salinities, minute changes in temperature, light, and so on. I think he will have some interesting results. So will Atkinson, whose work here on the parasites of all the larger animals will contain a good deal that is new. No one has touched the protozoa here before, and he has already got several new things both in protozoa and in ecto- and ento-parasites. My own effort in mid-winter to get to the emperor penguins at a time when their eggs would provide embryos fit for cutting turned out to be exceedingly difficult, but we succeeded in getting three different stages back, which, I think, will prove to be of some interest. We shall make the rookery another visit next spring. We find they lay their eggs actually before mid-winter's day, even earlier than we thought.

"I am afraid I shall be writing more than you will care to read if I go on, but that really gives a general idea of our work. We have still heaps to do—and every one is anxious for another year to do it."

THROUGH THE LUTZU COUNTRY TO MENKONG.

By F. KINGDON WARD, F.R.G.S.

For the past few years, events to which Mr. Archibald Rose, C.I.E., lately drew earnest attention, have been transpiring on the north-east frontier of India where two great Empires meet. It may, therefore, be opportune to say something of a journey on the China side of the frontier, undertaken before the revolution broke out, at a time when the fringe of Celestial outposts who have been gradually pushed westwards, were at the height of their activity.

Where far western China abutts against Tibet on the north and Upper Burma on the south, three great rivers have been pinched up together in the mountains, and run parallel to one another in a belt of country scarcely 50 miles wide, and these rivers, the Salween, Mekong, and Yangtze, are in the nature of vast gutters, draining the Roof of the World.

Entering Yunnan province by the well-known road from Bhamo, I went eastwards to Tali-Fu, crossing the Salween and Mekong *en route*, and thence turned northwards. The Yang-tze is reached just where it makes its great bend to the east, after which the road continues north-westwards, and we get back to the Mekong valley, 32 mule-stages from Bhamo. Thenceforward the main road runs almost due north through A-tun-tsi, and so to Batang, 49 mule-stages from Bhamo, where it joins at right angles the main road across China and Tibet to Lhasa.

I spent seven months wandering between these three rivers on the

China-Tibetan frontier last year, with A-tun-tzŭ on the Mekong for a centre, and the following paper deals with a short journey westwards into Tibet.

The physical barrier to be surmounted in the case of a journey from the upper Mekong to the Salween presents less difficulty than the political obstacles placed in the way by zealous mandarins. In an interview with the official at A-tun-tzŭ, however, I obtained permission to return to Tsu-kou, three days south of A-tun-tzŭ, and once there we lost no time in crossing the mountains to the Salween.

Our party comprised six Tibetan porters, a Tibetan interpreter and guide, my Chinese servant, a watch-dog, and myself; two ponies and a donkey, in charge of a woman, were to accompany us for the first two days to carry food for the men, and on the afternoon of June 7 we started up the mountain in the rain.

Ascending through pine forests interspersed with cultivated slopes, we reached the last Tibetan village, situated just below the first pass, perhaps 2000 feet above the river, and spent the night there. It rained incessantly, continuing all the morning, so that in view of the slippery nature of the path, it was impossible for the men to proceed; but towards the middle of the afternoon the rain ceased, and crossing the low barrier range or spur through which the torrent, flowing in its deep gorge, had bored its way to the Mekong, we descended through dense forest to the stream side. Here, instead of the cultivated slopes and open pine woods of the main valley, magnificent forests of fir and giant rhododendron, with a dense undergrowth of deliciously scented lilies, spotted arums, and delicate ferns, greeted the eye on every hand; but the going down the steep and narrow jungle path was very bad.

After descending some hundreds of feet to the stream, we began the ascent of the ever-broadening valley, and it was dusk when we eventually reached a small and unoccupied log hut; the forest, consisting now chiefly of grand old birches and alders, was here more open, the undergrowth, correspondingly more dense.

All night long it poured with rain, dripping through the hut and soaking everything, but shortly after breakfast the weather cleared, and having sent back the animals, we started for the pass. We soon emerged from the forest, which no longer occupied the valley bottom to any extent, though the immediate mountain slopes were forested for another 2000 feet or more—a phenomenon perhaps due to the gradual concentration of the winds sweeping down the open valley floor.

Crossing the torrent again and again, by wading, over crazy tree-trunks, and finally across a snow bridge, we ascended gradually till the mountain wall in front came into full view, and we stopped for lunch just below the snow.

The alpine flowers spread out between clumps of bamboo brake and scattered fir trees were a wonderful sight to behold, the glorious sulphur-

yellow poppy, Primulas, blue and purple, violet Columbines, crimson rhododendrons and many others, forming sheets of colour. Here and there alluvial cones had been washed down from the mountains blocking small streams, which had consequently formed bogs, where, I believe, a very good peat might be dug.

The Sie-la, as the Tibetans call this pass, is rarely open before June, and we were one of the first parties to cross; the snow was deep and soft, there was no trail to follow, and the porters frequently sank in waist-deep, having to be extracted by their companions. However, one by one we reached the summit which, by means of a rough boiling-point reading, I calculated to be about 14,000 feet. The Sie-la is a mere notch in this mountainous wall of rock, and the snow was banked high at the summit, though on the other side, which was terrifically steep (whereat I was very glad we had not brought the animals), there was no snow till we got down to a single large drift far below. When we crossed this same pass on November 11, wrapped about by freezing mists, and stung by the whirling ice-spicules whipped up by a raging wind, the snow was far deeper on both sides, and the natives were of opinion that no one else would get across that year.

The Sie-la has been crossed by several French army officers, by Mr. Nicolls, an American journalist, and by M. Bacot; the intrepid Catholic priests on the Mekong and Salween rivers frequently make the journey in all weathers.

We now descended into a deep valley trending south-south-west, more or less parallel to the Salween itself. In that region of the upper Salween, which is under the influence of the monsoon rains, the tributary streams flowing from the eastern watershed usually flow from their source for some distance parallel to the main river, so that a tiresome succession of deep valleys and high spurs have to be crossed when traversing the watershed from east to west.

Towards sunset we reached a second log hut surrounded by high alpine meadow, amongst which my guide pointed out several leaves and roots which the Tibetans eat, besides bringing in an armful of toadstools for my supper. This man, Gan-ton by name, was quite a wonderful person in his way, a Catholic Tibetan who spoke Chinese and Lutzu fluently, and both Moso and Lissu sufficiently well to make facetious remarks to any tribesmen we met; but he did not take his religion very seriously.

On the following day we continued westwards, and from the pass over the next spur, obtained a good view right across the Salween valley towards the headwaters of the 'Nmai-kha. Trending north and south immediately above the Salween was a snow-clad range, the glaciers descending from the highest peak being plainly visible.

From the views I obtained of this range in November, however, I do not think it is covered with perpetual snow for any great distance south of

NOTE.

This map is from a rough sketch supplied by Mr. F. Kingdon Ward, adjusted to sheet No. 21 S.E. of the Survey of India N.E. Frontier region, 1 in. to 4 miles, and to Captain F. M. Bailey's position of Menkong. (Geographical Journal, April, 1912.)

T'sam-pu-t'ong, though it doubtless runs northwards as far as Menkong before merging into the Tibetan plateau.

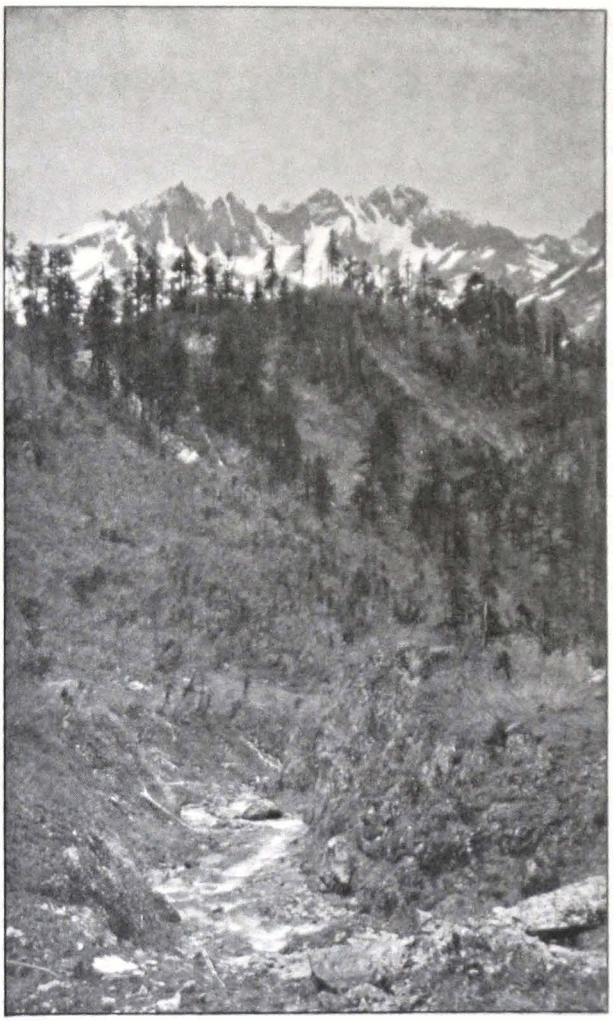
The magnificent peak rising immediately behind T'sam-pu-t'ong is called by the Tibetans Ke-ni-c'hun-pu, and I believe that the 'Nmai-kha has its source in this range, possibly from these very glaciers. There appears, in fact, to be a big snow-clad bluff terminating the Tibetan plateau, and stretching westwards in unbroken grandeur to the Assam frontier, on the southern face of which rises the 'Nmai-kha, and perhaps also the Mali-kha, while its eastern and western slopes, I believe, separate the waters of the Salween from those of the Brahmaputra system.

For the next two days we made only half stages on account of the appalling rains, and crossing the last spur, found ourselves on the evening of June 12 at the Lutzu village of Cho-la on the left bank of the Salween.

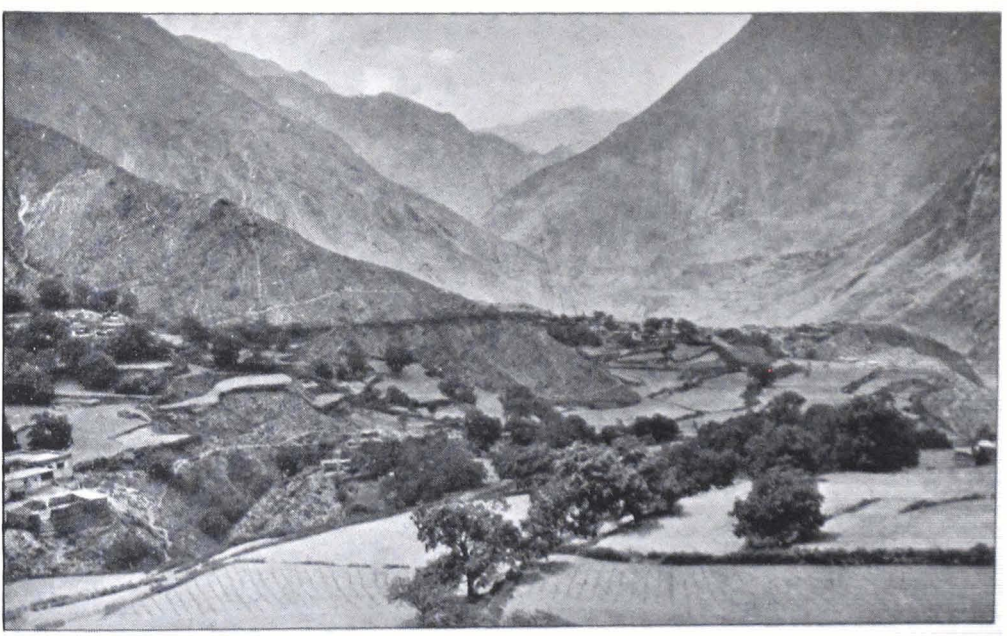
The Salween is here considerably bigger than the Mekong, and flows in a U-shaped valley as opposed to the V-shaped gorges of the latter, plainly the effect of the heavier rainfall. Comparatively broad terraces, cultivated throughout, and dotted with villages, extend from the mountain foot to the river-bank, or slope fanwise from the gulley mouths to end abruptly in a high bluff, being cut off sharply by the river flowing below.

The huts, which are, as a rule, widely scattered, comprise one or two rooms built of pine logs roughly dovetailed into each other at the four corners, their ends projecting several inches, and a ridge pole supporting cross-beams which rest directly on two walls; the roof itself consists of wooden shingles kept in place by large stones, much after the fashion of a Swiss chalêt, and the gable ends are either left entirely open, or partially filled in with bunches of dry bracken. There is no chimney, the smoke from the fire in the middle of the room finding its way out between the chinks in the wall or through one or two windows cut out of the logs. Frequently the building is supported on piles, or built against the edge of a bank so that the space beneath can be used for a cattle-byre; and since there are no floor boards, a rich smell of cattle, pigs and hens finds its way up between the logs. The "black" Lutzu of the arid region, however, have copied the Tibetan style of architecture, building two-storied houses with flat roofs.

The Lutzu are essentially an agricultural people, though they also do a little fishing. They carry on no trade with their neighbours, being in the enviable position of having everything they require, hemp for their clothes, which are woven by the women, tobacco, maize, rice, buckwheat, apples, oranges, and so on; bamboos and gourds supply them with water-vessels, and with the cross-bow they shoot big game and birds. Though not a drunken people, they certainly drink very large quantities of liquor made from fermented maize; but this beverage, which is of the consistency of thick pea-soup and is taken warm, is probably more nourishing than inebriating. In the winter men and women sit round the fire for hours at

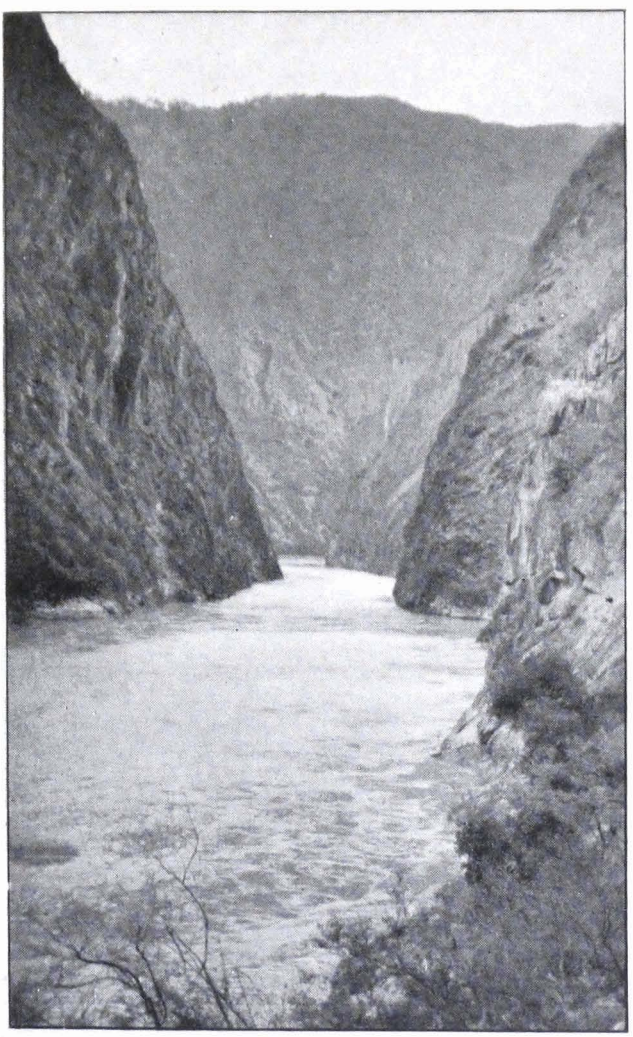


THE SALWEEN-MEKONG DIVIDE, SEEN FROM BELOW THE SIE-LA.



MENKONG, CAPITAL OF TSA-RUNG, TIBET.

WOMEN AND GIRLS OF THE "BLACK" LUTZU TRIBE.



THE SALWEEN IN THE ARID REGION, TSA-RUNG.

a time drinking, chatting, and smoking; it is meat and drink and medicine to them, and by no means unpalatable.

Sometimes two young women would take up a single bamboo cup, and putting their heads close together, quaff simultaneously from it; and judging by the sly laughter with which this performance was always greeted, I was inclined to attach some unknown significance to the action.

The men wear their pig-tails down, not bound on top of the head as do the Tibetans, and their dress, though simple, is not unpicturesque: short breeches (undoubtedly copied from the Chinese), and shirt of white hemp-cloth trimmed round the collar and sleeves with light blue, and strips of cloth wound loosely round the calf, like puttees. On the other hand, many of them have copied the Tibetans and wear only a long cloak tied up round the waist to form a skirt, though this style is chiefly confined to the "black" Lutzu, of whom more anon.

As to the women, some of the younger girls before child-birth are extraordinarily handsome—I have seen Lutzu maidens who would put to shame Cornelia, Queen of Italy. Their complexion is lighter than that of the Tibetans, but not so sallow as that of the Chinese, the features are regular, the nose well bridged, the eyes large and round, the high cheek-bones scarcely prominent. They wear a single long-sleeved garment usually of dark blue cotton cloth, reaching below the knees, and tied round the waist; commonly a hempen cloak, extending across the chest from the right shoulder to the left arm-pit, so as to hang in loose folds over the body, is added. Those who wear pig-tails usually bind them round the head after the style of the Tibetan women, but there is very little jewelry worn.

Their religion is a modified form of Lamaism, but I believe that this has been grafted on to a much older religion, perhaps not propitiation, for, in common with the Lissu, Moso, and other tribes, they hang up corn cobs in their houses, which are, I think, offerings to the *penates;* this practice is not observed by the Tibetans at all.

How far their Buddhism differs from the exotic form common in Tibet I cannot say, for the only rite I ever saw any one perform was when the young lady of the house took up a jug of water and made the sign of the cross over the household fire, by throwing water across it to north, south, east, and west. She did it in a very business-like way, just as she might have fed the chickens, the first shower hitting the wall behind, and the last one drenching me.

Meanwhile I had got busy with my medicine chest, as the people flocked round, mothers with babies at their breasts, young men and maidens, and we did something for them all—harmless but effective tabloids and faith for those whose ailments I could not diagnose, quinine or santonin for the more obvious weaknesses of the flesh. My medicine chest was indeed a passport amongst these tribesmen.

On June 13 we crossed the Salween in dug-outs, the river being some 40 yards wide, with a rapid current. Continuing a few miles up the right bank, we reached the village of T'sam-pu-t'ong where there is stationed a small Chinese official with ten or fifteen soldiers. This gentleman requested me to return to A-tun-tzŭ by the direct road, and on no account to cross into Tsa-rung, "because," as he remarked, "the roads are very bad"—the usual formula; and to ensure my following his advice he detailed two soldiers to escort me on the morrow.

Immediately above T'sam-pu-t'ong the character of the valley began to change, and, though we were not yet out of the rainy region, we were happily favoured with a glorious day. In a splendid limestone gorge through which we passed the effect of the heavy monsoon rains was still very apparent, forests of straight-limbed strapping trees, many of them covered with epiphytic ferns and orchids in great variety and a tangle of creepers, here clothing the cliffs and gullies in wonderful profusion.

Presently we recrossed to the left bank by a rope bridge, and finally ascended a broad valley to the east.

One peculiarity is to be noted about these rope-bridges. The Lutzu, when crossing, always carry with them a bamboo tube filled with water, which they tilt over the rope just in advance of the slider, thus reducing the friction and consequently the wear and tear on the rope. I believe the single-rope bridge, sometimes regarded as a Tibetan invention, to be merely the practical application of the natural liana bridges doubtless to be found in the jungles of Upper Burma and Assam, and carried eastwards by emigrating tribes from those regions.

Let us also remember that the Lutzu carry their loads by means of a strap passing round the forehead, as do the Lissu, Kachin, and other jungle tribes, but not the Tibetans. This is, indeed, typical of dwarf races, and though the Lutzu are not dwarfs, they are conspicuously short of stature. It is, indeed, difficult to escape the conviction that they are a jungle people in a comparatively advanced state of civilization owing to contact with Chinese and Tibetans; their use of the cross-bow, pre-eminently a jungle weapon for jungle warfare owing to its short range and diabolical effectiveness, their gourds and bamboo tubes and rope bridges all suggest as much.

That the Lutzu have come into the Salween valley from the north, representing one of the links left behind in a chain of emigration in that direction, I think very improbable. Rather do they represent an irruption of tribes from west to east, the possibility of which we are apt to overlook in this, the one corner of Asia, where a north and south emigration on a large scale has obviously taken place.

To get rid of my soldiers, whom I did not wish to accompany me into Tsa-rung, I told them that I was stopping a week at Kun-a-tong to collect plants, and they had better return at once to T'sam-pu-t'ong. They started back the same evening; but in the night I changed my mind, and decided

to go straight on. Unfortunately, it was now necessary to make a two days' *détour* back into the mountains, on account of some impassable gorges through which the river sawed its way; a narrow path said to traverse these gorges was now under water, but might be negociated during the winter, they told me.

After another long day's climb in pouring rain, the valley gradually contracting to a densely forested gorge, we stopped under a towering limestone cliff, the men sleeping round the fire under the rock, while I had my tent pitched amongst the dripping vegetation; and on the whole I had the worst of it.

Next day I felt sick and quite disinclined for the long climb in the rain to the crest of the spur; but we eventually reached the summit, and descended once more to the Salween, the Lutzen coming out to meet us and escorting us to their village. But what a change! Their hair, cut in a short fringe over the forehead, hung in tangled masses over their shoulders; their clothes consisted of a single garment, either an untanned goat-skin worn inside out, or a coarse hempen cloak tied round the waist, such as the Tibetan wear; and they were, without exception, filthy.

This marked change in the people corresponds to a marked climatic change, and it occurs in almost exactly the same latitude as a similar climatic and racial change on the Mekong. We were now on the edge of the arid region; and only a few miles to the north the Lutzu finally give place to the Tibetans. The "black" Lutzu, as we may call them, probably owe their uncouthness to a combination of causes, of which the inability to cultivate rice, and their complete isolation from Chinese influence, together with the proximity of the Tibetans, are contributing factors.

On June 17 we reached the last Lutzu village a few miles higher up, the river now flowing through a succession of barren gorges, where none but goats could find sustenance. Here we embarked in a dug-out for a voyage through some of these gorges, and an interesting voyage it proved. This dug-out was only 24 feet in length, about 18 inches in the beam amidships, and the same in extreme depth, though there were twelve of us on board, besides the dog and luggage; we squatted on our haunches in single file, there being five paddle-men forward and a single steersman aft. Our gunwale was almost awash, and, considering the water we had to go through, I frequently thought we must capsize. The men hugged the walls of the gorge most of the time, pushing against the rocks with their paddles, then darting across the river to avoid a rapid and catch the back-current; whenever shingle islands or a shore-line appeared, they got out and tracked, and in this way we covered several miles till we came to the first Tibetan village, and finally disembarked. The last I saw of the Lutzu, they were drifting down-stream in the canoe, sweeping a V-shaped net supported between two long bamboos under the water; the legs of the V were then opened widely, closed together again, and the net, with its enclosures (if any), brought to the surface.

There was no hint of rain now; it was a glorious evening, and a scorching wind raged up through the gorges, which grew more and more wild and lifeless. We did not reach our destination till nine o'clock, but it was a brilliant star-lit night, beautifully warm. La-kor-ah consists of three huts and a small temple, beside which the tent was pitched. Immediately below, a grey glacier torrent came booming through a deep sword-cut in the mountains and sweeping down into the mighty Salween was instantly engulfed in a surge of yellow water; up this narrow rift lay the pilgrims' road to sacred Do-ker La. Here I learned that the French explorer, M. Bacot, was at Menkong with a large number of mules, and I looked forward to meeting him; but in this country one rarely hears the truth of a story the first time of asking.

Next day's march, through an arid and totally uninhabited stretch of the valley, was a trying one. The river swept in huge S-shaped curves round colossal buttresses, smashed its way through deep gorges, and roared over the boulders. Immense screes, sometimes smoking with the dust of falling rocks, rose bare and lifeless on either hand, and a scorching wind, which seemed to suck the vitality from everything, blew throughout the day with ever-increasing violence.

Under that incandescent sky, stretched like a ribbon of fire up the valley, the place became an oven, but on the mountains to east and west, buried in cloud, rain, rain, rain! However, from the village of Chia-na we watched the sun sink, in a wild blaze of colour, behind Menkong, now only a few miles distant. Above Chia-na a narrow stony valley to the east pointed the way to a second pass over the Mekong-Salween divide. It was down this valley that Captain Bailey and Mr. Edgar had come from Y'a-k'a-lo, so that for the last 8 miles up the Salween, from Chia-na to Menkong, I was following in their footsteps. We reached the capital of Tsa-rung before midday, and, leaving the men to fix the camp, Gan-ton and I crossed by the rope bridge to the right bank.

Menkong is built on an alluvial fan washed out of the mountains by two converging torrents, and ending abruptly above the river in a bluff about 600 feet high. The Salween, here flowing in a deep trench and almost continuously interrupted by rapids, certainly discharges a considerably greater volume of water than does the Mekong in the same latitude. Scattered down the slope are the big two-storied "farm" houses, standing amongst fields of waving corn, and shaded by magnificent walnut trees; the contrast between the golden barley and the olive-green foliage was delightful.

The red and white lamasery, its peaceful courts sheltered beneath sombre *Arbor vitæ*, stands on the slope below the fir forests, and westward the neglected road winds away over the mountains to the plains of India. From the officer in charge of the garrison, I learnt that we had reached Menkong exactly a week too late to meet Captain Bailey, who had just started for India by this road, and Mr. Edgar, the English missionary at

Batang. M. Bacot, who in the previous year was, I believe, the first European other than the Catholic fathers to reach Menkong, was not there at all; the mistake as to who was the mysterious European at Menkong arose from the fact that Captain Bailey and M. Bacot possess the same Chinese name. On the two following days we retraced our steps down the valley to La-kor-ah, where we arrived on Coronation Day, and on June 22 we took the pilgrims' road eastwards, reaching the village of Aben at midday; for a week we had tramped beneath this flaming sky, between brazen valley-walls raked by a hellish wind. Abruptly the weather changed again, and ere we had surmounted a wonderful gorge, only to drop down beside the torrent later, the rain was once more drenching us through and through.

Camp was pitched beneath a high cliff, but there was no room to put up the tent, and we huddled as closely as possible under the rock-wall to avoid the rain. Next day we had a long and tiring climb through the dripping jungle, eventually bearing away to the south-east for Do-ker La.

At the head of the valley we were ascending, due east of the Salween, the glaciers of K'a-gur-pu, from which this torrent rises, showed up occasionally through the driving mists. The course of this stream has certainly been drawn wrong hitherto, since, in order to account for its size at La-kor-ah, it was necessary to place its source much further south; but the terrific peak of K'a-gur-pu, with its great glaciers and snowfields, had been neglected.

Camp was pitched in the forest again, at an altitude of about 10,000 feet, and as I was now reduced to *tsamba* as the staple article of diet, I sent Gan-ton out into the jungle to see what he could procure. He came back with some toadstools and bamboo shoots, the latter being roasted by the simple expedient of throwing them into the fire and leaving them till, on stripping off the outer burnt leaves, the inside was found to be soft and succulent.

June 24 was our last heavy day, but I now felt very weak. Gradually we emerged from the forest into an alpine meadow covered with beautiful flowers, and stopped for lunch beneath some big boulders amongst patches of snow. Suddenly there came a hail from one of the Tibetans just outside our little shelter, and everybody rushed excitedly for the open and climbed on top of the boulder; sacred Do-ker La had become momentarily visible through the clouds.

A steep climb brought us at length to the pass, which was now just clear of snow, though I think it is a few hundred feet higher than the Sie-la. A driving wind beat the cold rain in our faces, chilling us to the bone, and nothing being visible of the surrounding mountains save tantalizing peeps which were sufficient to prove that there was much behind the veil of clouds, we did not remain long on the summit.

So this was Do-ker La! A big cairn, into which were thrust many bamboos gay with fluttering prayer-flags and paper strips, was the only decoration,

though hundreds of pilgrims on their way hither passed through A-tun-tzŭ in the autumn.

Down below we crossed a big snow-drift, and after an extraordinarily steep descent reached the valley in which flowed a big stream, obviously another of the glacier streams from K'a-gur-pu.

This immense triple-peaked massif is situated almost immediately opposite the great snow mountain overhanging T'sam-pu-t'ong, and the two of them correspond in position to the line of junction between the rainy and arid regions of the Mekong and Salween valleys, so that it is evidently these peaks and the northward extension of the two ranges at a great elevation which form the remarkable rain-screen in these regions, whereby the Mekong-Yangtze divide has its rainfall cut off and the snow-line suddenly elevated to something like 19,000 feet.

The descent down this valley was through forest similar to that on the other side; gradually we got down out of the rain, and when we pitched camp for the last time there were stars shining overhead.

At the village of Londre, a little above the Mekong, we were told that two Chinese soldiers had arrived on the previous day in search of us, but instead of crossing to the Salween by the Do-ker La, they had gone over the main pass between the Doker-la and the Sie-la.

That same evening we reached the Mekong after a journey lasting nineteen days. There was an interview with the official when we got back to A-tun-tzŭ two days later, but I believe he was genuinely pleased to see us safely back, though he gave a certain amount of trouble when we returned to the Salween in November.