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BORDER COUNTRIES OF THE PUNJAB HIMALAYA

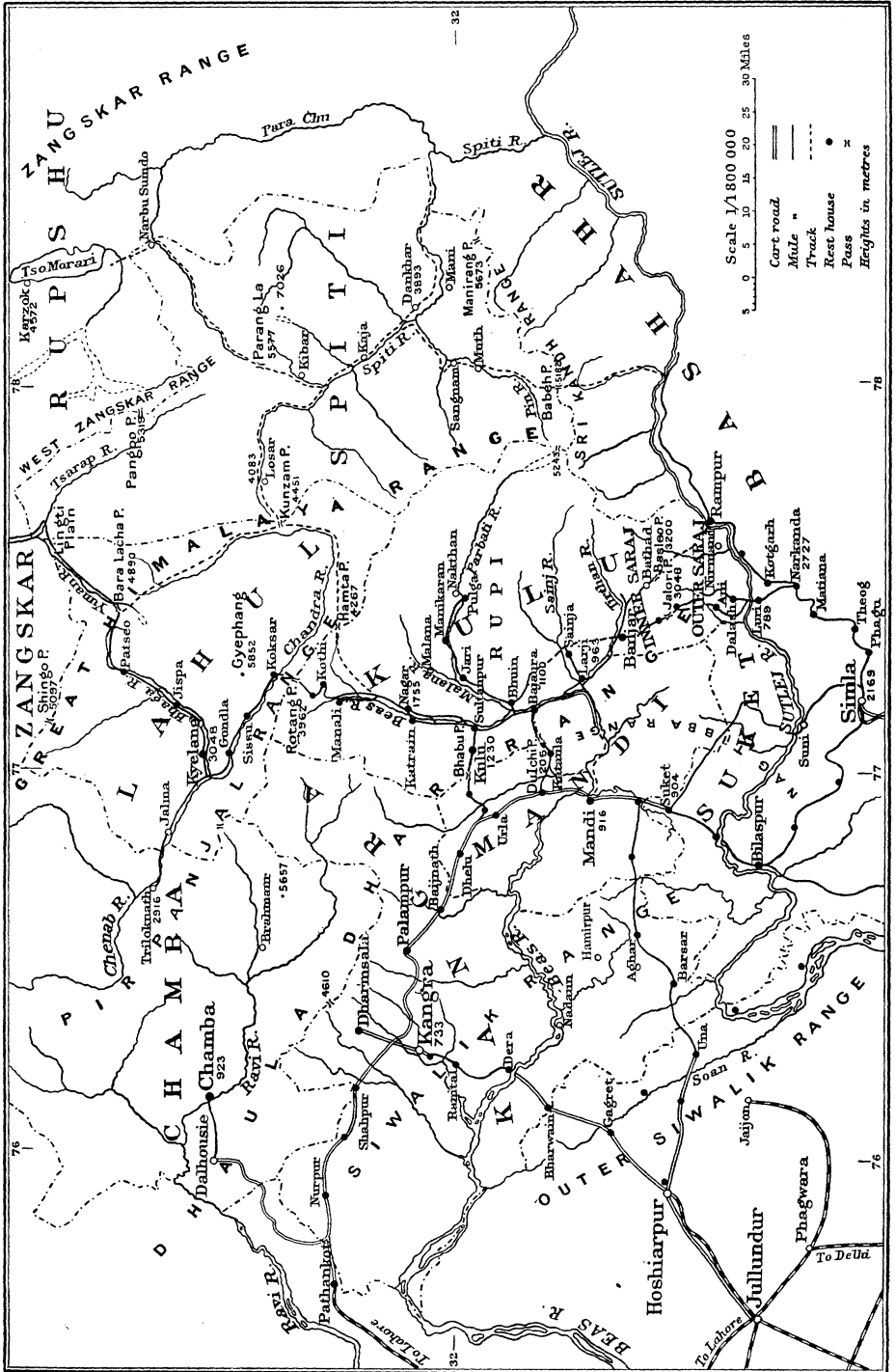
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Read at the Meeting of the Society, 22 May 1922.

NORTH of the Sutlej river the only tract of British India that touches the Nari Khorsum province of independent Tibet is Spiti, the easternmost Waziri of the Kulu subdivision of the Kangra District in the Punjab. While Spiti is described in the Imperial Gazetteer as being beyond question the most inaccessible part of the British dominions in India, Hindu writers of the past regarded Kulu as the end of the habitable world. In the seventh century A.D. the Chinese pilgrim Hiuen Tsiang penetrated to Kulu and gave a brief and accurate description of it. But he turned plainwards after hearing in Kulu stories of the dangers and precipices of the road north to Lahul.

These three geographically distinct countries of Kulu, Lahul, and Spiti form an administrative unit covering some 6607 square miles of entirely mountainous country. The area is thus considerably greater than Wales, and the latitude corresponds to that of Palestine, but the sea is more than 800 miles away. The population is small—about 125,000—and is composed of the most diverse elements, representing Aryan, Mongolian, and what we may perhaps call survivals of a very early Himalayan race. At least ten languages or dialects belonging to three separate linguistic groups are spoken. In a region where elevation varies from 2590 feet on the Sutlej to 23,050 feet in Spiti, and which spreads over the whole breadth of the Himalayan system of granite and crystalline ranges and even intrudes well into the sedimentary formations of the Tibetan zone, we find an extraordinary diversity of climate, vegetation, and fauna ranging from the sub-tropical to the arctic. In fact, in our small section of the Western Himalaya so rich is the variety in whatever field of study we are engaged, that we are tempted to linger in this valley or that, instead of dealing with our subject on wider lines. Even so, we must now limit our attention in the main to a few selected valleys out of many, perhaps equally beautiful and interesting.

The Sub-Himalaya of Kangra.—Let us approach the Himalaya from the Jullundur Doab. We first cross the low outer Siwalik range, composed



of rapidly disintegrating sediments of Tertiary Age, which contain a few fossils of recent animal forms. Soon we see faintly on the north-eastern horizon the long line of the granite snow-capped Dhaola Dhar, towering far above the low conglomerate and soft sandstone Kangra hills. This romantic and beautiful Kangra country is everywhere dotted with mediæval temples and high-perched castles. It consists of a series of parallel pine-clad ridges and small dales running north-west to south-east and into the Beas and Sutlej. In the 45 miles between the Jaswan Dun, just inside the outer Siwaliks, and the Kangra valley at the foot of the Dhaola Dhar we traverse three main lines of hills, not higher than 4000 feet at their loftiest points. The inhabitants are old-world Hindu Rajputs and other Hindu tribes, but now and then we encounter a Buddhist lama from some monastery beyond the snows on his way to the holy places associated with the life of the Lord Buddha. Five days' marching brings us to the Kangra tea gardens, behind which the Dhaola Dhar rises abruptly for an apparently sheer 13,000 feet. Here the rainfall averages well over 100 inches a year; 116 inches is the Dharmasala average, but sometimes 9 and 10 inches a day and 160 inches a year are recorded. The range is crossed by the Indrahar, 14,150 feet high, and other passes. On the north-east face the slopes are less steep. Here in Chamba State is the basin of the Ravi, near the headwaters of which rises the Brahmaur Kailas peak, which is said to be Mahadev's summer retreat. Lahul and Kulu, on the upper Chenab and Beas respectively, lie further to the east beyond a still loftier mountain range than the outer Dhaola Dhar.

Boundaries, and Mountain Barrier between Kulu and Spiti.—A reference to the map will show how the Kulu subdivision, which marches with Tibet in the east, is elsewhere almost completely hemmed in by Native States. On the north come the Western Tibetan countries of Zangskar and Rupshu under the Maharaja of Jammu and Kashmir. South along the Sutlej stretches Bashahr State, while on the west the Chamba and Mandi States all but isolate Kulu from the rest of British India. Kulu proper occupies some 1912 square miles on the upper Beas and includes a small area, Outer Saraj, on the north side of the Sutlej. It is inhabited, with one striking exception, by peoples speaking Indo-European dialects, belonging to the Kulu and Sutlej Pahari groups. To the east the Great Himalaya forms a complete linguistic and ethnological divide, besides being a natural watershed. Beyond lies Tibetan Spiti, which is within the geographical Tibetan zone. To the north the Pir Panjal westerly offshoot from the Great Himalaya cuts off Kulu from its north Waziri, Lahul. Kulu has access to its two dependencies only by passes closed for half the year, over ranges averaging over 18,000 feet in height.

From Mandi and the Sutlej Kulu is approached by passes 6740, 9480, and 10,000 feet high, of which only the first, the Dulchi, is open to mule traffic for most of the year. Communication between Spiti and Tibet, and

Lahul and Chamba, however, is easy and rarely closed by snow for long. The Spiti river runs east away from the plains before it turns south into the Sutlej, and it is remarkable that not a single river cuts its way through the Great Himalaya between the Sutlej and Indus, a distance of 360 miles. There is no gap between Kulu and Spiti so low as the Zogi-la, 11,300 feet high, that connects Ladakh with Kashmir. The lowest so far explored, but hardly ever used, is 17,200 feet high, and will be described later. The usual routes to Spiti are *viâ* the Chandra valley or by the Sutlej, both involving considerably détours. While the Spiti river drains into the Sutlej, the Tsarap carries the waters of the north part of Spiti and of Lahul beyond the Baralacha into the Indus.

A tongue of Spiti territory extends north-east beyond the Zangskar or Paralasa range into the lofty plain south of Tso Morari, the westernmost of the numerous elevated lakes found in the Tibetan zone.

Scope of this Paper.—I propose in this paper, after a brief glimpse at the well-known Kulu valley, which in rich beauty and grandeur is inferior to no other Himalayan country, to ask you to accompany my wife and myself from Nagar, our Kulu headquarters, east to Tso Morari. We shall linger awhile in the Malana glen, visited by General Bruce in 1912, ascend to the hitherto incorrectly mapped head of the Parbati, and cross into the Pin valley of Spiti by a pass never before, I believe, crossed in this direction by any European. Then, after a visit to the main Spiti valley, we shall reach Tso Morari by the Parang-la. Returning over the Pangpo-la, also on the Zangskar range, we shall find our way back to Kulu *viâ* Lahul. During this return journey we shall see the Tsarap tributary of the Indus and the sources of the Chenab. The vast district of Kangra, which includes Kulu, contributes something to every great river of the Punjab plains, with the sole exception of the Jhelum. Our journey will lead us over 490 miles, and will, I hope, give a fair general idea of the rivers, glaciers, and mountain barriers of this part of the Himalaya, besides bringing us into contact with some of its diverse human communities.

The Kulu Beas Valley.—Instead of entering Kulu from Mandi by the present routes over two lines of hills, let us follow the gorge through which the Beas escapes at Largi into the sub-Himalayan region. Here a motor road is being laboriously blasted out along the precipitous faces of rock that overhang the river. At Bajaura we enter the foot of the Kulu valley, here a verdant open dale with numerous small hamlets amid fields that are covered with rich crops of wheat, barley, mustard, and the opium poppy in spring, and with maize, rice, amaranth, and many pulses in the autumn. On either side of the valley rise gentle slopes luxuriant with a wealth of varied forest growth up to above 11,000 feet. The banks and islets of the Beas are densely wooded with alder thickets (*Alnus nepalensis*). On the hills forests of three main varieties of mountain oak, deodar, blue



THE UPPER BEAS VALLEY IN KULU FROM NAGAR



AN UPPER KULU SHEEP RUN IN SILVER FIR AND SPRUCE FOREST



SNOWFIELD AT HEAD OF PARBATI, AND PASS TO THE PIN IN SPITI



THE PARBATI MORaine FROM 13,520 FEET

pine, spruce, silver fir, ash, and silver birch present to the view masses of varying depths of green. Walnut, horse-chestnut, maple, elm, mulberry, and in the Parbati the chil pine are also found. At about 5000 feet the giant tree rhododendron (*R. arboreum*) attains a height of over 40 feet, and, just beyond the birches 6000 feet above the red rhododendron, the mauve shrub rhododendron (*R. campanulatum*) flowers even before the snow melts. The abundance of wild flowers in the dales, forests, and especially above the snow line defies all verbal description. Perhaps among the most striking of the Alpine flowers are the blue Himalayan poppy, the yellow violet, the beds of mottled iris, and the numerous clumps of primulas, but the masses of variegated colour that in the rains adorn the high sheep runs or *thaches* impress one most. The wild fruit trees, apple, pear, peach, apricot, cherry, currant, raspberry, and walnut, and the recently introduced European and American varieties in the fruit gardens are an important economic feature of Kulu. Fruit does well, as the climate between 4500 and 6500 feet is favourable, and here the rainfall is only 30 inches per annum, less than a third of that at Dharmsala on the outer slopes of the Dhaola Dhar. In March and April fruit blossom adorns the valley throughout its length and breadth. The fauna need not detain us, as it is much the same as in the adjoining hills. There is little detailed geological information available about Kulu, which is practically all slate, schist, and garnet. From above Bajaura we first see the snow cone of Gyephang in Lahul peeping over the Rohtang pass at the head of the Kulu valley, where the Beas has its traditional source. In its 40-mile course thence to Bajaura the river drops 9500 feet. In the first 10 miles the fall is 7000 feet, nearly three-quarters of the total drop. Bajaura is only 3600 feet high. Cultivation and human habitation extend to above 8000 feet. Till June the Rohtang, 13,000 feet high, is not clear of snow, the winter accumulations of which are 40 feet or more deep in late February.

Kulu People and Religion.—The agriculturists of Kulu are preponderantly Kanets, who, according to the most recent authority, were in all probability among the earliest Aryan invaders of the Himalaya. Their religion is peculiarly local and entirely different from the Hinduism of the Punjab plains and even that of the Kangra hills. The gods own a large share of the cultivated land, and their worshippers are also their tenants. The village god is a popular local institution, managed by the Kanet village community in its own interest. It seems to be often a family deity in origin, though it is sometimes a nature spirit exercising sway over a larger but still limited tract of country. This local worship, despite seventeenth-century and other Brahministic importations of Rajput chiefs, is essentially democratic and non-Brahministic. The village gods are extremely human, easily offended, and most capricious. They have their divine or semi-divine relations and acquaintances, whom they entertain and visit on fixed

'At Home' days. Gods and worshippers keep in close communion through the agency of prophets, a remarkable and widespread class found throughout Kulu and the neighbouring hill states. These prophets, like those of the Old Testament, are selected by the deity to act as his human mouth-pieces. In Kulu the deity may pick out a man of any caste, Kanet or menial Kohli, as his Gur or prophet. Indian Buddhism, prevalent in the seventh century and earlier, has disappeared and the old gods again hold sway.

The people are cheery and contented peasants, the spoilt children of a rich country that lavishly supplies all their simple wants. Their substantial stone timber-bonded houses of two or more stories are veritable palaces, compared to the mud houses of the Punjab and thatched huts of Bengal. The women can hold their own with any peasantry in the world in comeliness of feature and beauty of colouring, also in grace of dress, though their ideas of cleanliness and marital fidelity may be open to criticism. The Kulu people are aloof and suspicious of outsiders, but insist on discussing their most intimate family and religious affairs with their alien ruler, whom they expect to take, and who fortunately often does take, an interest in these matters. They are much attached to their mountain homes, and dislike even a journey to Dharmsala in the outer hills. Before 1915 they did not join the army, but of the small number that were induced to enlist in the war some served creditably in Mesopotamia, Syria, and Egypt. Their chief pleasures are dancing, drinking, and lovemaking, for indulgence in which pursuits the March to October season of religious fairs affords every facility.

The Kulu man's dress consists of a heavy woollen homespun coat-blouse reaching nearly to the knees, trousers tight at the ankles, a coarse shepherd's plaid, and a small round black cap. The women knot cotton handkerchiefs over their heads like Italian girls, and gracefully drape gay-bordered blankets around their persons as dresses, which they fasten together with large clasp pins. Their jewellery, mostly silver and enamel, is barbaric and effective.

Sultanpur, or Kulu town, the little trade centre of a country, the natives of which want little from shops and seldom care to make money, is 8 miles higher up than Bajaura. Fourteen miles further and 2000 feet higher lies Nagar, the old capital of the Kulu Rajas and now the headquarters of the Assistant Commissioner, Forest Officer, and Engineer. A few other Europeans, engaged in fruit culture, have residences here on the 6000-foot limit along deodar-clad slopes, 1500 feet above the left bank of the Beas. Halfway between Sultanpur and Nagar, the Beas is crossed at Raisan by a typical cantilever bridge of timber. This river, once the exclusive domain of the prolific and sharp-boned mountain barbel, has since 1910 been stocked with brown trout from Kashmir, which at an age of four or five years attain to a weight of six to eight pounds, but rarely take the fly.

Malana.—We shall not approach Spiti and Lahul by the usual Chandra valley routes over the Hamta and Rohtang passes. Instead, from Nagar let us turn up the mountain-side eastward and through deodar, spruce, and fir forests gain the Chandra Kanni pass, 3000 feet below which is situated Malana village. The deep and narrow Malana glen joins the Parbati valley, but so steep and rugged is the chasm through which the Malana river has cut its way out, that the easiest approach to the isolated village is over the mountains. Devta Jamlu, or Jang Jamlu, as the Malanis call him, resides on Indrasau, a 20,417-foot peak at the head of the glen on the Beas-Chenab divide. He is supreme lord of everything in Malana—of the people, animals, the land and its produce. The Malana people relate how he and his wife, Naroi, on their first entry into Malana, rested on the top of the Chandra Kanni. They opened a casket, whence the gods of Kulu emerged and were blown to their present abodes. The casket is still preserved at Malana! This legend symbolizes Jamlu's position compared to the Kulu village gods. He is throughout Kulu regarded as a mighty spirit of the mountains, feared by men and godlings alike. The latter often submit their disputes to his arbitration. His brother, Gyephang of the Lahul peak, and his sister, Hirma or Harimba, now of Manali, but formerly of the Rohtang ridge, share the respect in which Jamlu is held as one greater than local village devtas. Indeed, the proud Malanis boast that Jamlu once exerted his power over the Emperor Akbar in far-off Delhi, and inflicted leprosy upon him, because his tax-gatherers had unjustly extorted from a Sadhu on his entrance into Delhi two pice given to him from the Malana treasury. Even now, year by year in the spring at a spot called Karauni, they commemorate in mimicry the arrival of the embassy, bearing rich gifts, which Akbar sent in order to be freed of his leprosy. Jamlu has no image and no temple, but his spouse, Naroi, has a small shrine. The god does not express his will only through his prophets. Often the divine afflatus descends upon the Ra Deo, the whole assembled body of Jamlu's own people. In the spring the two priests hold solitary communion with Jamlu for several days in a small hut called "Pholobari" till barley seed taken by them inside has sprouted.

The Malana religious practices have been described, but little is on record about the highly democratic theocracy of this isolated village of less than 400 inhabitants. Malana, in fact, abounds with religious and social survivals, some probably dating from a time before the first Aryan wave of immigrants had entered Kulu. In Malana we have the general assembly, or Ra Deo, and an elected senate of eight elders, the Jathira. When even one of them dies, a new set of eight must be appointed. With the elders sit also the three principal officials, namely, (1) the hereditary manager and high priest, known as the Karmishta; (2) the god's own selected prophet, or Gur; and (3) the senior hereditary priest, or Pujari. In most matters of communal interest these two bodies sit

together in the place of assembly. The senate and officials are called collectively the Rigin Nashing, or upper assembly; they sit up above on the raised stone platform, with the Ra Deo in front below. All disputes between residents of Malana are settled by the elders. The only Malana cases that have come before me have been with outsiders. One was Devta Jamlu *versus* a British colonel. They are conducted by the Karmishta, no doubt under Jamlu's instructions. The manager, or Karmishta, is assisted or checked by two bodies, one a treasury committee of five and the other a storehouse committee of four Kothialis, who are appointed by the Ra Deo. Thus in almost every matter the Bari, or officials, are closely watched by the community. Shoi, the Karmishta, I knew well and respected greatly. Sixty-four years old and reserved, he combined business-like acumen and independence with charm of manner and undoubted sincerity, qualities rare in Kulu. In figure he was slight, his face was somewhat drawn and pointed, and his clear eyes had a far-away look, though bright and animated during conversation. When he first came to me he was clad all in black, which emphasized his singular personality.

The Malana language, Kanashi, intelligible only to inhabitants of this one village and different from Kului and Tibetan alike in structure, is of a family represented in a few other small groups of tongues found in Lahul, Bashahr, Almora, and Eastern Nepal, all spoken by hill tribes on the linguistic border-land between Tibetan and Indo-European speech. This has been pointed out by Sir George Grierson in his Linguistic Survey. Kanashi is unwritten and has tones like Central Tibetan and Burman. Dr. Francke thinks it has affinities with the earliest known group of Indian languages, such as the Munda, that belongs to the old Austric family, which is found from Sunday Island off South America to Madagascar and even as far as New Zealand. But in the Linguistic Survey Kanashi is described, not very succinctly, as a "Complex pronominalized Himalayan Tibeto-Burman Language." A few samples of the unusual Malana personal names may be of interest. Aïti, Gui, Buia, Muian, and Shoita are men's names. Women's are Aïa, Chakoti, and Sako. In addition there is also a remnant of what is, perhaps, another language, known as Naroï's speech, since it is used only in her worship. Songs in it are taught by mother-in-law to daughter-in-law. Jamlu owns lands outside Malana in numerous Kulu villages throughout the basin of the Beas—a trace of the time when his worship was general. The Malana folk in a body visit these villages every summer and billet themselves on the inhabitants, who fear the Malanis as weird and uncanny people in league with an all-powerful spirit it is unsafe to offend. Our boastful Malanis affect to despise the Kuluis as fools, who waste their substance on women, beer, and disputes, and contemptuously describe their gods' temples as Jamlu's outhouses. They do not intermarry with Kulu people, except that they take girls from Rashol, a hamlet just outside Malana.

They pride themselves on their peculiar customs and arrogate to themselves a wisdom superior to that of the rest of mankind. Perhaps their little Utopia is after all better off than many parts of our distracted outer world!

The Parbati Valley.—From the summit of the Roshkoling or Rashol pass we look down into the valley sacred to the goddess Parbati, the gentle daughter of Himalaya and bride of Mahadev. Before us is the barrier of the Great Himalayan range, over which our journey will take us. The Parbati has a course some 12 miles longer than the Beas, and probably carries more water at the junction by Bhuin, 3 miles above Bajaura. Both at Manikaran and Kheir Ganga in Kothi Kanaur, 22 and 40 miles above the confluence, occur groups of hot springs. Others are found in the upper Beas and the Sainj valleys. The hottest Manikaran spring reaches 201.2° F., and is used for cooking food. Others are utilized for thermal bathing establishments. The water issues from granite and contains carbonates of iron and lime, but no sulphur. The name "Mani Karan," or "Ear Ring," perpetuates the local legend of the origin of the springs. Once on a time Parbati placed her ear-rings on the bank before bathing in her stream. During her absence they were stolen by Sessa Nag, King of Lower Underworld. Evidently a suspicious character, he was soon taxed by the gods with the theft. So indignantly did he repudiate the charge that he gave a violent snort. Out of his nostrils came the stolen ear-rings, which his hot breath carried up through the earth and out at Manikaran. Hence the hot springs! Three miles above Manikaran we pass the abandoned Uchhieh silver-mines, for which the Rupi Waziri was once famed. Kulu is rich in silver, copper, lead, iron, and rough slate. Gold-dust is found in the Beas as well as in the Chenab, and tales are told of secret seams of copper and silver in the Malana valley. Twelve miles beyond Manikaran, Nakthan, the last Kulu village, is passed, and for eight days' march we shall see no human habitation. At Thakur Kua, 13 miles beyond Kheir Ganga, an elevation of 11,320 feet is attained. The Alpine flowers near here are marvellous; all arboreal growth, except stunted juniper scrub, has been left behind. Here we halted, sent back our surplus baggage and coolies, and collected a small amount of fuel for a week over bare stone, ice, and snow. Just before Thakur Kua the path is over a rock face, as the valley is contracted by spurs that close in to the river on either side. The monsoon almost exhausts itself just before this point, so the climate and vegetation now begin to resemble those beyond the central range in Spiti. In our next march we crossed to the right bank of the river by an enormous boulder, some 60 feet high, which bridges the stream. It is known as Pandoseo, the bridge of the Pandavas. Opposite it on the left bank is the last nala and glacier with a local name. This is the Dongspal, a name of Tibetan rather than Kulu sound. Perhaps it is a

relic of the days when the Tibetans held all the valleys which give access to Kulu from the east, and so controlled the old now disused trade route from the Shigri in the Chandra valley to Rampur. Henceforth the river runs near to us in a shallow spread-out stream or streams, instead of in a deep narrow gorge, as it did near Nakthan and Kheir Ganga. The valley, as we progress, curves gradually towards the south. Our camp at Roba Thach, at 12,700 feet, was on the alluvial flat of an old lake-bed. Below it we had toiled over masses of old moraine débris.

The Parbati Glacier.—Three miles above, an enormous moraine tumbled right across the main valley from the west; beyond this dam lay a shallow lake that was drained over the moraine barrier by a gap near the right bank. From an opening beneath the ice and débris issued water from the lateral glacial moraine. From below, this lateral moraine looked like the end of the main Parbati glacier, but the latter was another $1\frac{1}{2}$ miles distant hence, at an elevation of 13,540 feet and 43 miles from our last camp in inhabited country at Pulga. The snout was that of a slowly receding glacier, but observation showed it to be, if anything, a little in advance of the position given it in the 1904 1-inch map, which up to this point was found to be tolerably accurate. This map is based on surveys made in 1894-5 and 1900-1. The surveyor seems to have penetrated only a short way behind here; hence his error in supposing the visible top of the glacier, 6 miles away, to be up against the actual Pin-Parbati watershed. The glacier, in fact, turned to the east, and so continued out of his sight in the shape of a wide icefield at a much higher level for more than $1\frac{1}{2}$ miles further. Its total length is $7\frac{1}{2}$ miles, the largest glacier in Kulu.

The afternoon was spent in endeavouring to fix the position of the glacier snout, a task interrupted by the appearance of some inquisitive burrhel (*Ovis nahura*) on the heights above, and lengthened by the extreme hardness of the rock in which we tried to hew marks. The thermometer fell to under 38° F. at night. Only above 15,000 feet does it fall below the freezing-point at night all the summer. On leaving our camp by a small torrent that rushed down the right bank, we scrambled along the eastern glacial stream for just over a mile of the roughest imaginable going. This took about two hours. Then we arrived at the spot where a considerable volume of water issued from two ice caves in cliffs of thick black ice, surmounted by gigantic piles of moraine débris, which filled the valley from side to side. These tumbled masses of débris, ice, and snow made us search for an easier route along the rocks, but precipices drove us back to the moraine.

We had with us a tent-pitcher, one Jaiwant, who had in 1906 accompanied a former Assistant Commissioner, Mr. F. Skemp, into the Parbati valley from Spiti. Despite the uninviting appearance of its head, he thought he recognized a side nala as the one he had then descended by.

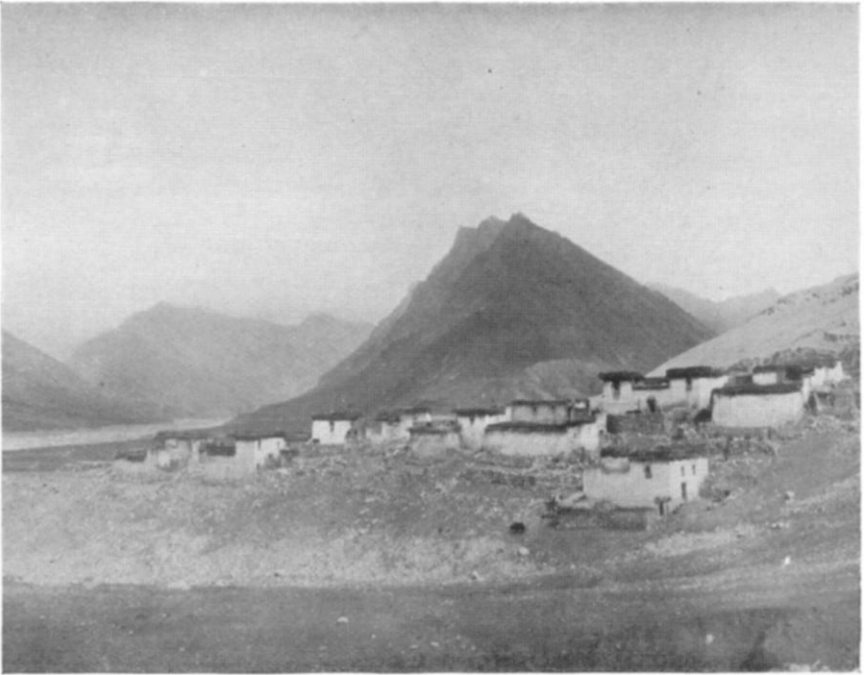
But after two hours' exploration he returned and excitedly reported that the way was blocked by a sheer wall of ice, that looked like the end of the world, and, if he had ever been anywhere near here before, which he now doubted, everything looked absolutely different. Certainly it did, as Mr. Skemp had come over some two months later in the summer, when the ice and snow were considerably less. Owing to the slowness of our progress and this delay we covered only $2\frac{1}{2}$ miles that day, and bivouacked on a little shelf 300 feet above the glacier at 14,850 feet. Our progress was slow, as we were a large party of nine, with fifty-two coolies and two headmen, and had with us almost two months' supplies. This year it was a scarcity of food, both for man and beast, that caused me to visit Spiti in order to organize relief measures. So the coolies had full loads and the pace was slow.

We went to rest looking out on to three magnificent lateral glaciers, deluded by the incomplete survey map into the expectation that before 10 a.m. next morning we should be over in Spiti after an easy 4 or 5 miles' walk. The largest glacier opposite us seemed to present a practicable route westward over into the Rakti nala at the head of the Sainj valley between mountain peaks we had previously seen from the other side. In the revised 4-miles-to-the-inch map published in 1916 the Sainj is wrongly drawn as rising in the Great Himalaya. This error is also copied in a 2-miles-to-the-inch Forest Department map published in 1919. In reality, the Sainj rises in the range to the west of the upper Parbati. While both these maps cut off the upper 11 or 12 miles of the Parbati, the 1-inch map contains everything except the great snowfield on the upper glacier, which is little over $1\frac{1}{2}$ miles wide from east to west. The omitted area amounts to some 5 square miles. The 4-miles-to-the-inch Indian Atlas sheet places the trijunction of Kulu, Spiti, and Bashahr, which is just south of the pass, approximately 10' too far west and 15' too far south. In it the drawing of the entire Parbati and Pin valleys above Thakur Kua and Baldur, respectively, is fanciful. The Pin in Spiti is made 10 miles too long. No even approximately correct map of the upper Pin valley yet exists, though in 1884 Sir Louis Dane, the first to explore these two valleys and cross from Spiti to the Parbati, pointed out that the mapping of the upper Parbati was wrong.

From our bivouac we descended on to the moraine and, once we reached its central hump, had an easy $4\frac{1}{4}$ miles' gradual ascent, first for a short way on rock and ice, and then over snow nearly to the position assigned to the watershed in the 1-inch map. But here to the east we were confronted by a very much hummocked wall of black ice apparently 300 feet or more high. It was evident that at this point (15,700 feet) the glacier came tumbling down between the base of two mountains in a sort of gigantic cascade from a higher level to where we stood. Over the ice wall and far beyond to the east we could just see the summit of a lofty peak. Two of us ascended the rock face to the south of the ice-fall to

prospect, but failed to find there any practicable route for laden coolies. Then we climbed up to the peak above, 1500 or 1600 feet higher than the base of the ice-fall. From it we looked east on to an extensive glaring snowfield, which gently sloped up to a bold serrated ridge with a low gap in the centre. Beyond the ridge we saw some not much lower mountain ranges, that ran away from the main ridge into the distance. There could be no doubt that we had at last located the watershed, and the surmise that the distant ranges beyond were on either side of the upper Pin subsequently proved correct. Our point of vantage also enabled me to discover an extremely steep but apparently practicable back door ascent from the lower glacier to the upper snowfield round the north side of the mountain on which I stood. There only remained time that afternoon to lead the party $1\frac{1}{2}$ miles back down the soft and now ominously cracking glacier and 400 feet up above its right or east bank by a steep nala. Then at 15,750 feet we bivouacked on narrow rocky ledges. The next morning, July 6, we first negotiated a rocky ascent precipitous in places, where the rope was used; then we descended along a narrow rocky ledge on to a small glacier. But before we crossed this ledge heavy monsoon clouds came sweeping up the Sainj valley from the west and snow began to fall. A halt was called and temporary shelters erected, but happily before 11 a.m. clear blue sky appeared in the west, so on we went down to the snow. Then we zigzagged up a narrow and very steep snow slope, that was banked between the ice at the top of the small glacier and the base of the mountain ascended by me on the previous afternoon. We now found ourselves at an elevation of 17,000 feet on a low rocky wall, which separated the minor glacier we had just ascended from the large snowfield I had prospected the day before. We were above the ice-wall that had stopped us the previous morning. By 3 p.m. we were halting at an elevation of about 17,200 feet in a rocky gap on the Pin-Parbati watershed, 40 or 50 feet above the snowfield we had come over for the last $1\frac{1}{2}$ miles.

The Pin-Parbati Divide.—The scene that met our eyes was worthy of the Great Himalaya. The camera gives some suggestion only of the broad vista towards the south-east, but its record is more adequate than words could be. The imagination too could not fail to be impressed by the thought that the civilization before us was Tibetan for over 1200 miles up to the borders of China, and Hindu civilization and Aryan languages had been left behind. We had visited the birthplace of the goddess Parbati, daughter of Himalaya. The mountainous region in front was, in formation and origin, entirely different from the Himalayan zone that stretched from the Dhaola Dhar to the range on which we stood. Here in primæval times lay the vast ocean named the Tethys: in the sediments 20,000 feet deep of this zone is represented almost every marine deposit from the time of the earliest known appearance of animal



KYI VILLAGE AND MONASTERY, LOOKING NORTH UP THE SPITI VALLEY



CONFLUENCE OF THE PIN AND SPITI RIVERS, FROM DANKHAR, SPITI



KYELANG, LAHUL, LOOKING DOWN THE BHAGA VALLEY



CONFLUENCE OF CHANDRA AND BHAGA RIVERS AT TANDI, IN LAHUL

life. We erected a cairn to commemorate the first crossing of the range at this place by an English lady, my wife, and the first ascent from the Kulu side by any European. My predecessors, Sir Louis Dane in 1884 and Mr. F. Skemp in 1906, had both crossed from the Spiti side later in the year, perhaps by somewhat different routes from that taken by us.

Pin Valley in Spiti.—We camped in Spiti on the right bank of the Pin 3 miles beyond the pass at 14,890 feet, after a troublesome descent in the late afternoon over a treacherous, much-crevassed glacier covered with soft snow. Opposite our camp a large glacier from the north-west joined the Pin. A late start was made next day, as our coolies were fatigued and some needed medical attention. We first forded a stream from the south-west, and then crossed to the left bank of the Pin by a snow-bridge. An easy march took us to a sheltered and grassy camping ground facing the nala, which joins the Pin at Baldur from the direction of the Han-la or Babeh Pass that leads over into the Sutlej valley. Here flocks of goats and sheep were grazing, and the Bashahri shepherds gave us plenty of welcome milk. At Baldur are some remains known as Lyungti Khar, or Kulu forts, erected by a Kulu invader, perhaps Raja Man Singh or Jagat Singh. From here our Kulu men returned, and after a halt our baggage was carried to Muth, 11 miles distant, on yaks, which we had sent for. On this march we had a number of deep streams to cross. We were impressed by the excellence of the grazing and by the abundance of wild willow and other growth. Wild rhubarb and onions were plentiful, and were appreciated by us. The rainfall appears to be greater here than in the main Spiti valley. Muth, the first Spiti village with the exception of a few houses at Shian on the right bank 3 miles back, was a prosperous-looking hamlet of flat-roofed houses of Tibetan type, with fields green with young barley. The banks between the fields were ablaze with the large flower of the opaque light bluebell, which all the inhabitants seemed to be chewing. A broken-down rope bridge spanned the river. The next day brought us to Sangnam, the largest Pin village at the junction of the Parachu river with the Pin. At this camp the local demon showed his annoyance at our intrusion by a whirlwind that upset the tents, buried their occupants, and sent a heavy bread tin, saucepan lid, and tarpaulin flying high in the air for nearly one-third of a mile. The lid went into the river. I suppose the demon was satisfied with his spoils and his handiwork, as he did not trouble us again; but the villagers did, as that evening they came and danced and sang for hours before our tent.

The whole of the Pin valley above here is remarkable on account of the brightly coloured strata of the hillsides, and the sharp-pointed peaks that in July carry little snow under 18,000 feet. Its general aspect is quite unlike that of the main Spiti valley, which is more enclosed, so that few peaks and practically no snow is visible. Here the conglomerate formations, so frequent and striking at Dankhar and above, are absent.

Spiti is a perfect geological museum, as numerous series of strata are exposed to the view, and there is practically no covering of vegetation as in Kulu. Though there exist no accurate large-scale topographical maps like those made in Kulu for forest purposes, many parts of Spiti have been closely examined by geologists, especially by Sir Henry Hayden, to whose memoir of 1904 reference can be made by those interested. Red hæmatite and galena are found in small quantities. From the latter bullets are made locally. Gypsum occurs in very large quantities: it is extensively used as a plaster and wash for houses and temples outside and in. It forms an excellent base for frescoes and other paintings.

After Sangnam the Pin runs in a gorge for 8 miles. The view of its mouth from Dankhar Fort is remarkable. Above the right bank, where the river narrows, we pass the Pin monastery by a large poplar tree, said to have been planted at the foundation of the monastery, some eight or nine hundred years ago. Here only in Spiti is found the Nying-ma sect of monks, an early sect prior to the seventeenth-century reformation of Tsong-kapa and his disciples. That reformation has not affected this valley or Lahul, where also some traces of ancient Buddhism are preserved. In addition we have here in Pin an unique and curious set of friars or strolling players, called "Buzhen" (pronounced Budjen). Sir James Lyall first described this order, which was founded by one Thang-Tsong Gyalpo, an incarnation of the God of Mercy, Chen-rezig, in order to win people to The Way of Buddha. Their performance consists of a medley of prayer, song, miracle play, and stone-breaking feats. Behind they set up a brightly painted wood altar with its usual appurtenances of images, bells, and offering vessels. Above it is a painting of their founder. Their hair is long and plaited into ropes. They cover their heads for the performance with long streamers of bright ribbon, and they wear pleated skirts also decked with numerous streamers. The rapidity of their gyrations, with their hair, ribbons, and skirts all flying out, resembles that of dancing Dervishes, and the brilliance of their colours, those of Russian dancers. Their jests we fortunately could not follow, as they were certainly not over-refined. They threw the audience, including old gentlemen piously engaged in whirling their prayer-wheels, into convulsions. There are only nineteen families of these Buzhens, who marry like the Nying-ma monks.

Spiti Valley.—There is no time to describe the main Spiti valley in detail. The river within Spiti is 70 miles in length. The total area of Spiti has been calculated to measure 2931 square miles, but only 2372 acres, all irrigated, are under cultivation. The population in 1911 was 3629, and entirely Tibetan. The name Spiti, pronounced there and in Tibet as Piti, means the "Middle Country," perhaps from its situation between Great Tibet and Little or Western Tibet. The language is that of Central Tibet, but it has a few resemblances to the Tibetan of Lahul.

Its lamaism, that weird medley of Buddhism, Tantric doctrine, and demon worship, hardly differs from that of Tibet, except perhaps in the identity of the demons, which seem in Spiti to be more numerous than the men. The dress is Tibetan; so are many of the customs, such as the salutation of the great by extending the tongue as far out as possible and keeping it there.

The villages are situated at elevations varying from 11,000 to just over 14,000 feet. Except at the bottom of the valley, there are no real trees. Near Mani, Lari, Tabo, and Pog we find poplars of fair size and juniper trees. Tabo even boasts one apricot tree. Barley forms three-quarters of the total crops. "Sermo," with its large grains in tiers of four in the ear instead of three, the dark beardless "Nyu," and "Sowa," which is much like the common Kulu barley, are the three main varieties, but the quality is inferior to that of the similar kinds of barley in Lahul. Wheat, peas, oilseed, and small quantities of buckwheat and millet are also grown. The local seed measure is the khal, or sheep-load, instead of the bhar or man's load of Kulu. The khal is divided into 20 dre; a khal of barley is about 20 lbs., but one of wheat is 4 lbs. more. The domesticated animals are the yak, the famous surefooted Spiti ponies, a stalwart breed of small asses, sheep, and goats. The latter are few in number, under 6000 in all, unlike the vast flocks kept by the neighbouring Kuluis, Lahulas, Kuna-waris, and Rupshu nomads, some of whose animals annually visit Spiti for the summer grazing. Few animals die without being turned into food. The Spitials are great meat eaters; four or five men can finish a small sheep at a sitting after roasting it whole.

Spiti Customs and Government.—In striking contrast to Lahul and Kulu, where all sons share alike, there exists in Spiti a system of primogeniture that serves to maintain the holding of the family intact and to give the vigorous young and middle-aged people the main responsibility for its cultivation. The young do not have to wait for their parents' decease to enter upon their heritage. As soon the elder son grows up and marries, the ancestral house and fields are his. The parents are relegated to a small house with a field sufficient for their wants. The aged are happy cheery people and are apparently quite contented, even when the marriage of their grandson entails a removal to a still smaller house than before. These democratic people settle their own disputes in the village assembly, in which the women also assert their views: they elect their own village Gadpos, or Elders. The Gadpos Chenmos, or circle headmen for the five groups of villages, are elected and dismissed by the land-owners. These five men form the council of the hereditary Wazir, or Nono (noble). The custom, which over seventy years of nominal British rule has failed to end, that parties to suits before the court of the Nono and his councillors must supply them with beer till the case before them is decided, often leads to most protracted proceedings. Indeed, unless

the Assistant Commissioner of Kulu visited Spiti every two or three years, probably few cases would ever terminate before the decease of the parties. Fortunately, crime hardly exists and civil disputes are usually settled in the villages. Spiti does not labour under a cumbrous system of dyarchy or multiplicity of laws. It has been excluded from the operation of the recent "reforms," which are not needed in a country where flourishes a healthy democratic spirit of which there are few signs in India proper. Spiti is never likely to "go dry." Though salted greasy tea is universally drunk, barley beer, which gives the main reason why so much barley is grown, and which is consumed in vast quantities by clergy and laity alike, shows no signs of declining popularity.

The problem of what to do with the younger son is solved by sending him to the local monastery, where he will enter upon his monastic career as the servant and pupil in the family cell of, perhaps, his uncle. Both are maintained on the produce of a field, known as the "da-zhing," which forms a portion of the family holding. When the neophyte, known as "tsun-pa" or "get-sul," has passed his examinations, he becomes a full lama or "gelong." But even then, if his elder brother dies, he may, on payment of a fine, leave the monastery and succeed to the family estate and his brother's widow.

Monasteries.—The monasteries, as elsewhere in Tibet, are found in most picturesque situations. That at Dankhar is perched on a conglomerate pinnacle above the town, the large Kyi establishment surrounds the whole of a pyramidal hill, Than-gyud, just above the junction of two deep ravines, peeps 2000 feet down into the valley below, and to the east faces the holy twin-peaked Jo Jo Gang Milta, 23,050 feet high; Than-gyud's other name of Sakya Gongmig appropriately means the Upper Eye of the Sakya sect. Tabo alone is on a plain. Than-gyud, when on another more accessible site, was burnt down by the Tso-po, Galdan Chang's Mongols, three centuries ago, and Kyi, too, was fired by the Muhammadan iconoclast, Ghulam Khan, during the Dogra invasion. Fortunately Tabo, the most ancient and interesting monastery or rather temple of all, has escaped any such disaster. So far the legend that until the Yang-tso, or Mani lake, should dry up, so long would the temple remain, has proved true. The main hall, with a large four-headed image of Nam-par-nang-zad (Vairochana in Sanscrit), an early Buddha, and with thirty-two almost life-sized images of gods and goddesses seated on brackets round the walls, possesses the most impressive interior in Spiti. So far these thirty-two figures have not been identified, but Dr. Francke, the Moravian missionary, has recently informed me that they may be the gods of the pre-Buddhist Bon-pa religion, of which there are frequent traces in the neighbourhood. The frescoes more closely resemble those of Khotan and early India than those found elsewhere in Tibetan temples. Some probably date back to the tenth or eleventh centuries. Inscriptions show

that, as a Buddhist foundation, Tabo has existed from 1004 A.D. There are in all seven temples. The monks here are now of the reformed Gelugpa sect, as they are also at Kyi and Dankhar. Tabo, like some of the Lahul temples, certainly dates from the days when Buddhism was disappearing from India.

Dankhar and the Parang-la.—Dankhar, the capital village of Spiti, is perched up on the conglomerate pinnacles of a spur over the right bank of the Spiti river. To-day its appearance is almost the same as it was in 1820, when visited by Trebeck from Leh, where he had gone with Moorcroft, the first English visitor to Kulu and Lahul. Trebeck has left an interesting drawing of the village. Dankhar, 12,774 feet high, means the "Cold Fort." At one of our four visits here we stayed in the fort, whence we had an excellent view of the roof-life in the village under us. It is the official seat of the Wazir or Nono who resides at Koling, higher up the valley. There is not a single shop at Dankhar or elsewhere in Spiti!

I wished to travel from Spiti to the extreme north of Lahul in order to inspect the Leh-Kulu trade route from Lingti to Kulu, and also to see some of the work done to improve the approach to the Parang-la in the Sangba Lungba, a difficult river valley, by a man of Kyibar, whom I had persuaded to apply himself to this task. He had left the Thangyud monastery in an irregular manner on account of a love-affair, and had been sentenced by the monastic disciplinary court to expiate this breach of the rules by useful and arduous works, so I found him one beneficial to travellers and difficult enough to satisfy even the monks. Both he and his son, Chepa, were painters and copied several frescoes for me.

So it was that my wife and I crossed the Zangskar or Paralasa range by the Parang-la (18,300 feet), and back by the Pang-po-la (nearly 18,000 feet), which have been crossed by few Europeans and have not been accurately surveyed. The Indian Survey Department has no information as to the height of the latter pass, and has only an entry in a route map as to the height of the Parang-la, which coincided with my aneroid barometer reading. Trebeck in 1820 and Jäschke more recently considered it to be 19,000 feet high. Cunningham gives 18,502 feet, and the 1917 *Gazetteer* quotes this height.

We were able on our journey to follow the upper Parachu, a tributary of the Spiti, which joins it in Tibet; to see Tso Morari, the beautiful 16-mile long sapphire-blue Rupshu lake; and to visit the upper valley of the Tsarap river, which under the name of the Zangskar river joins the Indus below Leh.

Tso Morari, Rupshu.—The knot of mountains we visited drained into the Chenab, Indus, and Sutlej, as well as into Tso Morari, which I think may possibly have a subterranean connection with the Parachu, though there is now no surface channel. The water of this enclosed lake is only

very slightly brackish, which is surprising if evaporation is the only factor in removing the equivalent of the considerable volume of water added to it by its feeder streams in summer and by melting snow in spring. From the south shore of the lake, the gravelly plain gently slopes upwards for 3 miles. Down it the Phirsi Fu stream ripples north in a shallow bed. Almost in a line with the exit of this stream from the hills to the west into the plain is the present surface watershed between the lake and the Parachu, the main stream of which is $5\frac{1}{2}$ miles to the south at Norbu Sumdo. When I stood on the hillside above this watershed, and looked first towards the lake and then towards Norbu Sumdo, there seemed to be no very marked difference of slope in either direction. As Norbu Sumdo is further off and the river channel is under high banks, I formed the impression that the river level there was just a little lower than the present lake surface, and that the watershed was not more than 100 or 150 feet above the lake. My Ross Compensated Watkin Barometer, which could not, of course, be entirely trusted for these small differences of level, indicated Tso Morari as being just above 15,200 feet, and Norbu Sumdo as about 100 feet less. I was unaware at the time that Cunningham thought the watershed to be 700 feet higher than the lake, and that sheet No. 52 of the "India and Adjacent Countries" map showed the heights of Karzok by Tso Morari and Norbu Sumdo as 14,900 feet and 15,300 feet. On these heights I presume Mr. Oldham based his theory of an elevation of the Parachu's bed.

Till accurate levelling is done, it will not be possible to arrive at any conclusive results as to whether Tso Morari has subterranean drainage towards the Parachu. It is unsafe to build hypotheses on heights which are either unreliable or the exact positions of which do not appear from the map. Possibly neither of the two heights in question was taken at the water-level.

Three facts, however, deserve attention: (1) The old terraces above the lake show that formerly the water-level reached more than 200 or 300 feet above the present surface, so that at one time the south shore was much further south. (2) The lake is not becoming more saline, though there is no surface drainage; in 1820 Trebeck found it brackish. And (3) about 2 miles to the south of the watershed near Shialli Chumik the middle of the plain is very swampy, apparently owing to percolation from below, and from it a large volume of water drains into the Para river.

Captain A. Gerard's information of 1817-18 that the Para river issued from the lake may be based on a tradition of an early surface outlet. Moorcroft's map, which is compiled from material collected in 1820, indicates the Phirsi Fu as running into a stream or streams, continuous thence both to the lake and to the Parachu. In 1846, as appears from a letter at Nagar, Cunningham was told that the Phirsi Fu, which then flowed north as now, sometimes flowed south also; he considered

that the lake originally emptied into the Parachu. Undoubtedly, even after the lake had receded as a result of desiccation and evaporation, the Phirsi Fu has continued to raise its bed, which formed the watershed between the lake and river. For the last eighty or a hundred years the stream has more or less settled down to flow north only. Probably the lake originally lost its surface outlet to the Parachu as the combined result of the fall of the lake level and the rise of the mass of detritus brought down by the Phirsi Fu.

At Shialli Chumik, close to the Spiti boundary with Rupshu, we were met by the Gova, or chief of the nomad Chang-pas, who graze their long-fleeced Biangi sheep in pastures 15,000 to 17,000 feet high, and whose great yaks are without the nose-ring, that last vestige of civilization found on Spiti and most other domestic yaks. A little barley is grown at Karzok, 15,000 feet high, where there is a monastery, and the Gova has the one house in the country. The wide plains near Tso Morari teemed with animal life. The kiang (*Equus hemionus*) roamed about in pairs and in herds, often within 100 yards of our ponies. The large hare and great marmot were numerous. The soil was undermined by rats. Geese were nesting, and hundreds of sand-grouse settled down to the south of the lake. The Nahu, or Burrhel (*Ovis nahura*), was as common as in Spiti, and the horns of the Nyan (*Ovis Hodgsoni*) were frequently met with. Though brackish, Tso Morari contained no fish; the streams and lagoons by the lake abounded with small fry.

Pang-po-la to Lingti.—The ascent to the Pang-po-la (under 18,000 feet) from the east was easy, unlike the east side of the Parang, which was covered with hummocked and crevassed soft snow. The crest of the Pang-po (meaning "the green turf summit") was free from snow and grass-covered, as its name indicates; but the descent towards the Tsarap proved to be the steepest bit of screes I had ever been over. The animals put their legs together, sat down, and somehow slid to the bottom safely, and we did much the same. The ascent to the Parang from the west had been trying, but this abrupt descent was infinitely worse. After two camps on the Tsarap we reached Lingti plain. It took us a hard five hours' work, at a place where the conglomerate cliffs dipped sheer into the stream, to hew a path practicable for unladen beasts. Our last march was as much in the river as on land. We had to walk the whole way, as the unshod feet of our ponies had suffered from the long stony marches and the trying slide down from the Pang-po. Owing to the rising river and delay in making the path along the cliffs, our baggage yaks reached Sarchu on Lingti after midnight. Our joy at their arrival was diminished when we found tent and blankets to be dripping with water. The large furze-covered Lingti plain, 14,650 feet high, is well known, as it is on the Kulu-Leh road. Here we parted with our Rupshu nomads, and in two days crossed the Baralacha to Patseo, or Dozang, 36 miles distant.

The Chandra Bhaga River and the Shigri Moraine.—On the Baralacha (16,047 feet) in Lahul rise the Yunan river, which joins the Tsarap, and the two headstreams of the Chenab, which meet at Tandi (9500 feet). From the pass to that point the Bhaga has a fairly direct course of 60 miles, but the Chandra makes a southerly *détour* round by the Shigri glacier and covers 115 miles.

The inhabited part of Lahul is on the lower 30 miles of these two streams and along the Chandra Bhaga for 15 miles below the junction.

A brief mention of the great Shigri glacier, which has to be crossed on the usual route from Kulu to Spiti over the Hamta and Kunzam passes, may be of interest. It has been surveyed and described by Messrs. Walker and Pascoe of the Geological Survey. It rises near the point where the Pir Panjal branches off from the Great Himalaya. Two striking twin peaks over 21,000 feet high rise behind it. They are known as the Peaks of Good and Evil (*i.e.* Dharmsura and Papsura), and are said to vary in height according as Good or Evil prevails in the world. Of course, now the last-named peak is much the higher. To the south they look down the Tos nala, the mouth of which we passed near Nakthan in the Parbati valley. The length of the Shigri is about 15 miles, and its greatest breadth over a mile. In 1869 Harcourt paced it as 2 miles, but pacing is quite inaccurate amid the hillocks of such a moraine. In 1873 it took the traveller, A. Wilson, author of 'The Abode of Snow,' three hours to cross, and our passages occupied well over two hours. In the mountain to its left are veins of stibnite. The masses of moraine matter on the Shigri were aptly described by Wilson as like the huge ridges of a fallen mountain. Immense boulders and smaller *débris* are constantly hurtling down the slopes on to the moraine. Two marches lower down the Chandra valley we ourselves once witnessed from close quarters the discharge of hundreds of tons of granite, that formed a part of the summit of a mountain 7000 feet above the river. The whole north portion of the peak split off with a loud cracking, followed by a thunderous roar and thick clouds of dust. Immense stone blocks 30 or 40 feet high came bounding down the slopes and jumped far over the river, here 100 feet in width. The mountains have far from settled down, and the combined effects of alternate intense dry heat and bitter cold are constantly operating to break them up and to fill the moraines and river valleys with their *débris*. During May in the Chandra valley, from 10 a.m. till late afternoon, avalanches seem never to cease crashing.

Patseo Trade Fair.—But we must return to Patseo, a place on the Bhaga below the Baralacha and 8 miles above the first Lahul village, Darcha, where every August Lahulas, Kuluis, Tibetans, and Chang-pas gather to sell or barter wool, salt, borax, and other products. A little wool is brought here on pack sheep and goats, but immense Biangi flocks are themselves driven down by the Chang-pas and shorn by the Lahula

buyers and their men. These fine sheep are soon hurried away, as they cannot for long endure the low altitude of only 12,925 feet. Patseo is a most busy place for three or four weeks every year. The little stony plains on both sides of the narrow river, here once crossed by a stone bridge, and hence called Patseo by Kuluis and Do-zang by Tibetans (from pat and do, meaning "stone," and seo and zampa, meaning "bridge"), are covered with little tents. Each set of people keeps to its own tent-pitch and uses the same piled stone enclosure to keep the wind off. Besides regular traders—the Lahulas buy or rather pay an advance on the wool the year before, and also own several of the Tibetan flocks—casual buyers from Lahul and Kulu attend; and the smiling Khampa wanderers, who once lived on the confines of China and still keep up the dress of the East, foregather and engage in peddling all sorts of worthless trinkets from the plains. In winter they descend as far as Hoshiarpur and Pathankot, whence some take train to Delhi and even Calcutta. At Patseo, too, we find a few tall picturesque Gaddis with their flocks, which in summer graze on the south-westerly slopes of the Baralacha, and in winter are taken to the lower Kangra hills between the Dhaola Dhar and Outer Siwaliks. The Gaddi's own home is under Kailas in Brahmaur. In August the trade fair is attended by a diversity of hill peoples, but in September Patseo is populated only by large herds of ibex, which come to lick the stones where the Tibetan salt has been piled.

The trade imports into Lahul and Kulu from Central Asia are, if we take into account the communications and means of transport, fairly considerable. In the one year 1918-19, the main imports (in maunds of 80 pounds and valued in rupees) were as follows: Wool, 3878 maunds, worth Rs.1,49,997; salt, 5820 maunds, worth Rs.11,640; and borax, 240 maunds, worth Rs.1200—all brought in on pack sheep and goats: 9050 of these animals were imported in 1917-18, many to go to butchers.

The exports from the Punjab *viâ* Lahul are somewhat insignificant. Only cotton piece goods have any considerable value, *i.e.* Rs.24,898. In 1918-19 silver to the value of Rs.99,893 in coin left Lahul; in all Rs.3,06,689 worth of silver went into Central Asia and Tibet from the Punjab to make up the adverse trade balance in that year. Since 1903 the price of the long-staple Biangi wool more than doubled. A quantity of pashm or fine shawl wool, the downy under-fleece of the goat and other animals that live at great heights, is included among the wool imports. It is remarkable that a large quantity of inferior brick tea from China reaches Spiti and Lahul overland, though these countries are situated politically in a Punjab tea-growing district. In 1918-19 only 312 maunds of Kangra and Kulu tea passed the Lahul Trade Post. A constant stream of grain goes up from Lahul and Kulu to Rupshu and beyond as these countries produce insufficient crops for the support of their inhabitants.

Lahul.—Lahul and Spiti are often mentioned together as if they were much alike ; but, at least as regards the inhabited parts, the resemblance is less marked than the difference. Spiti is isolated, and the population is almost stationary on account of the social customs. Spiti people are intensely conservative and stay-at-home. Lahul lies between the three countries of Ladakh, Chamba, and Kulu, which in old days were constantly invading each other through Lahul. It is on the Central Asian trade route from the east Punjab to Leh and Yarkand. The Lahulas are enterprising traders, who wander far afield. They are constantly increasing in numbers, as even their lamas, of the Drugpa sect, marry. Whereas Spiti is uniformly Tibetan in language and civilization, Lahul with a smaller area of 1764 square miles has a population of the most diverse elements and four different languages. In 1911 the population amounted to 7760.

Except in the upper Bhaga and Chandra valleys, where a Tibetan which is midway between that of Spiti and the toneless West-Tibetan dialect of Ladakh is spoken, the three local languages belong to a group quite different from Central Tibetan or Ladakhi. The social and monastic systems have little in common with those of Spiti. In Lahul polyandry is practised, as it is also in Saraj in Kulu, and so a man often finds it impossible to name his father. Primogeniture only prevails in the Thakur or "Jo" noble families, which have a Tibetan origin. The lamas have less power here, and, owing to their not being celibate, are not as sharply cut off from the laymen as in Spiti. There are communities of nuns, a profession always open to the unmarried ugly daughter. Boys and girls alike are taught Tibetan at the monasteries, so the degree of literacy is higher than in Kulu and most of India.

In the Mauchat towards Chamba, Hinduism and ideas of caste have crept in during recent years. The dress is only Tibetan in the higher villages. Elsewhere the men's dress approximates to that of Kulu, but the women's is peculiar to Lahul. It is like a long dressing-gown, girded by a cord. The head is bare, except for a silver lotus-shaped cup from which large round silver earrings are suspended.

The Tantric Buddhism, that Padma Sambhava introduced into Lahul and Tibet in the eighth century, has survived here with less change than it has suffered further east. Lahul, probably owing to its distance and political separation from Great Tibet, was little affected by the monastic reformations of the fifteenth and sixteenth centuries that considerably modified the early Buddhism of Tibet and the main valley of Spiti.

Many of the temples, including the important one of Guru Ghantal or Dil-buri, still preserve the old wood pent-roof form, which is never found in Spiti, but is common in Kulu and Chamba. The proximity of timber, has, of course, something to do with this, but the houses of the laity in Lahul are flat-roofed and remind us of Spiti rather than Kulu architecture. Some of the religious frescoes are of early style, and the

white marble head of the Boddhisatva Avalokiteshwara in one temple is distinctly Buddhist Indian work.

Though Lahul is somewhat lower than Spiti in the inhabited parts, which lie between 9000 and 12,000 feet, the amount of snow-fall is almost four times that of Spiti; 7 or 8 feet often collects at Kyelang. There is also slightly more rain. Water is plentiful, and both trees and crops flourish. Below 12,000 feet the shupka, or pencil cedar, the kail or blue pine, and the bhurj or birch grow in thick forests and relieve the monotony of the bare hillsides. Near villages lines of pollarded willows follow the water-channels, and both the Himalayan and Lombardy poplar (*Populus ciliata* and *nigra*) are planted. The crops resemble those of Spiti, but more buckwheat is produced. The Lahul barley is famed for its excellent quality and is more valued than wheat. The parched barley meal or "tsampa" is delicious and satisfying. In the lower parts of the country two successive crops of barley and buckwheat are obtained. Grass and Ladakh lucerne are grown in irrigated fields for winter fodder for the ponies, cattle, and flocks. Apples, pears, and apricots do well, but ripen late. A feature of Lahul is the number of rose bushes, many of which bear large blooms of a distinctive yellow shade. A botanist has enumerated 282 different varieties of Lahul roses.

The alpine grazing of Lahul is unsurpassed. Foreign sheep and goats to the number of 168,000 have come over the passes in one summer to fatten on the succulent blue grass, or "niru." The Lahulas themselves keep large flocks, also herds of ponies and hybrid yaks, known as "churu" locally and "zho" in Tibetan. The churu cows give fine rich milk, greater in quantity than the pure yak cows give. Yak bulls are kept only as stallions.

Like Spiti the country is directly governed by a hereditary Wazir. He is of the Kolong noble family, which has always displayed the most active loyalty to the British Government. The late Wazir, Thakur Amar Chand, personally took over a hundred of his men to Mesopotamia early in the war. His father, Thakur Hari Chand, travelled extensively in Tibet and Turkestan for the Government, and administered his country with conspicuous success. Thakur Amar Chand's brother has recently been put in charge of the Lahul roads and forests. No Indian officials are employed either in Lahul or Spiti, except on occasional inspection duty. Kyelang, the capital of Lahul (10,100 feet), commands extensive distant views of majestic mountains both up and down the Bhaga valley. The foreground includes many hamlets and sinuous lines of bright green willows and well-watered fields of luxuriant crops. There are flowers everywhere.

The climate is dry and invigorating. "Kyelang under the snows" has a quiet beauty and charm all its own, which the traveller appreciates equally, whether he has come up from the damp oppressive heat of a

Kulu summer or down from the arid wind-swept wastes beyond the Great Himalaya.

Before the paper the PRESIDENT said : I hope you will all congratulate the management of the Society upon the appropriateness of the lectures which it provides. Some few weeks ago, when there was a most awful blizzard, you were provided with a lecture on Mesopotamia. In the heat of the evening of what I understand has been the hottest day of the present year, with the thermometer at 86°, we are provided with a lecture upon the Himalaya and the snowy passes of Kulu and Lahul. Mr. Shuttleworth was the District Officer in charge of Kulu, one of the most delightful spots in the British Empire, and very much like Kashmir in miniature ; he was monarch of all he surveyed in that district. I have much pleasure in asking him to give us his paper.

Mr. H. Lee Shuttleworth then read the paper printed above, and a discussion followed.

The PRESIDENT : Thirty-eight years ago I made my first trip in the Himalayas into this very country of Kulu, and there I was most hospitably entertained by Sir Louis Dane, that versatile genius who was not only Foreign Secretary in India and a great diplomatist, but also Governor of the Punjab. He made his mark in the Punjab as an engineer, and to-night he will appear to us as the explorer of the pass between Spiti and Kulu. I ask Sir Louis Dane to speak.

Sir LOUIS DANE : I first went to Kulu in 1880, a very long time ago, and when I married in 1882 I took my wife there, and we spent a honeymoon of three years in Kulu. She was a much better mountaineer than I was, and she went everywhere with me until there was a baby, and the doctor would not allow the baby to go over passes of 16,000 feet. The baby, I may say, often travelled strapped on the back of a woman or a man, as the case might be, as the by-roads were impassable for any other form of conveyance. I had the time of my life in making roads and making the place passable for four-footed animals. Up to that time the only form of carriage in Kulu, apart from the Central Asian trade route, until you got into Tibet, was laden coolies, and you had to keep gangs of them halted at different stages on the chance of a passenger passing through. Before I left India I resolved to do something for my first and last love, Kulu. We made a better graded road for the fruit and general traffic into Simla, and started the road up the valley of the Beas which you saw in the photographs, and which goes up an even gradient the whole way. If I were in India I should drive into Kulu in a motor-car by the year after next.

I was very lucky when I went to Kulu, because nobody had been there for eighteen months, and things had got rather out of hand. A big mine of sapphires had been found. I dare say you have all heard of the Kulu sapphires ; they are supposed to be the finest there are, and they are found on the borders of Kashmir and Chamba at a place called Zangskar. A shepherd had lost the flint of his flint-and-steel ; he was hunting about for another and found a blue stone. He struck it and found it gave very excellent sparks. He brought down a pocketful of blue stones, and later a man came down into Kulu with a donkey-load of blue stones that he was offering to exchange with anybody for a donkey-load of flour. One European who had been a Forest Officer was offered them, and he said he thought it was all nonsense and did not buy them. They got to Delhi, however, and all Delhi went up there, and there

were all sorts of complications. I might have made my fortune, because after I went up the Delhi jewellers had given out that the sapphires were not real but something else. I happened to know enough about minerals to know that they were sapphires, and if it had not been for the ridiculous proscriptions of the Government, which prevented one from engaging in legitimate trade, I might stand before you to-night as a millionaire instead of being a poor pensioned Civil Servant.

I am sorry that the old castle of Nagar has been given up as a residence and is only used as a court and office. It was supposed to be haunted. A fair Ranee had been accused of infidelity to her husband and was hurled from the battlements. However, her innocence was afterwards proved and she haunted the premises. My wife and I slept in the haunted room and we were never incommoded. But the chaplain from Dharmasala, who used to come and see us once in three years or so, had a very bad night, and I believe that some of my successors were more psychic than we were and they also were disturbed. However, I have no doubt that my relationship with Jhemlu saved me from such minor inconveniences. In fact, I found that relationship with Jhemlu had most excellent results. Whenever I gave an order it was never questioned. Jhemlu's headmen used to come down in the winter and sit for a fortnight in my verandah, and I used to feed them largely and nobly in recognition of our kinship.

You have heard of the Kulu fruit. Peaches, apricots, and apples are all excellent, but the pears are superb. The first growers intended to dry the fruits, but it was clear that America could send a ton for every pound Kulu could put out. My wife and I took in two coolie-loads of apples and pears and asked an enterprising merchant in Simla if he could sell them. He ate one pear and said, "I could sell as much as you can send." We paid Rs.40 a maund (82 lbs.) for pears, and something less for apples. Lord William Beresford happened to pass the shop, ate a pear, and bought the lot. For two years we arranged a coolie *dak* or service of runners for the fruit, and that is how the Kulu fruit trade was started. To get the Kulu people to grow the fruit we taught the Nagar schoolmaster grafting and budding, and he did very well out of it. Later on as Lieut.-Governor I induced the Conservator of Forests to make his men more popular by teaching the natives through them generally something about fruits. I hope that success has attended their labours, but in these hill tracts everything depends on the human agency, and votes and resolutions of Government are useless. The peaches and apricots ripen in the very hot weather at the beginning of the rains, and so far it has not been possible to get them to market in good condition owing to the journey.

Trout is an old story. By changing the position of the hatchery, with the continued assistance of the Duke of Bedford, at long last we succeeded in getting trout to breed in Kashmir through Mr. Frank Mitchell, who was actually in charge of the matter. After six years they sent me from the hatchery a fish weighing 18½ lbs., which is a good size for a brown trout. From Kashmir we got the ova and spread trout through the Panjab hills.

As regards the Pin-Parbati route, which is my only claim to be called a geographer, I was fortunate there. I was young, and I had not much regard for the consequences, and I came down the hill instead of going up as Mr. Shuttleworth did. I think any one who has been over a mountain pass will know it is one thing to start at 11,000 feet from your camp and go over a pass 17,500 feet and another to start 16,000 feet, as I did, walk quietly in the early morning to the top of the pass, and then saunter down the glacier in the course

of the day. I admit it took me from four o'clock in the morning to six o'clock in the evening, and it was a purely unscientific proceeding. I wanted to save eighteen marches, and did not want to go back by the way I had come. We, however, had great difficulty with the people. They all tried to bolt over the Bhabeh Pass, but I was too quick for them there. I rode on in front and cut them off. Then when we got to the top of this pass we found a very unpromising look-out. I put the pass at about 17,500 feet high. It was about 2 miles across that upper Parbati glacier or icefield, and there was no apparent outlet. The coolies all threw down their loads; even my yaks looked suspicious; in fact, the only animal that was unperturbed was my pony, which proceeded to walk down the other side as though he knew all about it. I pulled out an old survey map, which I quite agree with Mr. Shuttleworth was quite incorrect at this point. I had a sundial compass and a pair of binoculars. Those were the scientific appliances which this first discoverer of the Pin-Parbati Pass employed. I looked at the sun and at the map and said, "This is the road," and I did so because it was the only possible way we could get off where we were standing. Where we were to go afterwards we could not tell. But we got along quite well.

It is a great place for pilgrimage; they come even from Madras to see the hot springs at Manikaran, and some go up to the source of the Parbati, though a great many of them never return. When you see the pictures you can understand that a man from Southern India getting into one of these glaciers is likely to die there from cold or to be caught in a snowstorm. There was a proverb in Kulu that nobody ever saw the source of the Parbati and lived. I was the first white man to see the source of the Parbati and I still live; of course the Kulu people put it down to my relationship with Jhemlu. The priest at Manikaran put it down to the fact that I excavated and restored a very old temple of Raghonathji; and for my services to the temple they took me into the temple and showed me the hot geyser, about 8 or 9 feet high, which is not usually shown. My idea was that if that road had been taken up as a trade route and a track made of some sort on the hillside above the last 4 miles of the glacier, it would be a perfectly easy road, and you could ride across it on a Spiti pony. But, unfortunately, the Spiti people were dead against anybody going there, and they were afraid the Kulu people would come in and steal from them, while the Kulu people professed the same fear and did not want to be bothered by travellers. So I did not succeed in getting anybody to go over the pass for some years. I think Mr. Skemp went over it ten years ago.

I am glad that Mr. Shuttleworth was able to use his camera. In my own time there were nothing but wet plates, and it would have been impossible to carry a camera in the sort of country one went over. He has shown us most beautiful pictures, which make me feel I could go back to Kulu and live it all over again.

The PRESIDENT: You can understand how very popular Kulu is among Lieutenant-Governors of the Punjab. We have another ex-Governor present, Sir Michael O'Dwyer; perhaps he would like to add to the discussion.

Sir MICHAEL O'DWYER: I can claim only a very slight acquaintance with Kulu. The fact is that in the days of my distinguished predecessor (Sir L. Dane), both on this platform and in the Punjab, Kulu was so popular, and that not only with Lieutenant-Governors but with other officials, that it became necessary in the interest of the administration to put Kulu out of bounds, and I had to give an example of my self-denying ordinance which

limited me to one brief tour extending over a few weeks. I am, therefore, able to tell you very little about it, but one thing I can claim: that I was responsible indirectly for the delightful lecture and slides we have seen this evening, because it was when I was Lieutenant-Governor that Mr. Shuttleworth was posted to Kulu. Not only that, but I think much of Mr. Shuttleworth's success in Kulu was due to the fact that he had with him in his wife such an intrepid partner in all his journeys. A very famous predecessor of mine in the Punjab, Sir John Lawrence, used to say that when he found a young Assistant Commissioner with a wife and a piano, he hustled him about from pillar to post until he first dropped the wife and then the piano. In my day we were more considerate, and I may say that one of my reasons for posting Mr. Shuttleworth to Kulu was the fact that the maiden name of Mrs. Shuttleworth was MacGillicuddy—MacGillicuddy of the Reeks—and I thought a young lady who at home was in the habit of running up MacGillicuddy's Reeks would equally be at home at 18,000 feet in the Himalayas. As a result you saw her in one of the pictures at a height of 17,000 feet, and I am sure you realized that she was to the manner born. Mr. Shuttleworth had not to drop his wife, nor his camera, fortunately for us.

There is very little that I need say about Kulu. There is one weird function that I witnessed. We have been told a lot about the local gods and the large part they play in the interior economy of the valley. I was privileged in October 1917 to be present at the great annual meeting of the gods at Sultanpur, when all the gods from all the villages are brought in to pay homage to the great god Raghonathji and to one another. I thought I would stroll down to see what went on, but as the Lieutenant-Governor I was hauled up on to a dais before I knew what was intended, and was told that all the gods would march past and salute me, and I was to receive the salute. There was no way out of it. I felt tremendously honoured and also much embarrassed. All the gods of Kulu, preceded by Raghonathji, marched past and I returned their salute.

So far as regards Hindu Kulu. A few days afterwards I was going up the valley on the way up the Rohtang pass, and I met the Nono of Spiti, the head of the Buddhist religion. He is something like the Dalai Lama, and is the spiritual and (under Government) civil authority in this remote valley of Spiti. The previous Nono had died the year before, and the new Nono had been appointed by the Spiti College of Cardinals, and came in to receive investiture from the Lieutenant-Governor. I happened to meet him, very tired after his long journey over the pass, and we had a most pleasant interview, in which I gave him due recognition and increased his poor temporalities by giving him a larger share in the income of the Principality. It is only to-night that I have heard that his good fortune did not last long, and that he was succeeded by the boy we saw on the screen.

There is one little fact I might mention. Lahul is perhaps the most remote corner of British India, being 150 miles away from the nearest railway, and is only reached by the Rohtang pass about 14,000 feet high. I was there at the outbreak of the war, the echoes of which resounded as far as Lahul. The people of those parts are extremely peaceful; for generations they have had no fighting to do, but they knew the British Empire was at war, and that it was a time when the King-Emperor expected his people to rally to his assistance. At that time all our fighting forces in the Punjab were being drained dry. We had sent a quarter of a million combatants to the colours. The local Thakur or Rajah came to me in October 1916 and said, "Sahib, I am a

man of peace, but if necessary I am willing to fight." I said, "We are getting our fighting men from the plains." "But," he said, "how can I help?" I said, "At the present time the Government is very sadly in need of a Labour Corps in Mesopotamia," and I told him where it was; "but you would not be fit to go into Mesopotamia. You could not leave your snow-clad mountains and shady valley and go to the wastes of Mesopotamia." He replied, "Sahib, I am going. I will take two hundred of my men with me." He passed me his word, and before six weeks were over that man, at the beginning of the winter, that is to say in October, had left these tremendous heights and the snowy mountains and taken two hundred of his merry men with him and gone to work in the arid and sun-smitten wastes of Mesopotamia, to do his bit in the Great War. They remained for six months there, and did admirable work. Probably not more than two or three of that intrepid band had ever left their mountain passes before, yet for a great cause they risked everything. One might have heard of more showy deeds, but not of any more genuine testimony to the loyalty and spirit of these people in these remote mountain passes than that one single effort.

The PRESIDENT: Sir Louis Dane first went to Kulu in the year 1880, but there is a gentleman here to-night who was there a good many years before. I do not know whether Mr. Coldstream would like to corroborate what has been said about the beauties of Kulu.

Mr. W. COLDSTREAM: Of those who are present in this audience I am probably the first who was in that interesting land which the lecturer described. I was there as Assistant Commissioner in the year 1866. I found it a most interesting sphere of work in those days, and it has been a great pleasure to me to watch the development of Kulu. I hope that it may go on and flourish, and may have a great many as zealous and enterprising officers to carry on the administration as those whom you have seen on this platform to-night.

The PRESIDENT: I know that you will all wish me to thank our lecturer, Mr. Shuttleworth, for giving us a most vivid description of that wonderful and delightful land over which he ruled for a year or two; but especially for having brought back to us those photographs which have given us a very clear idea of the magnificence of the scenery.

THE EVIDENCE OF A TRUE NORTH AND SOUTH DIRECTIVE FORCE IN THE ATMOSPHERE

E. A. Reeves, Map Curator and Instructor in Surveying,
R.G.S.

Read at the Afternoon Meeting of the Society, 15 May 1922

ABOUT four years ago, at one of the afternoon meetings of this Society I read a paper on "A Transformation of the Magnetic Dip Curves,"* and at the end of the paper stated that I hoped on some future occasion to place before the meeting the results of experiments which I had been making for some time past in connection with the subject. These experiments were commenced about 1911 and have been continued ever since when possible, not only by myself in this country,

* Published in the *Geographical Journal* for March 1919.