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THREE JOURNEYS IN THE TIEN SHAN, 1928–1929: *A paper read at the Evening Meeting of the Society on 19 May 1930, by*

LIEUT.-COL. REGINALD C. F. SCHOMBERG, D.S.O.

THE journeys described in this paper lie wholly in the Tien Shan. The first began with the ascent of the Kash valley from Ili or Kuldja, then crossed the main northern range to the west of the Manass mountains, and ended by reaching the main Manass–Shihho road. This took place in 1928. In 1929 a start was again made from Ili. The Kunges valley, which lies south of and parallel to the Kash, was followed to its source, and the route, continuing due east, led over the Könsön Dawan, along the head of the Little Yulduz, down the Algoi Sai to Toqsun. A little later in the same year the Tien Shan was crossed from north to south by a difficult but locally well-known track over the Tengri Dawan, through both the Little and Great Yulduz, and over the group of passes in the main Southern Tien Shan, skirting the small lake Qara Köl, and over the Qirghiz At Dawan to Kucha.

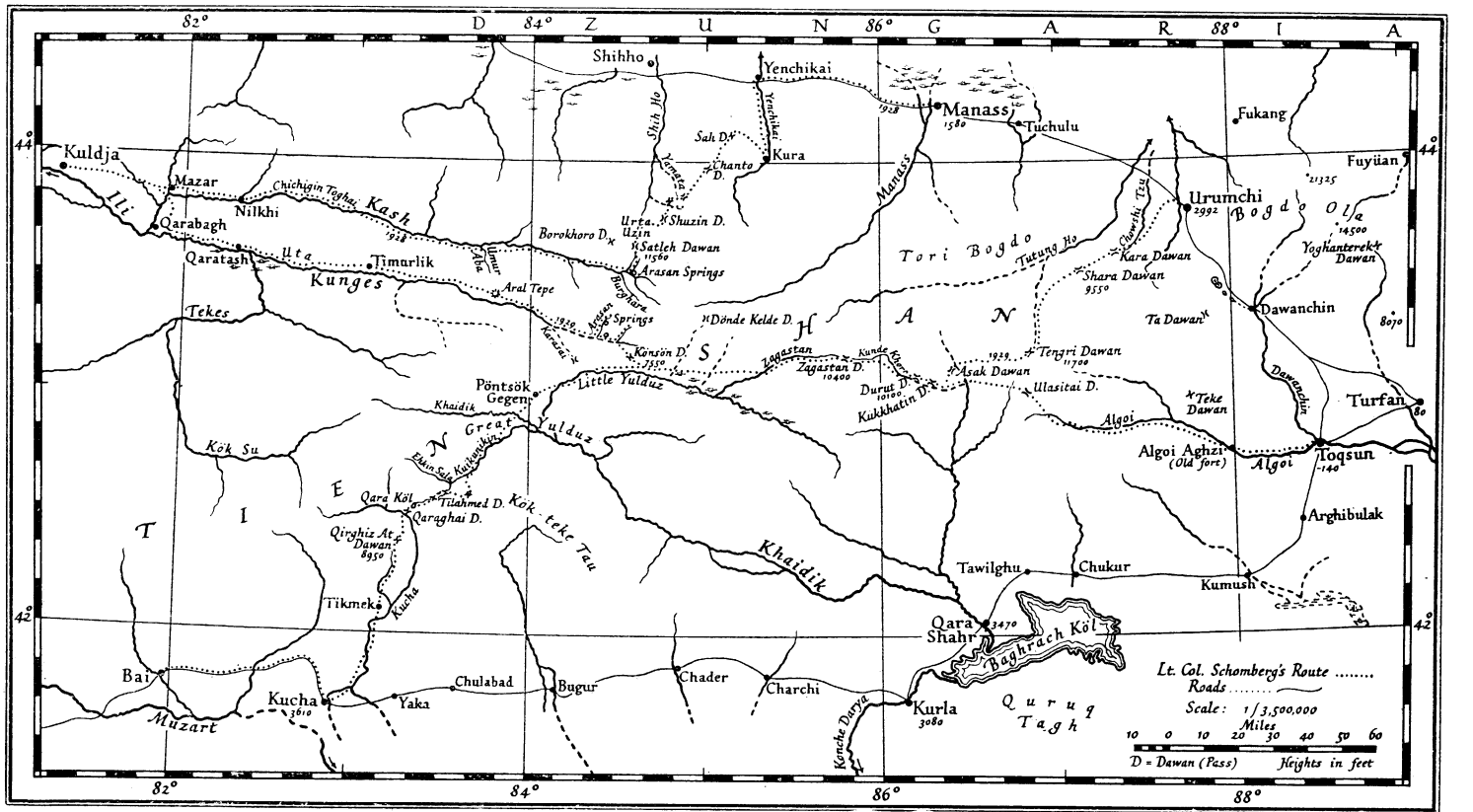
The object of the journeys up both the Kash and Kunges was to find a route that led down directly on to Manass. The local people insisted that there was none, but unfortunately in Central Asia, and perhaps even elsewhere, such assertions are not always strictly true. Our failure to find such a track was not wholly our fault, as will appear.

No one who travels in Asia away from rail or metalled roads should expect comfort, and harrowing descriptions of the inevitable disagreeableness and hardship of travel in Central Asia are out of place and boring. For the benefit of future travellers, however, it is well to point out that the weather in the Tien Shan is so fickle and so impossible to judge, that the climate of the British Isles is monotonously regular in comparison. Professor Merzbacher, in his book on the Central Tien Shan, published by this Society, complains bitterly of the vagaries of the climate—and with reason.

We left Kuldja on 31 July 1928 and went up the right side of the broad cultivated Ili valley. Just below Mazar, a village with a large and frequented shrine built in the Tungan style, the Kash river flows through a gorge into the Kunges, and the united stream is called the Ili river. Continuing up the right bank of the Kash river, the country became down-like in appearance, though deep and unsuspected gorges made travel away from the river quite impossible. These narrow gorges, really deep canyons with foaming impassable streams, are a feature of both the southern but particularly the northern, slopes of the Tien Shan, and more pronounced perhaps in the northern than in the southern range.

It is unfortunate that there is no means of distinguishing the two arms of the Tien Shan, except by a vague and unsatisfactory periphrasis. The mountain people, though nomads, are too local in their outlook to invent a name or even to realize the need of one.

The debris brought down by the streams has formed subsidiary hills between the river and the mountains on the north, which makes the right of the Kash valley very broken and tedious to travel through. This fact and the difficulty of crossing the swollen streams flowing from the north, compelled the route to cross the Kash by a ferry-boat very like a coffin. The *modus operandi* was simple.



Colonel Schomberg's routes in the Tien Shan

The boat or box, loaded to its utmost and with two horses attached, was thrust into the boiling, tearing flood, and tore down the river at a prodigious rate, until it was near the opposite bank, when the horses were lashed, the craft reached the bank, and the frightened passengers scrambled out.

Just below the ferry, and above Nilkhi, the last village, was the summer encampment of the Zungur lamas, at Chichigin Toghai (willow plain), a striking collection of sixty-four large white felt tents on a grassy plain by the willow-fringed river. The sacred tabernacle with a blue and yellow covering, and distinguished further by a small gold spire, was an impressive feature in the centre of the circle. The lamas were extremely courteous, and appeared prosperous. Their winter quarters, with monastic buildings, temple, and a large chorten, were 8 miles above Nilkhi.

The country on the left of the Kash was even more down-like than that opposite, and it rolled away, fold upon fold, until it culminated in the grassy watershed between the Kunges and the Kash. The track now rose high above the river, and to the north the serrated peaks of the Tien Shan, a stark wall of fretted stone, stood out naked against the blue sky, for there was little snow left on the rocky summits. At the end of the valley the snows and glaciers of the Manass group gleamed.

The Kash valley became more alpine in character, and the right side of the valley was particularly broken by deep fissures; and its difficult nature was evident from the fewness of the auls, in spite of the abundant grass. On the left side of the valley, however, these comfortable beehive tents were standing everywhere. Dense spruce forests covered the hillsides, and park-like prairies stretched along the river. The views up the dark forest-clad side glens were tantalizing, inviting exploration which leisure did not permit.

The Kalmuk area was now left. A little farther up on reaching Umur Aba we found several small camps of Chinese who were collecting the annual taxes from the Kasai Qazaqs who swarmed everywhere. The taxes are paid in kind, and are levied at the rate of 2 per cent. of all animals. We overtook many dejected but loyal owners, driving back beasts which the Chinese, very wisely, had refused to take. No one but a Qazaq would have expected it to be otherwise.

The chief of the Kasai was here, a stalwart, active man of fifty-three, who but for his clothes might have been a British farmer. A curious pest of flying stinging ants had been a nuisance near Umur Aba, and pursued us for miles over the plain.

The weather now became very bad, with drenching rain and driving wind, and hailstones as large as cherries, which made the dogs howl mournfully and flee into the long grass for shelter. Above Umur Aba the scenery became delightful, the forests were thicker and deeper, the valley sides more regular, and the smaller nalas more frequent. The auls, too, were very numerous, often pitched high up close to the snow-line, on some bleak exposed slope, where the fine pasture was ample compensation for distance and discomfort. The river gradually became less formidable, and we re-crossed to the right bank quite easily just below the junction with the Burghara, a valley and stream almost equal to the Kash, coming in from the south-east. The forest here ended, the scenery grew rugged and wild, and the last nomads were left behind. We should have felt happier with a guide or a map, but there was neither. The

Qazaqs all swore that we had reached a cul-de-sac, and advised us to go back and retrace our steps down the valley. All forms of persuasion were used by us to glean some information about the route, but we could discover nothing except that we should have to turn back and retrace our steps.

Continuing up the valley we came in 6 miles to the warm springs of Arasan. The neighbouring Kunges has a similarly named valley also provided with a hot spring. Not knowing what to do, we turned left up the Arasan Ridge, but were disappointed to find that the two heads of the valley were blocked by immense glaciers, splendid to look at, but not adapted to our purpose.

After we had camped on a wretched bit of grass as far up the valley as we could go, we saw two Qazaq marmot hunters scrambling down the valley side on their ponies. Waving our largest teapot we persuaded them to come near us, and entertained them with tea and talk. They said, pointing vaguely towards a heap of boulders, that there was said to be a pass in that direction, so the next day I went over with one of my men. The pass proved to be excellent, as passes go in the Tien Shan. The ascent from the Kash side was steep and stony, but on the northern side the descent was over soft shale at a slope of 45°, very awkward for the first 100 yards immediately below the pass, but otherwise not difficult. The track wound down under huge gendarmes to an open valley. This pass is the Satleh Dawan, and seems to be a little to the east of the Borokhoro, which means "grey hollow" in Mongol. I am however prepared to admit that the Satleh may be identical with the Borokhoro, in which case the latter seems to be marked too much to the west in existing maps. On the other hand, Merzbacher, in his map, seems to put the Borokhoro more to the east, in a network of difficult peaks and glaciers. The real explanation is that the maps of the whole area of the Tien Shan are quite inaccurate, and the only remedy is a completely new survey. At present every traveller, and I am no exception, bases his maps and sketches on the work of the original cartographer, so the original error increases. The height of the pass was 11,560 feet. Crossing it on 15 August 1928 we found ourselves in the Urta Uzin, a valley with two long arms running respectively east and west, and surrounded by glaciers. The grass and vegetation were abundant, but the valley was entirely deserted, and the only sign of man was a deserted shikari's hut. Descending the valley, we passed through a dense growth of willow and extensive groves of well-grown poplar. We were now growing a little anxious, as we had not very much food and did not know where we were. A short march of 10 miles down the valley ended in a magnificent canyon, with lofty precipitous walls of stone soaring up from a rushing unfordable stream. Turning east, we ascended the Shuzin stream and camped by the Aqsai torrent, quite impassable at midday, as the stream flowed from a fine cirque of peaks to the south, and the melting snow came down in flood by that time.

We had that day passed a number of deserted sheep-folds and much fine pasture, and the desolation of the valley called for explanation. We subsequently discovered that the water in the Urta Uzin stream had risen so much of late years that the valley had been abandoned. Near the Aqsai torrent we found two Qazaq youths who gave us some directions, and after a day's halt to enable the baggage to get halfway up the pass, we crossed the right of the Shuzin valley, and then over a pass as steep as the side of a house. At the top we skirted

the head of a small valley over bad shale close beneath a glacier, and descended easily into another valley with a very large glacier and moraine. As we had little idea where we were we should have halted, and indeed wanted to do so, but there was no grass, and no dung for fuel, not even enough to boil a kettle. Here we went wrong, as we crossed the valley, toiled up an interminable shale ascent, passed the head of two valleys which lay far below, and in pouring rain reached the cul-de-sac of Kara Mören. The sight of sheep cheered us up as we hoped it meant a comfortable aul, but to our disgust the hardy herdsmen had no better shelter than an overhanging rock, and this disappointment made our tempers viler than ever. We spent two miserable days here in the snow, retraced our steps to the previous valley, and camped at the foot of the Jingsikuzhan Dawan, where we lost time by having to reconnoitre the pass, which proved to be a long stiff climb to 12,435 feet.

Crossing on August 24 we were rewarded with fine views, thanks to a break in the weather, and descended to the well-known yailaq or pasture ground of Yamata, an extensive grassy valley much frequented earlier in the season, but now nearly deserted, as the grass was all eaten away and the short summer of the Tien Shan was over. Crossing the Yamata Bash Dawan—an easy pass—we then struggled up to the Narin Köl Dawan. The first 400 yards of the ascent was very steep, over hard earth sprinkled with stones. In fact it was stony, with layers of shale, in parts all the way to the top of the pass. The cold was intense, with a bitter wind blowing, and there was little view as the clouds hid the peaks. On the north side the path crossed a glacier for 900 yards, then went over a moraine and down to a clump of willows. Here the valley again became impossible, and it was remarkable how consistently all these Tien Shan valleys narrowed into a canyon-like gorge.

Journeys in the Tien Shan are thus always sideways, down a valley as far as possible, then over its side into another one, which is followed in the same fashion till it too becomes closed. It is a tedious business—difficult for man and beast, but this crab-like form of progress is the only possible.

The track out of the Narin Köl was very steep and greatly tried the worn-out ponies, and the top of the pass, the Chanto Dawan, was reached in 2½ miles. The view back was fine, but rather marred by the weather, and the autumn tints were well advanced, showing how near winter was. Leaving the pass the track led down the Chantoleh valley for 5 miles, then crossed the Sah Dawan, with a view of the river Shih Ho, and the plains, and followed down the Sah valley, which was very narrow and gorge-like, with dense forest and undergrowth and striking cliff scenery. Then suddenly the valley ceased, and, as if by the touch of a magic wand, the trees, stream, grass—the verdure and freshness of the mountains—all vanished, and the hot plains of Dzungaria lay before us. The ponies required a rest, and we all needed food, so we camped for several days near the Yenchikai river, and straightway the servants took the opportunity to go sick. Manass was reached on September 9, and the distance from Kuldja proved to be 350 miles.

Having already visited the Kash valley I was anxious to see the parallel valley, the Kunges, and hoped that we might be more fortunate in finding a way over into the Manass district than we had been. We started from Kuldja on 23 April 1929, St. George's Day. The weather during the previous journey

had been consistently bad, and as July, August, and September seemed wet months, it was hoped that April, May and June would be dry. The hope was a vain one, for the weather proved villainous. For the first few miles we followed our track of the previous year, but before Mazar we crossed the Kash river by a bridge just below the red sandstone gorge which almost blocks the valley mouth. The river, even so early as this, was a turbulent unfordable stream. We continued up the valley with the Kunges near us on the right, and left the last cultivation at Qarabagh, and we were sorry to do so, as, though the Turki is a tiresome creature in many ways, he can usually provide good victuals. His tastes, too, were our tastes, and the future was of doubtful alimentary promise.

The difference between the lower Kash and the lower Kunges was very marked. The Kunges was a wide level valley, with abundant pasture, watered by a winding sluggish river, and bounded by rather low and commonplace hills. There were often many poplars (*Populus alba*) and some brushwood near the river, but elsewhere the valley and hillsides were treeless, and the fuel difficulty in consequence was a nuisance in places. But the touch of spring coloured everything. A small blue iris, a yellow poppy, and berberis were abundant, the primulas were coming out, and the banks of the river flashed emerald under the bursting shoots of the new reeds.

At Qaratash the Tekes river, a fine stream, comes in on the left from the south-west. It was remarkable that the Tekes was lined with trees, usually willow and poplar, whereas the Kunges above the junction was devoid of any. The explanation probably is that the Tekes is the faster, remains in its bed, and thus allows the reeds and plants to grow. The Kunges is sluggish, often changing its channel, and giving vegetation no opportunity to reach maturity.

The Kasai Qazaqs were the owners of most of the Kunges valley, and their flocks and herds and tents covered the plains. The Kasai is less attractive than he believes himself to be. To begin with, he is a thief, preferably a horse thief, but ready to steal anything from a cooking-pot to a cigarette. He is a born bully and a bluffer, and not particularly hospitable. But we knew our men, and got on admirably with them, and never allowed ourselves to be bullied by them. We always, however, kept a sharp eye on our property, and passed through the Qazaq country without losing anything.

In the lower valley lay the great plain of Uta, covered when we crossed it with tents and animals, as the grass was plentiful, though even in April water was already scarce. North of Uta the scenery improved as the main range of the Southern Tien Shan, previously separated from the valley by the hills between the Tekes and the Kunges, came in on the left with its forest-clad slopes. The north or right side of the valley remained bare, and it was only some miles above Timurlik (where there are old iron workings) that a little brushwood and spruce were met. The Kunges was here 50 yards wide, a deep, muddy, unfordable stream, with brakes of reed and high grass and treacherous sides.

One difference between the Kunges and Kash valleys lay in the absence of lateral affluents in the former, whereas in the Kash these were very frequent; indeed, in the lower Kunges the only tributary was the Tekes river. The low isolated mound of Aral Tepe in the centre of the valley was a continuous landmark for two or three days before reaching it; and it was noteworthy as being the point where the Kunges valley definitely assumed a mountainous character.

We spent a couple of days pleasantly enough near the village of Aral Tepe, a rather dreary collection of ramshackle huts, for the nomad in a house makes a poor job of it. The scenery however was delightful. The river ran through forests of wild apple-trees in blossom, and dense thickets all burgeoning with the first touch of spring. On the southern hills the fresh tracks of the first travellers of the year over the Chang Ma and Narat passes were visible in the crisp snow, and all around us were spruce forests hanging from the steep mountain sides. The chiefs of the Kunges Kasai Qazaqs, Urus Bai and Turus Bai, father and son, fat, prosperous, jolly souls, entertained us. They ran the most successful horse-stealing association in Western Sinkiang, were arrant liars, bluffers, and thieves, and were hospitable, helpful, delightful humbugs, the typical Central Asian mass of contradictions.

We noticed here many abandoned farms, and were told that they belonged to Sarts who had come up here, and finally abandoned the trying life of the farmer for the free life of the veld. Indeed, a number of settlers had turned nomad, and so long as Central Asia remains what it is there is little likelihood for the Qazaqs or Torguts taking to husbandry, for what inducement can they have?

On leaving Aral Tepe we passed, 9 miles up, another long low isolated hill, Baiying Yurek, and we camped at Uliasutai, where the valley bifurcated, by a river lined with poplar, birch and apple-trees, berberis, briar and juniper, the light greens of their partly opened buds contrasting with the background of sombre conifers. The names now became Mongol—Uliasutai means "poplar" —and a few miles on the Kalmuk grazing-grounds were entered. It is worth remarking that the distribution of the pastures is incomprehensible to a traveller. The Chinese may have some subtle scheme, they may even be assuring compensation to dispossessed herdsmen, but the plan of dividing the same valleys amongst hostile tribes leads to endless friction and bitter feeling. One valley for one tribe should be the rule.

On leaving Uliasutai the river flowed picturesquely through a very narrow thickly wooded valley, where we saw many wild pig. The track was awkward, rising high over spurs, and then dropping steeply to river-level again. A little farther up the valley forked, and the fine Karasai streams came into the Kunges, which above this junction was now known as the Arasan—the same name as the upper waters of the Kash. The scenery continued fine, but the track was tiresome, being often in the river over boulders. This narrow gorge of the main valley was about 25 miles in length, when the character of the country changed unexpectedly. At the end of the defile we emerged on to an open rolling country, with high mountains on the south and grassy uplands on the north, while beyond the latter the country became very wild and rugged. Here we met the Kalmuks or Torgut Mongols, and we were not very pleased to see them; with all their virtues their ways were hardly ours.

At this point it was impossible to determine which was the main stream, but it seems reasonable to suppose it was the Yeldi Usun, which continued in an easterly direction to the foot of the pass. The stream that flowed from the north, however, was called the Arasan. Going up this lovely valley, passing first of all the grassy downs and clumps of conifers in the sheltered spots, we reached the hot springs, 15 miles farther, where had been built rough baths with painted figures of Buddha above them. The water was very hot, and just

bearable to the hand. Unfortunately the journey up had proved too much for the thermometer, and the temperature was not read. The altitude of these hot springs, of which there were certainly twelve with a copious flow, was 7965 feet. The springs were surrounded with a regular midden of mutton bones, the remains of the patients' meals, and bits of felt. The water was clear and almost tasteless, with only a trace of sulphur. There were plenty of tadpoles, and also (it was said) snakes, so that it was dangerous to graze animals here. Pushing up the valley, much impeded by the dense growth of juniper, we came to a moraine of recent date (the trees were still standing amongst the stones), from a small glacier dominated by a magnificent pinnacle of rock. After passing a few stunted conifers the valley turned south-east and ended 2½ miles farther on in a smooth saddle of snow, that compared poorly with the magnificent rock peaks on either side.

After being snowed up for two days we again reached the junction of the Yeldi Usun and Arasan. Crossing the high downs between the two, we passed a number of small tarns. One of the prettiest was the Noghan Nor, which the Kalmuks said was very unhealthy, as any one staying by it got covered with a nasty rash, or pains in the limbs. It sounded like malaria. This lake consisted actually of two small lakes, and mallard, sheldrake, teal and geese floated in them, while pigeons fluttered in the trees. The local people regarded the Arasan as the main stream, but the wider one was the Yeldi Usun, or Tsarno Usun, though there was less water in it than in the former. On the other hand, later in the year it would carry a larger stream, as it drained a greater area.

After being delayed by bad weather at Ulan Kura (the red lamasery), we ascended the Yeldi Usun valley to the Könsön Dawan on our right; we continued up the valley, now called the Tsagan Usun (White Water), but found it less attractive than the Arasan, as it proved to be much more rocky, and consequently held little grass or forest. The track, too, was difficult, and the climb was considerable. Fifteen miles from its junction with the Yeldi Usun, a large moraine at 9340 feet above the level almost blocked the valley, and it was observed that a small lake was beginning to form here in the red sandstone detritus. Beyond was yet another moraine, and the valley ended in a wide circle of rocky peaks, with much shale and moraine in the valley bed. There was said to be a difficult track at the head of the valley, but no trace of it could be found. It was, however, probably too early in the year, as it was not open till July. The weather was severe for mid-May, and we were again snowed up, as the snow fell for twenty-four hours with a bitter wind.

Descending, we returned down the Tsagan Usun, and camped at the foot of the Könsön Dawan at Koyur Bulak (Two Springs), height 6380 feet. From here we crossed the easy Könsön Dawan, 7550 feet, which was one of several ways over the low ridge separating the Kunges from the Little Yulduz. The contrast between the two sides of the pass was great. On the side of the Kunges was a richly wooded valley with fine forests of spruce, whereas the Yulduz was a vista of low paltry hills, with much stone and not a vestige of a tree or bush. This insignificant pass is on the watershed between the Kunges and the Yulduz drainage system, and is an important geographical feature in Central Sinkiang, separating as it does the two principal catchment areas excepting the Pamirs.

Leaving the Little Yulduz and crossing pass after pass we finally arrived at

Looking up the Arasan, tributary of the Kash

Satleh Dawan from north side

Hot springs of Arasan, Kunges: looking up the valley

Toqsun, in the Turfan oasis. The weather was not propitious. Day by day for fourteen days it snowed. There was no grass and no fuel, except wet horse-dung; and as we had no maps we proceeded rather by the light of nature than by any other means. We became heartily sick of the Yulduz, and still more of the filthy Kalmuks, but we had not yet plumbed our hatred for either.

On the way to Toqsun, whilst crossing the 28 miles of sai (desert of stone or gravel) between the Algoi valley and the oasis, we were overtaken by the worst storm for a century. It destroyed almost every camel and most of the sheep within a large radius, filled up the Kariz (underground water-course) at the most critical time of the irrigating season, blasted the young corn, blew down walls, killed old women and children, and devastated the countryside. We passed the night huddled together in the desert, and lost all our light articles as well as five horses. I resolved never again to pooh-pooh the Central Asian buran.

These journeys up the Kash and Kunges had shown that there is no means of reaching the Manass by any satisfactory route through the mountains. The route over the numerous passes from the Kash is possible but difficult, and circuitous; from the Kunges there is practically none; and in no case is there a practical track that leads directly to Manass.

A little east of the head of Bagha or Little Yulduz it was possible to identify the Dönde Kelde Dawan, which figures so prominently in many maps. It is the centre of three adjacent valleys coming in from the north: the Hörte Kelde, the Dönde Kelde, the Ömnö Kelde, taken from west to east, and meaning the Hind Foot, the Middle Foot, and the Front Foot. These are all very difficult passes, and seldom used, as they are only open for a few weeks in the year, during the brief period between the end of the summer, when the snows have melted, and the beginning of winter. The season prevented us from trying them, and they can be dismissed as being of no real value as a route.

The third journey in the Tien Shan was from Urumchi over the Tengri Dawan through the Great Yulduz to Kucha. The route is regularly used, but little known except locally, and an account may be interesting. Whatever virtues Urumchi, the capital of Sinkiang, may possess, they are hidden from sight, and we were not sorry to leave on 4 July 1929. Dreary and squalid though the town may be, the environs are delightful, for it is only a day's march to the wooded valleys of the mountains. Travelling in the Tien Shan is always peculiar because of the truly prodigious number of passes that have to be crossed, and the reason is always the same, namely, the narrow deep canyons which are so persistent a feature of this range. Travellers who complain of the narrow valleys of the Himalaya would be greatly harassed by the gorges of the Tien Shan. The difficulty of travel in them is seen by the immense detours laden animals take sooner than face the difficulties of these mountain tracks.

Deluges of rain had fallen at Urumchi, and we left during a break in them, hoping foolishly for fine weather. The Dzungarian plain merged gently, almost imperceptibly, into the foothills, and for the first two days led through farms surrounded by fine crops largely grown without irrigation, as the rains are copious here. The valleys of the Tien Shan are so deep and fissure-like that the water is useless for irrigation until it reaches the plains.

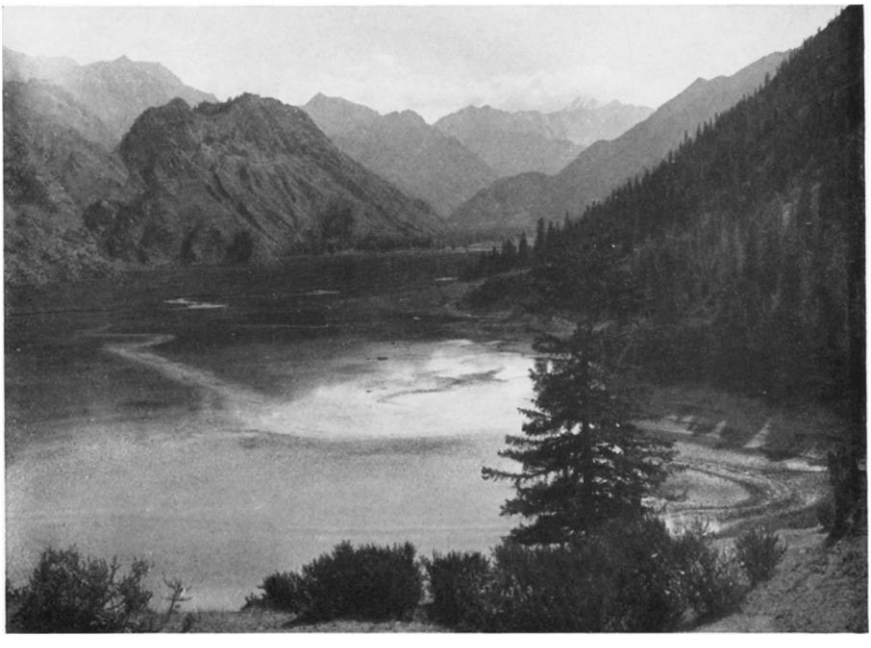
Undulating over low green but rather uninteresting spurs, the track descended, with that trick of sudden contrasts peculiar to Central Asia, into

the lovely Chowshih Tzu (Damp Stone Watercourse), with a fine growth of poplars, willows, and spruce. Climbing out of this, we reached the grassy yailaq (grazing-ground) high above the valley, with a perfect view over the Bogdo Ola, 35 miles away. The road then crossed the Kara Dawan (9700 feet) and wound down a very narrow valley into the Yapsar Salasai, where it poured for two days. In the Northern Tien Shan there are certain compensations to an enforced halt: mushrooms, wild spinach, rhubarb, and a kind of "greens" beloved of the Kashmiri, are abundant.

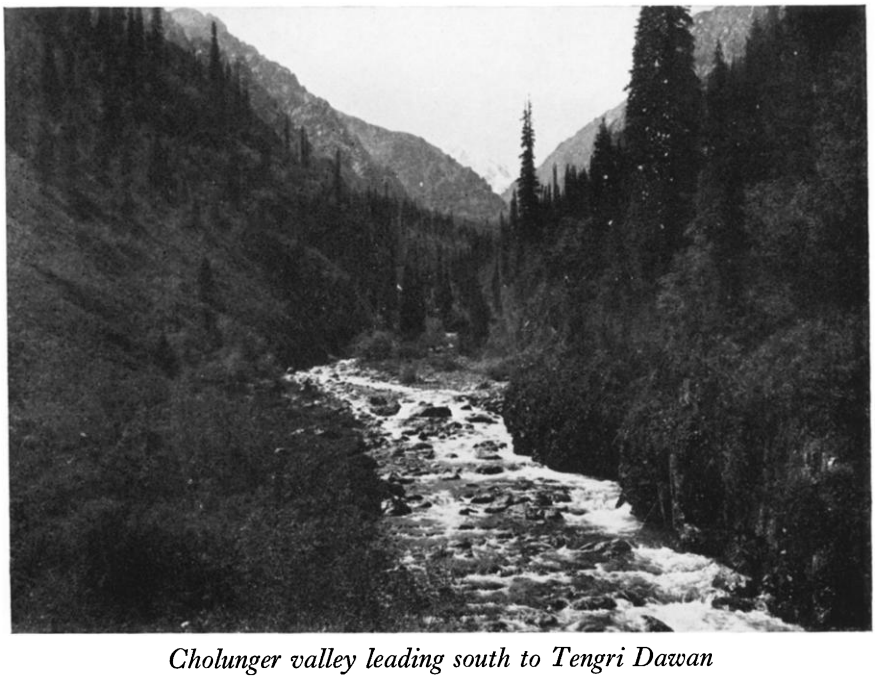
The route then ascended the Tutung Ho (First Series river), which was narrow and difficult for pack-animals, with high red cliffs above, frowning on the exuberant growth of willow and spruce. We passed by a wide stretch of bright green lawn between the tumbling river and the deep forest, and here we saw a dozen auls of the Kasai Qazaqs. A herd of yak, unknown in the Tien Shan, were grazing here. They belonged to a Tungan who had brought them from Kobdo beyond the Altai, as the owner had fled when the red flag of liberty was unfurled in Outer Mongolia. Leaving these nomads, we traversed broad and rich pastures to an easy grassy saddle, the Shara Dawan (Yellow Pass), height 9550 feet, with a splendid view.

It is one of the annoying customs of the nomads to give the same name to two different streams which unite farther down. The Tutung Ho was thousands of feet behind us, a high pass had been crossed, yet the stream and valley on the other side bore the same name. This topographical nomenclature leads to inextricable confusion, which is complicated by the poverty of the available place-names—common everywhere throughout Central Asia, and nearly meaningless in cases like this. It is due to the people, whether nomad or settler, never leaving their homes. As a Taranchi of the district said with pride, "We never travel. It is not our custom." Their stay-at-home habit is disastrous geographically, and results in hundreds of names almost useless for identification.

Leaving this second Tutung Ho, we descended to its junction with the Cholunger Sala (Stone House Valley), and followed them to its source. Where the Cholunger joined the Tutung Ho there was a long precipitous canyon through which the stream hurled itself with a roar. As we continued up the valley, crossing and recrossing the boulder-filled stream with some difficulty, we were struck by the lovely scenery, which surpassed any we had seen before. It was a steady ascent until near the head of the valley, when grassy stretches appeared. Camping at the foot of the Tengri Dawan, we crossed that pass on July 11. This pass (height 11,700 feet) has a very evil reputation, and long detours are made to avoid it. There was still snow on it, and it took several hours to reach the top, but on the northern side the gradient is nowhere really severe. On the southern side, descending into the long grassy Lopdong Ghol, the feeling was that of going down the side of a house, and in the reverse direction pack-animals could only do it by relays. The views from the top were fine and extensive. Although these passes had been crossed we had not passed over the watershed of the Manass river, and were thus still north of the Tien Shan. Leaving the pass we descended precipitously for 1200 yards, and after several steep patches we camped at Babaghai Sala (Wife's Valley). There was not a soul in sight, but our four best horses were stolen that night, and although we pursued

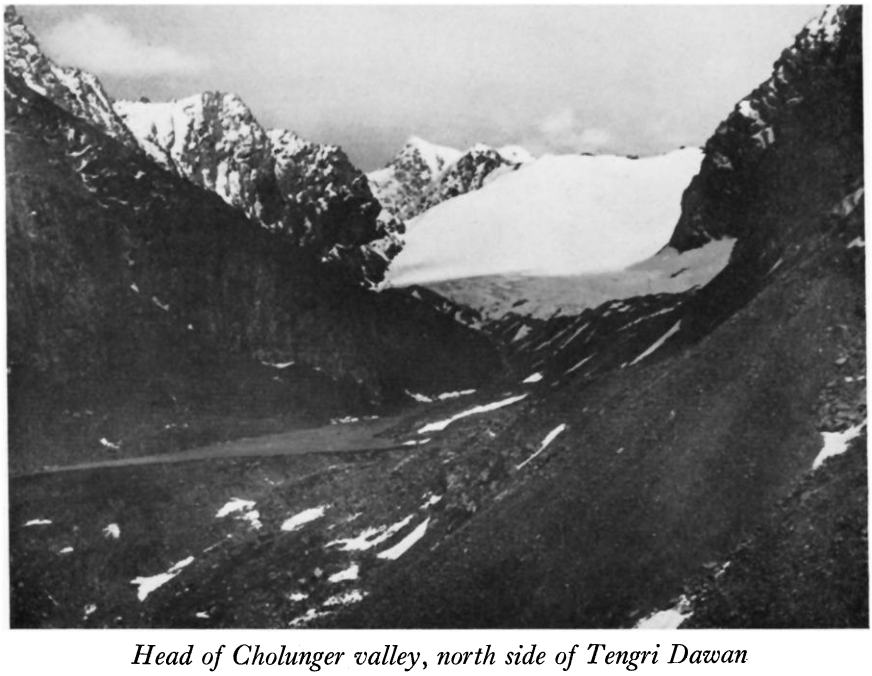


Qara Köl, Eastern Tien Shan



Cholunger valley leading south to Tengri Dawan

Looking south up valley to Shara Dawan



Head of Cholunger valley, north side of Tengri Dawan

the thieves, who were Torgut Mongols, we never managed to recover them. We noticed many abandoned gold workings at Babaghai Sala, and it was difficult to say why they had been abandoned.

The loss of four horses was very serious. In the days of the old Governor a horse thief was promptly executed, and very rightly. However, we managed to push on, but the riding-ponies had to carry packs. Turning nearly due south we crossed the Asak or Burukstai Dawan, height 11,850 feet, and in pouring rain we descended to the foot of the valley. From here, after retracing our steps over the Kukkhatin (worm or insect) Dawan, a grassy col, then into Durut or Durbut Dawan, 10,100 feet, then the Ulan Moron (red horse) Dawan, down the Kunde Khoro valley, over the important Zagastan (fish) Dawan, 10,400 feet, the Sagasutai of Stieler, we arrived at the head of the Great Yulduz (the word, strictly speaking, is Zulduz, or plain), and camped at Pöntsök Gegen, the Regent's headquarters. He was very civil and attentive, and replaced the four stolen horses, as is the custom of the country. I am afraid we hardly benefited by the exchange.

The headquarters of the Regent was a pretentious house built in the Russian style, but the auls of the lamas and chief Mongols and the tents holding the sacred images were more interesting. The camp was in a plain at the mouth of a side valley running out of the plain of the Great Yulduz itself. The latter is truly objectionable in summer, as flies of all kinds, but especially the large green-eyed horse flies and the mosquitoes, make life intolerable. The summer however is a short one, and the Regent only stays three months, as snow falls in September.

The Yulduz is nothing more than a magnificent grazing-ground. The low insignificant rounded hills, the wide grassy plain watered by a sluggish river, the complete absence of tree, shrub, or bush, and the treacherous climate with its detestable wind, the insect pests, and the rawness of the whole aspect make the Yulduz universally disliked by all except the nomads. Far better the real desert than these bleak uplands, deceitful with their fat pastures and devastating with their attendant evils.

Leaving the chief's headquarters, the route crossed the Khaidik river, which drains the whole Yulduz and falls into the Baghrash Köl, or Tengris Nor. The ground was swampy, but the river itself was easily fordable. A long stretch had to be traversed before the mountains were reached, and we were escorted by clouds of green-eyed horseflies which swarmed round man and beast alike, stinging and buzzing. The weary pack-animals bustled along as they had never done before, but it was only when we reached the top of the Tilahmad Pass that we managed to shake these insects off, which are always a serious menace to horses, and often cause death from loss of blood; indeed, it was owing to them that about 300 or 400 square miles of fine pasture were derelict.

The rest of the journey is soon told. The track entered the grassy but desolate Kuikunikin valley—the name means "the maiden's breast"—and a mile above the junction of the Ehkin Sala with the main valley, turned to the left up the Dawan Usun and crossed the Kuikunikin or Arche Dawan (11,200 feet). It is possible to continue up the main valley and avoid this pass, but the track is so rough that the pass is preferable. It is this pass which apparently figures on the maps as the Kuikul Pass, and which could not be identified anywhere else.

Descending the Shara Sala ("Yellow Valley") from the pass, the track led up a rough forbidding side valley and climbed rather steeply to the Dönde or Mulakchi Dawan (height 10,500 feet). The track then dipped into a valley, crossed the Arakwaste Pass, which at that height is only a col, and rose slightly to the Tilahmed or Noryn Dawan (height 10,800 feet). These three passes were close together and in a line—all visible from each other. It has been claimed that the Kuikul Pass is really the Tilahmed, but it can only be repeated that we failed to identify either name or pass, and certainly did not do so with either the Kuikunikin or the Tilahmed passes. The descent from the Tilahmed was very severe. It is a most difficult and dangerous pass at certain seasons, and Captain George Sheriff, H.B.M.'s Vice-Consul at Kashgar, lost his caravan and nearly all his party when caught in a snowstorm there in October 1928.

Passing the glades and park-like country near the lake Qara Köl—not to be confused with the other better-known Qara Köl in Russian territory—we crossed the Qaraghai Dawan (8400 feet) and skirting and then fording the Kucha river, where the scenery at Qurghan was fascinating, we crossed the Qirghiz At Dawan (Qirghiz Horse, after a huge peak so named), height 8950 feet, and in due course reached Bai, a little too early for the melons, but in time for plenty of apricots, peaches, and nectarines—very welcome and much appreciated after a diet of meat and stringy rhubarb.

In conclusion, the following observations may be made. The climate of the Tien Shan is most uncertain. At no season of the year can any fine weather be depended on, as is the case in the Himalayas. Now this is a most serious matter for the traveller, who is thus obliged to be always anxious about supplies. The changes in weather, too, are unusually rapid and capricious, and no reliance whatever can be put on conditions which would indicate in other countries' mountain systems some days of settled weather.

The bleakness and inhospitable nature of the Yulduz is not easily explained. The chief's yamen was only 7550 feet above sea-level, yet no trees would grow, even though carefully tended, and the few vegetables were most troublesome to cultivate. It is well known that Rupshu, the Pamirs, the Altai, or parts of the same Tien Shan south or north of the Yulduz, and other inhabited altitudes, carry trees, brushwood, and certain crops; but all the attempts to grow anything in the Yulduz have failed. It is due, however, to no defect in the soil. The only suggestion, and it is not a very convincing one, is that the wind is harmful to vegetation.

Reference must be made again to the canyons of the Tien Shan. On both sides of the main northern range, and also in the southern, these deep fissures were the feature of the mountain structure. Their effect is considerable, because it is owing to them that Dzungaria is cut off from the south, and that pack-animals have to cross the Muzart Pass, with a difficult and shifting glacier, as the sole alternative to going round by Urumchi.

Haze is very bad in the Tien Shan, and parts of the Yulduz plains looked as if some London fog had swept up the valley. This is a further complication to the traveller, who may be pardoned if he sometimes becomes exasperated by the churlishness of the climate.

A final remark with regard to the nomenclature of this region is desirable. The whole district is inhabited by a variety of races, and each gives its own

name to the local features. The consequence of this is that there are several names to one place, and these names are often used indifferently; for example a Qazaq will use the Mongol name, and, though less frequently, a Mongol will use the Qazaq or Sart name. There is, though, a tendency in the case of important features for one name to be the most general and others gradually to drop out. This, however, does not do away with, but merely mitigates the confusion; and it is this variety of synonyms, coupled with the poverty of place names, that makes the identification of points so difficult. The extremely bad transliteration of the Russian maps has also to be considered (Chinese names in particular suffer most in the process of Russification) and the clumsy German spelling makes the muddle still worse. In the homogeneous Turki districts of the Tarim basin, Achiq Bulaq, Aqsu, Jigda Bulaq, and the like are met with at every turn, but when the same few names are turned into Mongol, Chinese, Qazaq, and the rest, the result is devastating.

DISCUSSION

Before the paper the PRESIDENT (Colonel Sir CHARLES CLOSE) said: Since we last met we have all learned, with the deepest regret, of the death of two of our most distinguished Honorary Corresponding members. I allude to the death of Dr. Nansen, that world-famous explorer and man of science, who twice received a Gold Medal from this Society, whose name is world-wide and whose ability was only equalled by the amiability of his character; and also to the death of Mr. Hotz, so well known as a student of the history and geography of the Near East, who was a benefactor to this Society, having left us a large number of very valuable and interesting books as an important addition to the Library. The Council has, in the name of the Society, sent messages of sympathy to Madame Nansen and to Madame Hotz.

Turning to the subject of the lecture, I may remind you that though this year we have had a varied fare, we have heard more of Asia than of any other continent. We have had accounts of the Karakoram, of the Himalaya, of Northern Burma, of North-West Manchuria: in fact, about nine lectures dealing with Asia, chiefly with Central Asia and the great backbone of the continent.

Colonel Schomberg, who is our lecturer this evening, has given us two papers already, one published in the *Journal* for December last on the Tarim basin, and another, read at a recent Afternoon Meeting of the Society, in which he gave pretty conclusive reasons why we should give up the notion that that part of Asia is gradually being subjected to desiccation.

He will lecture to-night on the Tien Shan, which, as you know, is to the north of the Tarim basin. He has been there three times and will give us a condensed account of his three journeys. The Society thinks highly of his work in Central Asia, and recently awarded him the Gill Memorial, the presentation of which is reserved for June 23. By that time Colonel Schomberg will be once more on his way to Central Asia, and perhaps the only means of presenting the award to him personally will be to call on the services of Miss Amy Johnson. However, we wish him all possible success in his new journey. Meanwhile, we shall be glad to hear what he has to say about his three journeys in the Tien Shan.

Colonel Schomberg then read the paper printed above.

The PRESIDENT, having without response called upon two travellers present to open the discussion, said: If there is no one else who has been in the Tien Shan

I should like to ask the lecturer two questions: first, is the word "Tien Shan" known locally over the whole of that region, including the two branches?

Colonel SCHOMBERG: Not by the nomads, but by the Chinese.

The PRESIDENT: If you say "Tien Shan" they know what you are referring to?

Colonel SCHOMBERG: Yes.

The PRESIDENT: What is the height of the mountains in the Tien Shan?

Colonel SCHOMBERG: Manass peak is about 24,000 feet.

The PRESIDENT: And the hills you showed?

Colonel SCHOMBERG: About 21,000 feet.

The PRESIDENT: We have listened to a lecture on a part of the world which very few of us know anything about. Colonel Schomberg is gradually exploring that region which, I take it, is about 150,000 square miles in area. It is an area which deserves exploration because the existing maps, which are largely based on Russian material, are to a great extent worthless. I understand it is not by any means easy to do the mapping which is necessary, but we shall hope, bit by bit and as the result of Colonel Schomberg's journeys and perhaps those of others, soon to know a little more about the region. It is possible to make some kind of map if one has only a few points to go on. That is the great difficulty. If you take photographs and know where you are pointing and have one or two points in the photography you know something of, you can construct something of a map. But we have not much of a framework at present. Meanwhile, we are getting as much information as possible from Colonel Schomberg. We do not know where he is going to next time, but we hope he will carry on his explorations in that relatively little-known part of the world. I am sure we all wish him good luck in his next expedition, and we thank him heartily for his lecture.

THE MOUNTAINS OF CENTRAL ASIA AND THEIR NOMENCLATURE

PH. C. VISSER

THIS subject, handled by Sir Sidney Burrard, Mason, Longstaff and others in the *Journal*, has been of great interest to me for some time. Having thrice visited the Karakoram regions I felt the necessity for a revision of the nomenclature, although at the same time I quite understood how undesirable it would be to make more alterations than were strictly required. In the words of Mason (*G.J.*, 75, 1930, p. 41), "I base my desire for a revision of the nomenclature on the ineffectiveness, inconvenience and inaccuracy of the old." I am now in Chinese Turkistan, without the necessary literature and maps, but as the Editor has invited the judgment of other Karakoram travellers before the conference of this summer, I venture to state my views.

Although the time may not yet have come to enter into details, one can certainly now already draw attention to the main divisions of the Central Asian mountains. I even believe that this is most desirable, because if put off much longer, the chances are that it will be elaborated upon grounds which may perhaps afterwards prove less correct. The solution here, more perhaps than anywhere else, must be sought in a compromise between geographers and geologists. The geographer will be readily inclined to accept a large river valley as a division between mountains. The Indus, in its course from east to west, forms a striking boundary, for a geographer, between two great mountain systems; the Hunza river below the Batura glacier in its course from north to south likewise forms a dividing line between two lofty mountain groups; and as this river is in the most westerly part of the Karakoram main chain, it is only natural that the geographer will be inclined to consider the striking Hunza gorge as the western extremity of the Karakoram, and to include the mountain group on the other side in a more westerly mountain system. For the geologist a river will be little else than an accidental phenomenon in the tectonic build of the Earth's surface. It will perhaps not be difficult for him to prove that the mountains north and south of the Indus valley arose in the same geological epoch, and that we find the same geological formations in both mountains. It will be still easier for him to show that the group west of the Hunza river dates from the same geological epoch as the chain eastwards of this stream, and that both consist of the same minerals, and are none other than parts of one and the same chain of mountains.

The geographer, adhering to his geographical standpoint, will then draw two lines, one through the Indus valley and one through the Hunza valley, which both indicate the limits between mountain systems. Nevertheless there is a very great difference between the two valleys. The Indus flows for a great distance through a mighty longitudinal Tertiary dividing line, which owes its origin to a tectonic movement of the Earth's crust; the Hunza, on the other hand, flows through a transverse gorge which the river, if not altogether, at least for the greater part, has made for itself through the Karakoram chain. As regards the Indus the geologist will, in my opinion, have to give in slightly, and as regards the Hunza the geographer will have to concede. It will be easy in the

former case for the geologist, because he too may consider the Indus valley as a very striking geological phenomenon; while in the latter case the geographer will readily admit that the accidental presence of a river valley is no reason for adding a part of the Karakoram to another mountain range to which it does not actually belong.

One of the chief points of the discussion, whether the Karakoram should actually be counted to the Himalaya, or whether one should speak, as Major Mason proposes, of the Karakoram–Himalaya. But, I would ask, does this not unnecessarily complicate the matter? Has then the Kunlun, which is no less connected with the Karakoram than the Karakoram with the Himalaya (I would almost say that the opposite is the case) not equally as much right to be comprehended in that great Central Asian Complex? And why then should one wish to cut off the Muztagh Ata? Both through study of the map and also during our expedition of the past year across the mountains from south to north, I was very strongly impressed by the fact that here are several systems distinctly separated from each other, against which separation on the map the geologist would presumably raise no objections. As a geographer I have the feeling that the linking of the popular name Himalaya with that of the Karakoram is really more of a concession to the laity. I discussed this subject with some English people in India. They told me: "For us all those mountains in the north are the Himalaya mountains." For that assurance I need not have gone to India, for every compatriot of mine knows the name Himalaya, but how many are there who have heard of the name Karakoram? When I wrote my work on our first Karakoram Expedition, I chose Karakoram as the title, but my publisher insisted on having it coupled with the name Himalaya, but he did not do so because of geographical considerations. I cannot of course judge the motives of Sir Martin Conway when he sought a title for his book on his explorations in the Karakoram, but I should say that in 1892 a title which included the name of Himalaya was an absolute necessity for the public. For the geographer that necessity does not exist, or does so no longer, and in the long run the laity will follow the geographer in such questions.

As regards a south–north division, I myself had thought of the following: Himalaya System; Karakoram System; Aghil System; Kunlun System.

As to the boundary lines, I hope to have an opportunity of publishing something later on, as part of our explorations of the past year and part of that of the coming year are bound up with the determination of these limits. Already however I would name the Indus valley as the dividing line between the Himalaya and the Karakoram, a division which our geologist, Dr. Wyss, considers wholly acceptable. The northern boundary of the Karakoram System would run along the Shaksgam valley and partly along the Upper Shyok, where Dr. Wyss found the same geological formations as in the regions eastward of the Karakoram pass, which we explored.

With regard to the westerly and easterly limits of the systems, these should also be studied on a map comprising the whole of Central Asia. About the Himalaya System there will not be much difference of opinion. With the Karakoram System it is quite a different matter. Exploration has certainly advanced so far that the easterly limit can now be determined. On looking at the map of Ladakh one is inclined to have the main chain terminated by the

Shyok valley, but on looking at the map of Central Asia I feel very doubtful, and I believe that the question in the future will not read: "Where should we draw the eastern limit of the Karakoram?" but: "Where does the dividing line run between Karakoram and Trans-Himalaya?" Here I step already into the sphere of the nomenclature. Trans-Himalaya is the name geographers recognize. For the rest it seems to me that there should be no objection to including the Trans-Himalaya, if necessary, in the Karakoram System.

I believe there is more to be said with certainty about the western boundary. At the beginning of this paper I stated that I considered the mountains to the west of the Hunza river as belonging to the Karakoram, both geographically and geologically. Major Mason, if I remember rightly, does not share my opinion, but includes that chain of mountains in the Hindu Kush. Sir Sidney Burrard and Dr. Longstaff do not express a definite opinion in favour of the Hunza gorge as the boundary between Karakoram and Hindu Kush, but merely state that it is difficult to determine a limit. Longstaff says: ". . Standing on any height between Gilgit and Hunza I have found it extremely difficult to visualize where the Karakoram ends and the Hindu Kush begins."

Now the regions mentioned here were visited by us in 1925, in part at least, and by virtue of these explorations I came to the conclusion that the main chains of Karakoram and Hindu Kush in no wise lapse into each other, nay run alongside for a part. The Karakoram terminates immediately south of the point where the southern arm of the Batura valley begins. From that point onwards the ridge descends to the valley and does not continue in the main chain of the Hindu Kush. Even the chain which forms the northern limit of the Batura does not do so. The main chain of the Hindu Kush distinctly terminates, in my opinion, to the north of the Chapursan river. I have mentioned the Aghil region as a separate unit because there we have to do with a sedimentary mountain chain between the crystalline groups of Karakoram and Kunlun, while in my opinion a distinct geographical division is also possible.

As far as the nomenclature is concerned I am in agreement for a great part with the views of Major Mason. I fully realize that one should preserve the old historic names wherever possible, be it alone for the sake of the travellers who explored the Central Asian Highlands in years gone by. On the other hand, there should be no hesitation in handling alterations which serve to prevent labouring on further on a faulty basis. I hope that at the same time the different demands made upon names will be kept in view. In my opinion the inhabitants of the regions can only be interested in the names of the details. The names employed for the principal division will be chiefly of service to geographers and geologists. I therefore consider that it is immaterial whether the name Karakoram is known to the inhabitants in Hunza or not. Supposing they give another name to the Karakoram, as they are acquainted with it there, then that name would very well be given to that group, just as the Bernese Oberland is a group name in the Alps. I therefore hope that if subsequently it should prove that one of the chains to the east of the Shyok river is a continuation of the Karakoram, there will be no hesitation in including those mountains in the Karakoram System, no matter how the inhabitants of one or other of the valleys may denote those mountains. The giving of the name Karakoram is exclusively of interest to geographers, but to them it is vital. In that region

one should also be free to give a local name to one or more subdivisions (groups). At times I ask myself whether too much importance is not attached to a local name, for in some instances the inhabitants of several valleys have different names for one and the same mountain.

In the discussions already held the significance of the word Karakoram was also considered. It is regrettable that owing to an unfortunate concurrence of circumstances this name was given to one of the most magnificent snow chains of the Earth. Now that not only are the mountains known by the name of Karakoram but the name itself has obtained a trustworthy sound amongst travellers and geographers, I hope that an alteration therein will never be thought of again. That the outward appearance of the mountains bears no resemblance to its name cannot be an objection, to my mind. I might quote numerous similar instances. So one might ask why one of the least snowy mountain peaks in the vicinity of the Zermatt should be called Dent Blanche and why the base of the Mont Blanc should have been given the name of Aiguille du Gouter, for with the widest stretch of imagination it would never call to mind an "Aiguille."

When I discussed above the division of the Central Asian mountains, I put forward four mountain systems, which should simply bear the names of Himalaya, Karakoram, Aghil, and Kunlun. On the grounds already mentioned I would not advise the combination Karakoram–Himalaya, for to be consistent one would then have to add the word Himalaya to the names of the other systems as well.

In a division and subdivision of the mountain systems and the giving of names thereto one is involuntarily inclined to try to draw a parallel between these systems and the Alps, the best studied and subdivided mountains of the world, although even there the conflict over a practical division is not yet decided. The Alps are first divided into two halves, the East and West Alps (some geographers divide them into three parts). These great divisions are sub-divided into Alp groups, and the Alp groups into mountain groups, which on the whole are pretty clearly distinguished from each other. Now in the Karakoram, for instance, we at once notice a striking difference from the Alps. The Alps together form one vast entity, while the Karakoram System appears to be composed of mountain chains which in one or more places are most closely connected with the main chain. This difference in build however cannot, in my opinion, afford the slightest reason for deviating from the tested system of division of the Alps. If we apply this system to the Karakoram we necessarily arrive at practically the same results as Major Mason. Neither geologically nor geographically would it be justifiable in my opinion to consider the Kailas range as a separate range of mountains. No one who has seen even once only either the Hispar or the Siachen glacial region would allow these manifestly united mighty complexes to be separated. It stands to reason that the necessary outcome of that would be that we should have to consider the apparently so strongly individual chains east and west of the Nubra river as belonging to the same mountain system. The geographer however who casts his eye upon a carefully drawn map of sufficiently large scale will speedily be satisfied with this division, sooner at least than the traveller, who is misled by the enormous width of the Nubra valley.

The denomination of Kailas-Karakoram, etc., of Mason I indeed find both logical and practical. Geologically and, as far as I can gather from the material at my disposal here, geographically also, one may speak of the Ladakh-Karakoram, while I myself reckon the so closely united Sarikol chain with the Karakoram (I visited the immense binding knot in 1925). The denominations Kailas-Karakoram, Ladakh-Karakoram thus become equivalent to the denominations Pennine Alps, Bernese Alps, etc. There is, in my opinion, not a single objection against further applying this manner of nomenclature even to vast and striking parts of the Karakoram main chain, so that we might speak of Muztagh-Karakoram, Hunza-Karakoram, Nubra-Karakoram, etc. In order to have unity in the system of nomenclature it would, in my opinion, be advisable to alter the name of Zaskar range into Zaskar-Himalaya.

One exception I would like to make with regard to Mason's Aghil-Karakoram. From the rock specimens which the Mason Expedition brought back and the photographs which he issued, it is almost certain that in the Aghil range we have a geological formation which fully agrees with those of the mountains east of the Upper Shyok and the mountainous regions east and west of the Karakoram pass. Thus here an extensive sedimentary region exists, geologically differing entirely from Karakoram and Kunlun, from which it also deviates morphologically, while geographically it may be very distinctly outlined without being forced at all.

Just as in the Alps the Alp groups are further subdivided into mountain groups, so one can here do the same with the Karakoram groups. As an arbitrary example I would mention the Nubra-Karakoram, which could be subdivided into a Kondum group, a Saser group, etc. For the present however one will have to look exclusively at the wood and not at the trees. Only, once again, let the wood extend farther than the map of Ladakh!

NOMENCLATURE IN THE KARAKORAM: *A paper read at the Afternoon Meeting of the Society on 12 May 1930, by*

MAJOR KENNETH MASON

THE title announced for this discussion was "Nomenclature in the Himalaya." This was perhaps a little misleading for two reasons. In the first place there is undoubtedly some difference of opinion as to what comprises the Himalaya—where they begin and where they end—and how far north they extend. In the second place, it seems to me quite useless to discuss the nomenclature of a region without first considering its physical features. This is especially necessary in the Karakoram region because it is only in the last three years that the results of all modern surveys of this region, dating since Longstaff's discoveries of 1909, have been incorporated on our Survey of India maps, and even now some of these maps are not available to the public.

People have written to me during the last few months giving me their views, yet admitting at the same time that they "have not been able to refer to modern maps." Others seem to have assumed that the old maps of the Karakoram region made by the Survey of India during the early 'sixties of last century were made with the same accuracy as those of the nearer ranges of the Himalaya, regardless of the facts that they were done under special and often hurried circumstances, and that our surveyors were instructed not to waste time surveying barren land above an altitude of 15,000 feet. I hope to convince some of you this evening that we know more about the mountains of the Karakoram to-day than did our predecessors of seventy years ago; and that this knowledge forces us to modify the views then held.

The region concerned is bounded on the south by the trough of the Indus–Shyok, which is roughly parallel to the Ladakh range; and this range is itself parallel to the axis of the Great Himalaya. These two great ranges have been traced out by Sir Sidney Burrard in considerable detail in his 'Sketch of the Geography and Geology of the Himalaya Mountains and Tibet,' and though there are still considerable blanks in our knowledge of the details of these two ranges, there is nothing controversial in their general alignments. Sir Sidney Burrard traces both of them from the Indus on the west to the Brahmaputra on the east, and names them on the frontispiece to his 'Geography,' the "Great Himalayan Range" and the "Ladakh Range" throughout their lengths.

On the west of the Indus there are some difficulties in tracing their extensions; and Colonel Morshead, Kingdon Ward and others have discussed the possible extension of the Himalayan ranges east of the Tsangpo gorge. Morshead writes: "Does the Great Himalayan Range turn suddenly northwards through Gyala Peri and Makandro, or does it maintain its easterly direction with diminishing elevation through the satellite peak of Sanglung (23,018 feet), subsequently perhaps resuming its existence in the unexplored regions of Poyul?" And he goes on to say that the topographical evidence is incomplete, and that the problem is one which demands geological as well as further geographical investigation. These questions do not concern us here, and I only mention them as showing that such problems exist.

North of the Indus–Shyok trough, the parallelism of the ranges with the

Great Himalaya and Ladakh ranges is not evident. In Burrard's 'Geography' he shows two ranges—the Kailas and the Karakoram—from about longitude 72° to 78°, approximately parallel to the Ladakh range. With a break from 78° to 80° the Kailas range is continued parallel to the Ladakh range through the sacred mountain of Kailas and onwards to longitude 92°. The Karakoram range is shown parallel to this and, with a smaller break near longitude 80°, is continued across the Tibetan plateau, though diverging northwards out of true parallelism. East of longitude 79° this northern range is given no name. I understand that since the book was published in 1907 Sir Sidney Burrard's views have been modified and that he no longer considers that the mountain Aling Kangri is on the main Karakoram alignment.

It was, I think, very natural in 1907 to show the northern ranges parallel to those of the south. The extraordinary parallelism of the southern ranges was a powerful argument in favour of this theory, and we were perhaps rather inclined to emphasize this parallelism in the drawing offices. This has resulted in the Kailas range being continued across the two deep valleys of the upper Shyok and Nubra, in a direction almost at right angles to the visible direction of the ranges.

The name "Karakoram" has undergone some curious contortions. There is no doubt whatever that in this region it originally belonged to the pass, and that it is confined by the traders to the pass to-day. From this pass it was first given generally to the unexplored watershed between the Tarim basin and the Indus drainage; and so was carried westward along the watershed to the great range of snowy peaks, known to the traders at that time and to-day as "Muztagh," or Ice-mountains. I wish to emphasize this point: that the name "Karakoram," however well known it may be for the pass, is not now and never has been given to these mountain ranges by any one but Europeans. All the traders in these parts use descriptive names for localities. "Muztagh" is the word they use descriptively to denote ice-mountains, and I am quite prepared to believe that where Turki is spoken there are other Muztaghs, just as there are other Karakorams. In the small vocabulary of illiterate people there must be repetition. But "Karakoram" is used for the disintegrated regions below the snow-line; "Muztagh" for the mountains that rise above that line. The Karakoram pass is below the snow-line. The southern disintegrated slopes of Muztagh Ata—the father of Ice-mountains—are known as "Karakoram" below the snow-line. The fact that Muztagh Ata does not lie on the range we are discussing has been used as an argument against the range name "Muztagh." The same argument must surely apply to "Karakoram."

Since the word "Karakoram" was first applied by Europeans to the watershed range, there has been a great accumulation of knowledge. Sir Sidney Burrard tells me that early in the last century the Kunlun and the Karakoram were considered one range. Hayward, who first explored the upper Yarkand tributaries—though he did not reach the sources—separated the Kunlun from the southern ranges, or rather from a single southern range, which he called "the Muztagh or Karakoram"—"Muztagh" being the name given him by the traders, and "Karakoram" the name then coming into use among Europeans. On his map he showed tributaries from this single range flowing northwards into the Yarkand river. It was Sir Francis Younghusband who, in 1887, first dis-

covered the Aghil range which lies north of the main Muztagh range, and south of the Kunlun.

Meanwhile the surveys from the south, based on triangulation, had not reached the main watershed in the region of ice, though the limit of the surveys was believed to be the watershed and was shown so on maps. Burrard, in the frontispiece to his 'Geography,' naturally showed the Karakoram range according to this supposed watershed-alignment north of and only some 15 miles up the Siachen glacier, and, continuing it parallel to the Ladakh range, he took it across the upper Shyok, and not through the Karakoram pass. For some reason I cannot trace, the small-scale maps of about the same date (and until the war) showed the name "Karakoram" bending north-eastwards to the Karakoram pass, and not according to Burrard. On Survey of India maps, published after the war, owing to Colonel Wauhope's views, the name "Karakoram" was made to neglect the Karakoram pass, and was brought the whole way down the watershed between the upper Shyok and Nubra, thus cutting the alignment of the Kailas range, as shown on small-scale maps, completely in two.

During the last few years all these maps have been redrawn by the Survey of India, and we have included the many valuable surveys carried out by private explorers, with several of whose expeditions the Survey of India has attached trained surveyors. But neither the explorers nor the surveyors have brought back any names for the ranges, and they have used the term "Karakoram" more and more loosely. When drawing the maps we have been placed in the difficulty of putting the old range names along the alignments as surveyed in detail. For we find that the alignment of the names as handed down to us does not agree with the alignment of the ranges as surveyed.

A few years ago I layered a map on the 1:1,000,000 scale, on which I had put all modern surveys and heights. As far as possible I persuaded travellers to fill in the gaps in our knowledge, and when they came back, I put their results on to this rough map of mine. After my own expedition in 1926 I made another layered map, and during my spare time during the last few months I have made a third which you see before you.* This is layer-coloured as follows:

12–14,000 feet	dark green
14–16,000 ,, ...	light green
16–18,000 ,, ...	yellow
18–20,000 ,, ...	pink
Over 20,000 feet	dark red

I do not want to emphasize the fact that all the country shown yellow, pink, or red is at least 1000 feet above the area the old surveyors were required to survey rigorously; because some, notably Godwin-Austen, paid little attention to that instruction. But this map shows clearly how much more we now know of the physical features of the region under discussion. It includes the surveys done during the Visser expedition of last year, and I have left blank the area of guesswork which I hope the Vissers will fill in this summer.

I have not added much original exploration myself to this great region; but I have examined a great deal of it on the ground; I have read and re-read the

*This map is in process of fair-drawing and will be laid in proof state before the proposed conference.—ED. *G.J.*

descriptions of, I believe, all travellers who have visited it; and I have interviewed many of them personally. I have therefore often been consulted by the officers in charge of the drawing and reproduction of our maps of this region in India concerning the application of the range names.

I find that very few travellers in their writings have in recent years used the term "Karakoram" in the same sense, and no two existing maps drawn by different offices show the name "Karakoram range" on the same alignment, The views of our past experts in the Survey of India are not identical, as is natural when one considers that they studied material that was constantly becoming more accurate. But I have seen no published map that brings out the salient features of the area so well as this one.

The one important feature that "hits the eye" is the great Nubra–Siachen trough, at one time filled by a great glacier from its northernmost point (nearly 30 miles north of the watershed shown on the old maps) right down to its junction with the Shyok. This trough appears to be a prolongation of the Shyok itself, and there are indications of it having once continued by the Urdok glacier into the Shaksgam.

Next to this feature we see the great mass of the main snowy range. From K_2 it passes the Gasherbrum group, cuts across the Urdok–Siachen trough, and passing the Teram Kangri group, continues down to the Saser pass and the great peaks of the Nubra–Shyok divide.

The third feature is the Rimo–Upper-Shyok trough, east of which—especially towards the south—surveys are less detailed and not accurately contoured.

The Hushe and Kondus areas and those south of Masherbrum I have left uncoloured, because we have no contours and insufficient heights to go upon. There are undoubtedly great groups of peaks, but it is extremely difficult to place them in any range alignment.

North of the Gasherbrum–Teram Kangri ridge lies the Shaksgam and the ranges of the Aghil—rocky and difficult, but not continuously above the snow-line; and eastwards of them the comparatively insignificant Central Asian watershed by the Karakoram pass, easy to cross at all times of the year and petering out on the Kushku Maidan, the Aksai Chin, and the Lingzitang. On this last insignificant feature lies the Karakoram pass.

Our difficulty is to name these features on the map. On the main alignment of ice-covered peaks, known to the only people who see it as Muztagh, we have two well-known, though little-used passes, both called "Muztagh," and we have the well-known Saser pass on it farther south. The range, when only one was known, was called "the Muztagh or Karakoram" range by several of our predecessors. If therefore we give a range-name to this great alignment of ice-mountains, it seems, in my opinion, only right to call it the Muztagh range. And the name has the advantage that it would be understood by all traders using the trade route. If we decide to name the watershed and ignore the great Saser mountains, we may write Karakoram range along that insignificant watershed and extend it to the ice-mountains farther west. But since Turki names are all descriptive, I believe we shall never get the trader to follow suit. Muztagh is *their* traditional name, and they do not use our maps.

Whichever we do, we are faced with the problem of the southern range of the Karakoram. Sir Sidney Burrard (following, I believe, Alexander Cunning-

ham) placed the name "Kailas" along it. If we adopt Wauhope's alignment for the "Karakoram range," we cut this "Karakoram Kailas" off from its very problematical eastern extensions which are the only excuses for its name. I do not know from personal observation either the sacred Kailas north of Manasarowar or the Lesser Kanawar Kailas, but they exist and are well known to Hindus. Must we add a third Kailas, which is not Hindu, has nothing in common with either of them, and is, as Dr. Longstaff holds, much more closely allied to the Karakoram range?

North of the main watershed we have the Aghil mountains, which, in my opinion, are also very closely allied to the main Muztagh range. I doubt whether they are anything more than parallel outer ranges of that main range. Their parallelism is very marked. But they introduce us to an entirely different region—a region of disintegrated rock, red marbles, black limestones, and sandstones and shales, containing Jurassic fossils, and lastly red sandstone. It is a region of little rainfall compared with the main range, Tibetan in climate, and with Tibetan fauna and flora.

All these ranges have been included by various travellers in the Karakoram area, yet the same parts have been called by different travellers "Eastern Karakoram," "Western Karakoram," and merely "Karakoram." Sir Sidney Burrard advocated stopping the name "Karakoram" westwards at the Hunza river, the alignment farther west being denoted by the name "Hindu Kush," and this plan seems by far the best to adopt, though a recent traveller included the mountains bordering the Batura glacier in the Karakoram system. In searching for some sort of order in applying the range names to this area, I concluded that it would be best to call the whole region bounded by the Hunza river, the Indus, the Shyok, and the Raskam–Yarkand rivers "the Karakoram Himalaya," and to define the separate ranges by the names "Kailas," "Muztagh," and "Aghil." To distinguish the Kailas range from the others of the same name, I proposed to add "Karakoram" to it, and to indicate the grouping of all three ranges as a unit, I proposed to do the same with the other two.

These views were published as long ago as 1927 in the *Geographical Journal* and raised no protest. Before reprinting them in a Survey of India publication two years later, I naturally placed them before the Surveyor-General of India, who agreed that as so many explorers and geographers interested were resident in England, it would be well to ascertain their views with the aid of this Society.

The nomenclature I proposed was the best I could find that would introduce some systematic nomenclature out of the existing chaos. I do not believe "Karakoram" is a correct name to use descriptively for a mountain range, which lies throughout its length above the snow-line, but it suits a mountain region. I have tried to compromise by giving it definitely to the region, where it has more and more in latter years been applied.

If we retain "Kailas" for the southern range, I see no alternative but to distinguish it from other Kailases by adding the word "Karakoram." Similarly, if we use the word "Muztagh" we should use the name compounded with "Karakoram," to distinguish it from other Muztaghs: and if the Aghils are accepted in the Karakoram region, I see no objection to them following the same system.

I am not in love with compound names, but I fail to see why they are considered unsuitable. Muztagh-Karakoram is no more cumbersome than

Bernese Alps or Nepal Himalaya. I have been using these compounds of mine for three years now and find no difficulty or objection to them, whereas I found the previous nomenclature most awkward.

There remains the solution proposed by Dr. Longstaff. He wishes to abolish Kailas from this region altogether. I agree with him in that. As I understand him, he intends to stick to the name "Karakoram" for the region but to name no ranges, except on small-scale geographical maps. On topographical maps he would label the mountains by groups. This system has many points to recommend it, but is it not rather more complicated than the system I have proposed?

DISCUSSION

Before the paper the PRESIDENT (Colonel Sir CHARLES CLOSE) said: Major Kenneth Mason is going to give us a paper on the nomenclature of the Himalaya. That paper depends chiefly on new information which most of us, in fact, have not got, information which has been derived from the labours of recent explorers and the work of the Survey of India. Major Mason is a distinguished officer of the Survey of India, and it is on that new information that his paper will depend.

This question of nomenclature is one which has been disputed from time to time, but we always feel that it would be very advantageous if general agreement could be come to as to the names of Himalayan ranges, passes and so on, especially for the benefit of those who use maps. I have looked up the subject of this paper in the beautiful atlas of the Italian Touring Club and find it difficult to follow the paper, the reason being that much of the information is new. We are anxious to hear Major Mason, so I will not detain you any longer, but ask him to begin.

Major Mason then read the paper printed above, and a discussion followed.

The PRESIDENT: We are very glad that Sir Sidney Burrard was able to attend, and we should like to hear what he has to say on this subject; he has been quoted a good deal during the course of the lecture.

Sir SIDNEY BURRARD: Nature has provided Tibet with three primary ranges: Himalaya on the south, Kunlun on the north, and Karakoram the central backbone. I ask the Royal Geographical Society to save this primary classification. It is impossible to discuss secondary ranges and names until the primary foundation is fixed.

The Royal Geographical Society has always upheld the principle that geographical names should be chosen in the interests of the people of the country. May I ask this question: Who are the people whom this meeting has to consider? West Tibet abuts against Chinese Turkistan on the north. The Karakoram mountains stand in Tibet. The Tibetan population live on the south side of the range; the northern side is uninhabited. By the last census there are 178,000 residents who speak the Tibetan dialects. The number who speak Turkistani is less than 1000. So when I ask who are the people, the answer is: The Tibetans, not the Turkistanis.

Our old explorers, who explored the Indus valley south of the mountains, always brought back the name Karakoram for the mountains. Those few who went north of the mountains brought back the name Muztagh. The Tibetan pundits use Karakoram; the traders from Turkistan say Muztagh. Similar divergencies are to be heard in India. Afghan traders and Tibetans come into India in the winter, and if we ask them about mountain names, they do not agree with the Indians.

Major Mason has contended that the British explorers took the name Kara-

koram from the pass and gave it to the mountains; he argues that the name Karakoram mountains is a British introduction. He has produced no evidence of this. I ask him to produce his evidence. For it is upon this that he has condemned the name Karakoram. As far as I know, all evidence goes to show that the name was given both to the pass and the mountains long before British explorers went there. We cannot tell how the name originated. It is not a Tibetan word. Throughout history the Afghans have cherished the name Hindu Kush for their mountains, but neither of the words "Hindu" or "Kush" are Afghan. The history of Tibet is unknown. Marco Polo gave us one short glimpse into the past. In 1300 A.D. he said: "Tibet belongs to the Mongolian Khan." So conditions were different. The Mongolian capital was Karakoram, and, by a coincidence, the road over our Karakoram pass was the Karakoram road from India. This is no proof of the origin of the name, but it shows how unsafe it is to speculate about origins. We only know this, that the present Tibetan population has been slowly absorbing the name.

Moorcroft was our first explorer to introduce the name "Karakoram mountains" into modern geography. He did not go to the Karakoram pass. May I read you one sentence from his diary dated from Tibet, 1820: "Although I am unable to visit the countries which intervene between Kashmir and the Karakoram Mountains we had frequent opportunities of communicating with the natives of those regions and gained from them various notices which may not be unacceptable. It appears that those countries which lie along the foot of the Karakoram Mountains are . . ." and then he gives a list of names which is to-day quite correct.

Having read Moorcroft's diary I cannot believe that its author took the name from the pass and gave it, of his own initiative, to an immense mountain chain, without saying that he had done so.

In 1846 Cunningham followed in Moorcroft's tracks. He explored the south side of the Karakoram. He found the name applied to the mountains. It never entered his head that this name had been given to the range by the previous explorer.

Cunningham was followed in 1855 by Montgomerie, who spent ten years in triangulating Tibet and who had numerous observers over the country. Members of his party heard the name Muztagh used near the Tibet border and amongst their Turkistani followers, but they heard the name Karakoram in use on the south side. In those ten years no member of this large party ever suggested that the name Karakoram had been given to the mountains by British explorers. Mason wishes to introduce Muztagh, but he is doing the Turkistanis no service, for we have already given this name of theirs to the highest mountain of Southern Turkistan, and Stein has named the range of Western Turkistan the Muztagh Ata range.

Major Mason wishes also to introduce the compound name Karakoram-Himalaya into Tibet. In 1847 Cunningham gave a simple definition which fitted the ancient Sanskrit name into modern science. His definition was this: "The Himalaya Mountains form a natural boundary between India and Tibet." The Royal Geographical Society and the Survey of India have accepted this definition. Three presidents of the Royal Geographical Society have laid down that the name Himalaya should not be extended across the Indus into Tibet. The Indian Survey has never taken the name into Tibet. Colonel Ryder observed many high peaks in South-Eastern Tibet, but he never spoke of the Lhasa Himalaya. Sir Aurel Stein never spoke of the Kunlun Himalaya.

The Linguistic Survey of India has shown that there are races of men like the Gurkhas who are Himalayan and who are neither Indian nor Tibetan nor half-

breeds. The geologists also have their Himalayan zone and their Tibetan zone. Our geographical sub-division of Tibet ought to provide a basis for other branches of science

In every science there must be uncertainty when we pass the limits of exploration. But uncertainty need not mean confusion. To introduce such a name as Karakoram-Himalaya must lead to confusion, as it destroys the individuality of both the primary names. The double names will not be acceptable to other branches of science. And when you consider that this double name Karakoram-Himalaya is to be connected in Tibet with another new double name, Muztagh-Karakoram, surely you cannot agree to place such an unfair incubus upon the Tibetan people.

Sir FRANCIS YOUNGHUSBAND: I must confess I should like that part about the Muztagh pass to be called the Muztagh-Himalaya. When I went across in 1887 the name Muztagh pass was known and the natives used to speak of the mountains which that pass crossed as the Muztagh mountains. I have always disliked the name "black gravel"—for that is what Karakoram means—applied to those exceedingly high and snowy peaks where there is no black gravel at all, whereas one can understand the region about the Karakoram pass and the region to the east being called Karakoram because it is nearly all disintegrated mountain. I would certainly support Major Mason's views and say that when you go to that region round K_2 you are going to the Muztagh-Karakoram.

As regards the name Aghil range, I named that myself after the Aghil pass. When I went across there the people called the pass the Aghil Dawan. I applied the name of the pass to the range. And Aghil range has been accepted as the name of that range and is generally acceptable. As I say, I should like, for my part, to support Major Mason.

Dr. T. G. LONGSTAFF: What we want is simply to try and find out what is the most convenient nomenclature. Of course the whole thing is a mere convention. We did not make the mountains. We found them there and, having found them there, in order to describe them we want to place labels on them.

Some of those present may have read what I wrote in the *Geographical Journal* in January 1930 (vol. 75, p. 44), and I think I may possibly have influenced Major Mason in suggesting the use of the label Karakoram-Himalaya. I have since realized that there are grave objections to the name Karakoram-Himalaya, and so far I should think we probably see eye to eye with my respected friend, Sir Sidney Burrard. I recommend the name Muztagh-Karakoram for the whole mountain complex.

Let me now endeavour to clear up the question of names. As to Karakoram, you will find in most books and gazetteers that Karakoram is stated to be the capital of the empire of Chingiz Khan, about 1000 miles from the Karakoram pass. Various authorities translate the word "Karakoram" as "black gravel," or "black rocks"—more probably it means black screes. If Sir Sidney Burrard will pardon me, I should like to say that Karakoram is just as much Turki as Muztagh.

Sir SIDNEY BURRARD: But it is adopted by the Tibetans, whereas Muztagh is not.

Dr. LONGSTAFF: Well, sir, with respect, I think that Tibetans never use that pass, and there must be very few Tibetans who use Turki words. Furthermore, they never use the word Kailas. Sometimes they call it Tise; sometimes Kang-ri Rimpoche, which means the sacred ice mountain, or lord ice mountain. The names Karakoram and Muztagh are both descriptive and both used in many places. There must be Central Asian travellers here. How many Aktash do they know? Where there is a white rock, that place is called Aktash. How many Kizil Rabat?

I am very keen on the historical side of this question. The first man whose writings are of practical interest to the mountaineer is G. T. Vigne, who in 1835—ninety-five years ago—was the first European to penetrate up the glaciers. I have here a map of his journey ninety-five years ago, and he speaks of the Muztagh. He went up to the Saltoro pass that Sir Francis Younghusband went to look for in 1888. Vigne puts "Mustak" on his map for the main axis of the complex and "Kara Kurum" in smaller letters beside the "Pass to Yarkund," quite correctly indicating that the pass does not lie across the main axis of elevation (*vide G.J.*, 69, 1927, p. 329).

Sir SIDNEY BURRARD: It depends who he got his information from, whether Tibetan or Turkistan.

Dr. LONGSTAFF: From Baltistan. He went up from Khapalu to the Saltoro pass. When I went to Khapalu to ask about Vigne's route Rajah Shere Ali Khan was quite familiar with the name Saltoro pass (*G.J.*, 35, 1910, p. 624).

Up to 1890 Vigne's was the best map there was of the centre of the map now shown by Major Mason. Before Major Mason, Wood, De Filippi, the Vissers, or myself had made any explorations there Vigne's map showed the Saltoro pass marked on the right place. As a matter of fact, Slingsby, Arthur Neve, and I were the first Europeans to get to it. I have here also the map (1890) illustrating the explorations of "Captain F. E. Younghusband, King's Dragoon Guards, in 1888." On this is shown the Saltoro pass with the head of the Saltoro valley—all correct. Now why has that name been expunged from the latest maps? It starts historically in 1835; it was so well known that Colonel Younghusband went to look for it in 1888, and we went and crossed it in 1909.

The PRESIDENT: Who changed it?

Dr. LONGSTAFF: Why, sir, the Survey of India. I said in my paper (*G.J.*, 35, 1910, p. 627) that I knew that quite locally the people called the glacier Bilafond and they called the pass Bilafond La; but Shere Ali Khan called it the Saltoro pass and the maps called it the Saltoro pass until the Bullock Workmans changed it and were followed by the G.T.S. You have really not a better authority than Vigne, the man who went to the Saltoro pass in 1835. Also it is the only *important* pass into or out of the Saltoro valley.

But to return to Muztagh-Karakoram: the trouble is that it is really necessary to have two systems of nomenclature (*G.J.*, 75, 1930, p. 44): a system for maps which are on a small enough scale to show the relationship with other ranges, so that you can get a sort of schematic idea, and then what I call a local system, such as we require in the Alps, a topographical system of nomenclature of different ranges. You see I am withdrawing altogether the suggestion Karakoram-Himalaya which I made earlier (*G.J.*, 69, 1927, p. 330). I think Major Mason has very kindly not exposed me to the extent he might have done. I see Sir Sidney Burrard's point. I think he is absolutely right. The difference between the Himalaya and the Karakoram is so great that it would be a pity to mix them up. On historic grounds and on descriptive grounds I would like to see the word Muztagh restored, thus on further consideration going back on another suggestion of mine (*G.J.*, 75, 1927, p. 45).

One of my treasured volumes is a paper by Godwin-Austen of his travels in 1861 in the "Mustakh" range (*J.R.G.S.*, 34, 1864). As far as I know it is the first account of the actual glaciers, except for Vigne's visit to the Saltoro glaciers and Henry Strachey's visit to the lower Siachen glacier in 1848; but no one spent the time on the glaciers which Godwin-Austen did. He always called it the Muztagh range. So I think that with these really very authoritative usages respect for the historical record fully justifies the retention of the name Muztagh. If it were a case of voting I should vote for calling the whole complex between the

Hunza–Gilgit river, at any rate down to the Nubra Shyok, the Muztagh-Karakoram. I should like to see both elements of that nomenclature preserved. We must remember that our previous ideas of the structure of this range were not correct. Major Mason's map shows you that there is a definite continuous range from K_2 running diagonally past that big white patch that Major Mason has left blank, down to the great bend of the Shyok river. I know that range myself—of course not all of it—and I particularly know the Nubra Shyok end of it. From the top of the map before us down to the very centre and below the centre, it is one continuous range of enormous peaks. There is no known crossing of the range by anybody for the entire length of that diagonal curve across the map except across the Saser pass. Younghusband's Saddle is up at the head of the Siachen glacier, and there is possibly a passage for travellers from the Siachen to the Rimo glacier, which I hope Dainelli will manage this summer. But there is absolutely a continuous range. It does not fit in with the old lines. I cannot approve the bottom part of it being connected by name with Kailas because it really has no connection. I also know the Tibetan Kailas well, and it really has no connection with it. I therefore suggest that for the entire complex of the system that we are speaking of there is good historical tradition and warrant for reviving Vigne 1835, Godwin-Austen 1864—I do not think he has had the credit due to him—and that we should call the whole complex the Muztagh-Karakoram. There will also be this advantage: that in small-scale maps for which it will particularly be used, Muztagh-Karakoram being written from left to right, the word "Muztagh" will come on the west and the word "Karakoram" on the east, and will connect naturally and remind one of the Karakoram pass, but I cannot insist too strongly, as I did here twenty years ago, that the Karakoram pass has not got any vital connection with the mountains that we are discussing, and I wish also to insist that any system of names used is merely a human convention of convenience, and nothing else. But do respect history and the nomenclature of early travellers.

As regards the parallelism to which I drew attention in the *Geographical Journal* for June, 1910 (vol. 35, p. 625), I wish again to draw attention to those four rivers, the Shyok, the Nubra, the Shiggar, and the Gilgit, all flowing backwards round the corner. They all must be really tectonic valleys; they cannot be valleys that have been excavated by glaciers, because they are the wrong way; they are scratched by glaciers; smoothed by glaciers; straightened by glaciers; but they look to me to be due to original tectonic folding. The Nubra and the Shyok flow down from the north-west to south-east and join a river which is flowing north-west. The Shiggar river does the same; and the Gilgit also. So that our old conception of the ranges being parallel to the Indus does not work when we are on the ground, because elevation has taken place in two directions. It looks as if the original line of elevation may have been, roughly, an east-to-west elevation which was then crossed by cracking along a north-west to south-east direction, so that there is a criss-cross pattern. No map has ever been made that shows so clearly as this one of Major Mason's that from K_2 to the end of the bend of the Shyok there is an absolutely continuous range of mountains with only one pass, and that a glacier pass of 17,600 feet, namely the Saser, the lowest of all, and then, beyond to the north-west, the mountains run on beyond Hispar to Dasto Ghil, where the Vissers were, and right up to what is taken as the junction with the Hindu Kush. For the whole complex I do not think you can do better than use the label Muztagh-Karakoram.

I forgot to mention that I agree with De Filippi on the spellings Shayok and Rimu, and hope these will be seriously reconsidered.

Colonel C. H. D. Ryder: There are only two points I would like to make, one is that in making any change in the names in the area under discussion I hope

every one will be very careful. It is very much a No-man's land and the frontier has never been demarcated, and thus when applying names it is well to be very careful that you do not push, we will say, a name from Turkistan too far south, or push a name from Ladakh and that side too far north. The people, and even the Governments, of those or any other wild parts are very much inclined to attach great importance to a name when they are trying to claim more territory than they are really entitled to.

The other point is that I am always very much of a conservative, and the fact that a name has been current in a certain way for sixty years makes me feel very disinclined to go back to a name that may have been current before. It may even be a better one, but it would be very hard on those who have to learn geography if we in this room, a geographical society or any body like that, were to change a name unnecessarily. Once a name is given to a place for good or bad, I honestly think it requires a great deal of thought before it is changed. Names are so very much dependent on the way in which the first explorer happens to go. If he comes from the north he will give one name; if from the south another; if accompanied by Chinese interpreters he will give a Chinese name; if accompanied by other interpreters other names get used. I think that once a name has been current for a good many years I should be very sorry to make a change.

General C. G. Bruce: All I wish to say about the name is that in all my old maps I have always seen the ranges marked Muztagh or Karakoram, and further that I have always heard "Muztagh" used by the Baltis as a sort of omnibus word meaning snowy ranges. The language of the Baltis is a mixed language, and they might easily have adopted a Turki word. I have found that when talking to men in that part of the world, when they said "Karakoram" they meant the pass leading from Ladakh into Central Asia. Generally, no doubt, the Baltis do use "Muztagh" as an omnibus word meaning the snowy ranges, just as farther east they use the word "Barafwān," which merely means the snowy range, and as the Nepalese use Himal or Himal Shreni for the range and Himal Chuli for the high points generally.

Whenever I have heard "Muztagh" used among the Baltis it has always meant the snowy range. Personally I think it is rather absurd to use the word "Karakoram" for a snowy range as, after all, it only means black earth. I am quite certain that Tibetans east of Leh know nothing of the word "Karakoram," which is pure Turki, although it is possible that they may have heard of it as applying to the pass leading to Central Asia.

Colonel Philip Neame: My experience is only as a traveller in those parts, but I have been in touch with some of the top villages near the glaciers and the permanent snows on the south side of the range under discussion, and I have certainly heard the name Karakoram applied to the range and to the region by people I have met on the south side. Now I would say that the name seems to be quite well established, and the type of people who know it are certain Europeans, certain educated natives, Kashmiri officials, and local travellers such as transport men, shikaris, and village headmen. So it seems a pity to change this name and bring in one which, apparently, does derive from the north of the range. The name Muztagh is derived from the north of the range, whereas the Karakoram name does appear to be known on the south side, which I maintain is the side we should consider. We are considering this area from the point of view of the Indian Empire. Apparently the authority for the name Muztagh comes very largely from the traders on the trade routes. Those are mostly Yarkandis, and I can quite see that they, passing over a high snowy range, refer to it by the generic term, "Muztagh," just as we should say when going up any part of the Himalayas, "There are the snows."

I can give an analogy to that, for the same sort of thing occurs in several other parts of those mountains. For instance, Nanga Parbat has two names. It is known as Nanga Parbat from the south, the Kashmir side, and it is named Nanga Parbat on our maps, whereas it is known as Dumani on the north side, which I believe is the Gilgit name for it. However, one would not put that forward as a reason for renaming Nanga Parbat on all our maps and calling it Dumani.

General BRUCE: It is on most of the maps.

Colonel NEAME: Anyway, Nanga Parbat is the name from the Indian Empire point of view. Then there is one other analogy. Travelling in the Himalaya you find the local natives, where they talk Urdu, referring to the high snows as the "Bara pahar" or "Bara barf," which mean great hills or great snows. In the Garhwal Himalaya I have heard them refer to the high range in that way. You would not change the name Himalaya because local natives have not what one may call a proper name for the range. As a rule, in one's experience out there local villagers have no name at all for a range; they call the most conspicuous hill at the head of their nullah generally by the name of the village they live in. Round Haramosh I have heard four different names for it, but none of them Haramosh. Therefore I would advocate that when a name such as Karakoram has been known for many years, at any rate to the educated inhabitants of the region, we should maintain it and keep it for both the region and for the high range.

The PRESIDENT: Mr. Hinks, would you like to say a few words with regard to the map?

Mr. HINKS: Without having any knowledge of this country except that gained vicariously as editor of the *Geographical Journal* which, as you know, has published from time to time certain discussions upon this question, I may say that the point that has always struck me is the real difficulty of looking upon mountains there as ranges. Sir Sidney Burrard has defined a range as a "curvilinear alignment of peaks," but I feel from what experience I have of the matter that there is a good deal to be said for Dr. Longstaff's use of the word "complex," or something equivalent to it. I was glad to hear him use that word rather than "range," for there are many things called ranges on one side which do not appear as ranges from the other side—the Drakensberg, for instance.

A point which in the earlier discussions has not been brought out, but one that has appealed to me, is the desirability of, as far as possible, naming districts, big groups of mountains, rather than ranges. Dr. Longstaff pointed out that the practice in the Alps had now settled down into dividing up the mountains into groups separated by conspicuous valleys and celebrated passes. It seems to me from the general geographical point of view very desirable to have such a name for such a region as that between the Nubra and the Upper Shyok and south of the Saser pass. It would not debar it from being part of the Muztagh-Karakoram or any other general name adopted for the range. One wants a name for that group of peaks which is now known, roughly, as the Nubra peaks, although I do not know why the Shyok has been left out. It is most difficult to find proper names for those. I hope we shall not have to adopt the bad device of the botanists or gardeners who make compound names out of two adjacent names. They would like to call it the Shybra or the Nubrok, which is convenient, but ugly. That is all I have to say upon the subject of the large and general question.

The question of names of individual peaks will come very much later, but I would like to express the hope that as a result of this discussion we may continue it, first of all informally after this meeting and then perhaps at a later date in the summer have a round-table conference in order that we can put forward to the Surveyor-General of India certain suggestions, if there comes to be any agreement, in response to that very courteous and generous suggestion made by his

predecessor, the ex-Surveyor-General, that the Survey of India would be very glad to listen to the views of the Royal Geographical Society upon this subject.

Mr. J. H. REYNOLDS: With regard to the word "Muztagh," Robert Barkley Shaw, who I suppose is still the great authority on Turki, says in his Vocabulary that it means "a glacier; also a snowy mountain. See remarks regarding the application of such words as proper names under *Aqtagh*." There he says: "*literally*, white mountain, *i.e.* snowy range (as distinguished from mountain ridges on which the snow is not perpetual). Locally this word [and he is referring also to Muztagh] is often used as a proper name applied to the particular snow mountains of the neighbourhood; but its use in general geography should be supplemented, as in native use, by prefixing the name of the locality, as in English we say: the Brighton Downs, the Wiltshire Downs, etc. The neglect of this causes much confusion and false geography." So apparently the term "Muztagh-Karakoram" ought to mean that part of the Karakoram which has ice and snow. I have never been within thousands of miles of this district, but I presume that other parts of the Karakoram have ice and snow, which are not confined to the part to be called the Muztagh-Karakoram.

Mr. TOMBAZI: I have not visited that part of the Himalaya—my only travels have been round Kangchenjunga; but for the reasons put forward by Major Mason I am rather inclined to agree with the suggestion he made of renaming the mountains of the Karakoram district.

Major MASON: Dr. Longstaff has replied to a great many questions, and I think we might discuss the subject again at a round-table conference, however much we may dislike the sound of that word at present. We might preferably have a square-table conference and talk the question over and try to come to some agreement. I suggested the name Karakoram-Himalaya, joining the two words together, mainly because it has been coming into use for a good number of years. For the past twenty years the maps of this district have been headed Karakoram-Himalaya.

Sir SIDNEY BURRARD: Whose maps?

Major MASON: Several isolated maps published by the Royal Geographical Society or the Italian Geographical Society. For instance, Sir Martin Conway's map of the Baltoro was labelled so. However, I am not prepared to press this compound name, and Sir Sidney Burrard has given good reasons against its use.

Colonel Neame's statement that the word "Muztagh" is only known on the north is not correct. I asked the Mir of Hunza where the Muztagh mountains are, and he said, "To the East." His language is Burishuski and not Turki. He knows that the snowy mountains on his east are Muztagh. Longstaff has also shown us that in Vigne's day he got the name Muztagh from Baltis on the south. Godwin-Austen heard it on the south. I have heard traders both Turki and Tibetan (that is to say men from Leh) using the term "Muztagh" for the ice-mountains north of them on the Saser pass. Muztagh is a descriptive name for the ice-mountains (used originally by the Turkis), which every one in their neighbourhood has now come to know; the name Karakoram is not used for these ice-mountains by them.

In my paper I purposely mentioned our predecessors as little as possible, because I did not want to start a discussion on their respective merits or let it be thought that I was belittling their work in any way. I never have belittled the work of our predecessors and never will. But as Sir Sidney Burrard asked me to let him have some proof that Karakoram is used for the pass and not for the mountains, on the spur of the moment I have sent to the library for one book—that by Colonel Wood of his explorations with the De Filippi expedition. Wood

says, writing on the name Karakoram*: "The name is applied by the traders to the pass alone and not to the mountains. Dr. Thompson, who, in 1848, was the first European to reach the pass, found the same in his day (*J.R.G.S.*, vol. xix), and Hayward, in 1869, repeats the same information (*J.R.G.S.*, vol. xl). The latter appears to have been the first to suggest applying the name of the pass to the range, so it may be as well to remember that this extension of the name is purely due to Europeans."

I have no other evidence I can quote at the moment.

Sir SIDNEY BURRARD: I asked you to produce evidence as to which British explorer had taken the name from the pass to the mountains. That evidence is only that Colonel Wood says some explorer has done it.

Major MASON: He says "The name is applied by the traders to the pass alone and not to the mountains. Dr. Thompson . . . found the same thing." So did Hayward. Colonel Wood supports his statement with references.

Sir SIDNEY BURRARD: But British explorers before Hayward or Wood had found the name Karakoram applied to the mountains. I was quoting men of 1820 and 1840 who found the name Karakoram applied to the mountains by the natives.

Major MASON: I am sorry, Sir, I cannot say more than this. I do not know who applied the name to the mountains. I suppose it was applied to the mountains by the people at Dehra Dun.

Sir SIDNEY BURRARD: You only have to look at Moorcroft's Diary of 1820, before the office at Dehra Dun was built.

Major MASON: Moorcroft applied it generally to the undetermined mountainous watershed between the Tarim and the Indus basins, on which is situated the Karakoram pass—simply to the mountains at the watershed. The name of the pass was the only name he knew on the whole of those mountains. Neither Moorcroft nor Cunningham saw the Muztagh.

Sir SIDNEY BURRARD: Moorcroft got the name from the Tibetans and applied it to the mountains.

Major MASON: Is there any proof of that?

Sir SIDNEY BURRARD: There is his Diary and Cunningham's book of 1847.

Major MASON: I do not think Cunningham ever actually went anywhere near those mountains.

Sir SIDNEY BURRARD: He explored the whole Indus valley, and surely the people of that valley, who are always seeing a mountain in front of them, have some voice in the matter.

Major MASON: I do not think the people of the Indus valley can see the mountains we are discussing.

General BRUCE: Have not they got it from those Aghil travellers who ply continually between Leh and the Karakoram? They go backwards and forwards over the Karakoram and Saser passes. Therefore they gave the name to the pass.

Major MASON: Those travellers use the name for the pass only and not for the mountains.

Sir SIDNEY BURRARD: What I say is that no British explorer took it from the pass and gave it to the mountains.

General BRUCE: It is said he got it from the traders who were his transport.

Sir SIDNEY BURRARD: He got it from the Tibetans.

General BRUCE: They were half-castes. It would not be a Tibetan name because it is pure Turki.

Sir SIDNEY BURRARD: Moorcroft is before Vigne and Cunningham is in 1847,

*'Explorations in the Eastern Kara-koram and the Upper Yarkand Valley,' Col. H. Wood, p. 7.

and Dr. Longstaff quoted Godwin-Austen. On Godwin-Austen's grave there are the words: "He explored the Karakoram range."

Dr. LONGSTAFF: Vigne was the first traveller who went in. Moorcroft never set foot on the ice. Vigne practically went up.

Sir SIDNEY BURRARD: Surely inhabitants 50 miles from the mountains have as much right to have a voice in the name as those who live on the ice.

Dr. LONGSTAFF: No one has ever lived in those mountains.

Sir SIDNEY BURRARD: The people living in the Indus valley have always given the name Karakoram.

General BRUCE: Not in the lower part of the Indus valley. The Baltis still use the name Muztagh because they think it is the name you will understand.

Sir SIDNEY BURRARD: What happens in many places is that there are two different sets of people and they are each using a different name.

Dr. LONGSTAFF: No Tibetan ever goes over the Karakoram pass.

Sir SIDNEY BURRARD: It is not people who cross but who live in sight of the mountains.

Dr. LONGSTAFF: No Tibetans live in sight of those mountains.

Sir SIDNEY BURRARD: The people who named the Himalaya are those who live in the plains of India.

The PRESIDENT: I think I must now close the meeting. It seems that we have had a useful preliminary discussion, and we shall hope that it will lead eventually to the conference that has been suggested. It is quite certain that the whole of this area must be studied by the aid of Major Mason's map. I do not believe that any here can fully understand the arguments that Major Mason has brought forward without a study of that map, and I personally should be very glad if the Society were able to publish it, but map-publishing is expensive. If we could publish something like it, it would help all interested in the subject, because there is no map now in existence which contains the information that that map does. I am sure we are all grateful to Major Mason for introducing the subject; and for the production of the map. In your name and the name of the Society I thank him

Note on Sir Sidney Burrard's paper, "The Geographical Representation of the Mountains of Tibet," published in the Proceedings *of the Royal Society, Ser. A, vol.* 127, 2 *June* 1930.

This paper was received by the Royal Society on March 18, and was read, after publication, on June 12. It seems convenient to note here its principal points, for consideration with its author's contribution to the above discussion.

In the discussion Sir Sidney Burrard maintains that "the Karakoram mountains stand in Tibet. The Tibetan population live on the south side of the range." He is thus not speaking of the mountains to which Major Mason's proposals refer, but to mountains much farther east which he believes are continuous with what is generally meant by the Karakoram.

Similarly the title of the paper published by the Royal Society limits it to the mountains of Tibet, of which country "the Karakoram forms the central backbone which is the second highest range of mountains upon the earth . . . The main features of the Karakoram were determined in 1855–1865 by Colonel Montgomerie's surveys. . . . In 1870 . . . its eastern prolongation was unknown. In 1874 the survey sent the pundit Nain Singh to explore Central Tibet. . . . The view adopted by the Survey, 1878 to 1880, was that Nain Singh's range was probably the easterly continuation of the Karakoram. . . . In his book published in 1909 Sven Hedin also showed that the prolongation of the Karakoram range through Central Tibet was 2° further north than had been thought. . . . Since 1914 the surveys of De Filippi and Wood have given additional confirmation to the correct-

ness of the accepted alignment." The paper then criticizes Major Mason's proposed revision of the Karakoram ranges, but without indication that neither Montgomerie nor De Filippi and Wood in 1914 nor Mason was concerned at all with Tibet. The argument thus briefly traced above is therefore a little difficult to follow. The ill-defined watershed in the neighbourhood of the Karakoram Pass is at one time "a ridge carved out of the northern slopes of the Karakoram range," but a little later the "great divide" and "the high Karakoram crest-line."

It is more difficult to follow Sir Sidney Burrard in his statements: (1) that Colonel Wood's map "showed that there was no Aghil range." His map did not extend so far; (2) that the feeders of the Yarkand and Karakash rivers flow straight away from the main divide without encountering any serious obstacle: there is at least the gorge of the Karakash; (3) that the publications of De Filippi's and Wood's surveys have taught us that no trough exists behind the Karakoram. He has himself referred in the preceding paragraph to the deep trough of the Shaksgam which lies behind the highest peaks of what most people, but not he, would call "the real Karakoram Range"; (4) that the old alignment had been adopted in consultation with geologists—a suggestion made in the *Journal* for September, 1929, (vol. 74, p. 276) but repudiated by Sir Sidney (*G.J.*, 75, 1930, pp. 35–37).

The paper is written to advise "geologists and meteorologists and all who are interested in small-scale maps to consider the questions at issue before they accept the new geographical representations," but it gives no hint that at the invitation of the ex-Surveyor-General of India the whole subject is in active discussion by this Society.—ED. *G.J.*

At the request of the Editor, Dr. Emil Trinkler has kindly sent the following interesting contribution to the discussion :

The name "Aghil-Karakoram" suggested by Major Mason for the ranges stretching north of the main Karakoram Range is certainly worth considering. All the ranges in which also the Aghil Pass and the Karakoram Pass are situated belong together as well from an orographical as from a geological point of view. Therefore I do agree with Major Mason's proposal in calling all these ranges between the Western Kunlun and the main Karakoram Range the Aghil-Karakoram, or Northern Karakoram Range, if we call the Kailas Range the Southern Karakoram.

Perhaps the name of "Karakoram" alone would do for the high range of snow peaks. But if these mountains are to have a special name, "Muztagh-Karakoram" would really be the best name to give, if not simply the Karakoram Range.

The name "Kailas-Karakoram" should be altered. The high snowy mountains called Kailas-Karakoram have nothing to do geologically with the Kailas Mountain, which is so far away, and which, from a geological point of view, is only a pyramid carved out of a sedimentary filling of Pliocene Age, the strata being only slightly disturbed. Furthermore it is still unsettled whether topographically the "Kailas-Karakoram" finds its continuation to the east in the mountains round about the Kailas. Very probably we have to look for its eastern continuation in the ranges north of the Kailas. Therefore I would suggest altering the name of Kailas-Karakoram to "Southern Karakoram Range."

Thus we might have the

Aghil-Karakoram	=	Northern Karakoram Range.
Muztagh-Karakoram	=	Main Karakoram Range.
Kailas-Karakoram	=	Southern Karakoram Range.

Dr. Voûte then presented to Sir Francis Younghusband the Gold Medal of the Royal Netherlands Geographical Society, and Diplomas conferring Honorary and Corresponding Membership of that Society were handed to Sir Charles Close and Mr. Hinks respectively.

M. MAURY, speaking on behalf of the Société Royale Belge de Géographie; said: La Société de Géographie de Bruxelles, désirant, à l'occasion des fêtes du Centenaire, exprimer toute sa sympathie pour les dirigeants de la Royal Geographical Society, et honorer en même temps deux géographes éminents, m'a chargé de remettre en son nom le diplôme de membre d'honneur à Sir Charles Close, Président, et celui de membre correspondant à M. Hinks, Secrétaire. Elle m'a prié également de leur exprimer toutes ses félicitations.

M. Maury then handed to Sir Charles Close and to Mr. Hinks Diplomas conferring respectively Honorary and Corresponding Membership of the Société Royale Belge de Géographie.

The PRESIDENT: We now commence a series of papers on the Habitable Globe, and are very fortunate in having persuaded some eminent geographers to come and speak to us. We have three papers on a subject which perhaps is the most important of any which can be graced with the term "human geography." Amongst those geographers there is a very distinguished man of science, Professor Penck, who has promised to give us a paper on the alleged desiccation of Central Asia, and I will first call upon him, and then upon Professor Gregory and Mr. Leakey.

CENTRAL ASIA

PROF. DR. ALBRECHT PENCK

FOR centuries Central Asia has been the centre of unknown Asia; since the last fifty years it has been the object of so many explorations and researches that even the geographer who stands outside can venture to discuss some questions of importance which were in the foreground of exploration. If he will express his opinion on Central Asia as a part of the habitable globe, he must say at first to whom he owes his knowledge. Many men who have staked their lives and have crossed with indefatigable courage and sharp eyes the high mountains and the deserts, ought to be enumerated. If I mention only two it is to show to whom I am indebted most: Sven Hedin and Sir Aurel Stein are my great masters on the geography of Central Asia.

Whoever speaks on Central Asia must confess what is his conception of this region of the world. There is a diversity of opinions in regard to what Central Asia is. Humboldt laid much stress on its central position in the continent, but indicated no sharp borders; Richthofen followed physiographic reasoning which allows a sharper definition. He observed that all products of the degradation of the land remain in Central Asia and are not transported into the sea. But this is true for all regions which have no outlet to the ocean, whatever their geographical position may be. Richthofen excludes indeed those regions from

Central Asia which in recent geological times were drained into that interior sea which stretched during the later Tertiary Period in the east of the Mediterranean; he does not include therefore Turan in his Central Asia. But there are besides this vast tracts of Persia and Asia Minor which since long time have had no oceanic drainage and continue to have none, and in which all the waste of the land remains, though they have a true peripheral situation in the continent and are neighboured by the sea. These countries also are not included by Richthofen in his Central Asia.

His distinction between central and peripheral regions in a continent is based essentially on climatic facts. The waste of a land remains on that land, where aridity consumes the water. Therefore, an arid climate is the cause of all central regions in the sense of Richthofen. An arid climate however is not always characteristic of the central parts of a continent. Most of the arid regions of the globe lie excentrically; in lower latitudes they stretch to the west coasts of the continents and directly border the ocean. I hesitate to identify the central regions of a continent with arid climate; there are as well peripheral parts which since long geological times are under the influence of a climate of extreme dryness. The definition of a central region in the sense of Richthofen fits excellently for the Sahara, but nobody would apply the designation of Central Africa to that desert. Therefore, when looking for a definition of the central part of a continent I lay stress in the first place on its central position and make use of physiographic or other facts only in order to recognize reasonable boundary lines. For different continents different ways of reasoning can be followed. The purpose must always be to recognize the entity of a larger region.

The climate plays a principal rôle. Central Asia rises out of the arid parts of Inner Asia, but it is not a dry region in its whole extent. It gives origin to large rivers; most of them run into the surrounding deserts or desert-like countries. The Amu Darya and Sir Darya end in Lake Aral; the seven rivers of the Northern Tien Shan evaporate with the waters of Lake Balkhash; Lop Nor or its substitute is the terminal lake of the Tarim. Other rivers of Central Asia, the Hwang Ho and Yangtze Kiang, the Mekong and the Salween, the Brahmaputra and Indus, indeed reach the sea; this is due to the fact that they are not totally absorbed in those arid regions through which they pass. They may be compared with the Nile. Large rivers can never originate in an arid climate. Here all precipitation is consumed on the spot by evaporation. This does not always happen immediately. The water of violent rain-showers runs a certain length on the surface before it disappears. Thus we have in nearly all regions of the world with an arid climate ephemeral watercourses, which in Turkistan are called "sai," while its rivers are called "darya." The sais display in their short course the same actions as all running water: they erode and accumulate according to the same laws as the big rivers. They create in arid tracts the same surface forms as are met with in humid regions. But these forms do not unite systematically into larger ones and the land has not that harmony of slopes which is so characteristic of all humid climates. There is no uninterrupted inclination towards the sea or towards an interior basin. Besides this, wind-action becomes effective; sand and dust are easily blown away and redeposited in other localities. Aeolian erosion and aeolian deposition however are in arid

regions subordinate to erosion and deposition by water, as long as sandy and dusty soils do not predominate. Where this is the case, wind-action also becomes visible even in humid regions; it is not restricted at all to the arid one.

From the morphological standpoint the tracing of a boundary around the arid regions is not easy. The desert of Helwan in Egypt is as water-worn as any limestone region in Europe. The action of wind here seems to be insignificant, if it is not recognized in the absence of fine-grained products of decomposition on some surfaces of the limestone. On the other hand, sandy tracts in moist climates often have a desert-like appearance. Easier it is to judge from the vegetation. Forests are always absent from arid regions; the vegetation here is always scarce, more or less uncovered by it are open spaces. Plantless deserts are a climax of aridity. But deserts are not only the products of an arid climate; they occur also in cold regions. It can become difficult to distinguish dry deserts from cold deserts. This concerns especially Central Asia. One fact gives much help here, that is the existence of terminal lakes with salty water. Here not only that water evaporates which falls as rain or snow on the surface of the lake, but also that water which runs into the lake from the humid or nival neighbourhood. In mountainous regions these salty terminal lakes afford good means of drawing the *arid line* which separates the arid climate from the adjoining climate. They lie in the arid region, their feeding grounds beyond. The arid line is not identical with the border line of interior basins, the rivers of which disappear in their dry interior; it lies always within that border line; arid regions occupy only a part of those regions which have no outlet to the sea.

It is not surprising that our knowledge about the arid line in the continents is still very limited. There is an essay on it in North America, a good investigation on it in South America, and it has been traced through Africa. Dr. Lotte Möller is studying the extension of the arid regions of Asia both in the horizontal as well as in the vertical direction; it is to be hoped that the results of her research will appear next year. My observations on the arid parts of Central Asia have only a provisional character.

In Western Tibet there are salty terminal lakes at elevations of more than 17,000 feet. Here the arid line can be expected at a height of more than 20,000 feet. In the neighbourhood is the desert Aksai Chin, which has the character of a dry desert at 16,000 feet. Similar evidence is found in Central Tibet. The country is sprinkled over with salty terminal lakes at heights of 15,000 feet which receive their water from the neighbouring higher mountain chains. The arid line is here everywhere to be looked for at elevations of about 18,000 feet. Towards the east its height diminishes and the arid line may be at less than 13,000 feet; the salty Koko Nor has an elevation of only 10,000 feet. At the frontier of China proper it sinks down rapidly; the old empire lies everywhere above it. Also in the western direction there is a decrease of the height of the arid region, it embraces still the plateau of the Pamirs (13,000 feet) as indicated by the saltness of the Qara Köl. But on the western side of the plateau below the snow-line we meet with humid conditions which extend nearly down to the foothill region. Here at elevations of about 4000 feet the arid line makes its appearance. In the interior of the Western Tien Shan the salty Chatir Köl indicates a height of the arid line of about 13,000 feet. Farther north, the brackish water of the Issik Köl demonstrates that this lake is still in

the arid region which must reach here higher than 5500 feet; but at the northern foothills of the mighty mountain chain it extends only up to 4000 feet. Very high it is however on the southern foothills of the Tien Shan on the Muzduk. Judging from the researches of Dr. Groeber it seems to be here on the south side at more than 10,000 feet. Only in a shaded part there are trees at 9000 feet. In the Eastern Tien Shan the arid line is far lower. There are forests on the north side which extend down to 3300 feet, where the dry appearance of the Dzungaria begins. In the south side however the arid character extends up to heights of 7000 feet or more. Very high also is the arid limit on the opposite side of the Tarim basin on the Kunlun and Altin Tagh. The land is dry here even at elevations of more than 13,000 feet. The arid line does not sink much from the highland of Tibet to the southern rim of the Tarim basin, it does not sink much over the basin and makes its rapid descent to the north in the Tien Shan mountains. Thus the basin of the Tarim has no considerable effect upon the situation of the arid line. The arid country between the Himalaya and the Tien Shan forms a vault with reaches highest in Western Tibet, especially in the rain shadow of the Karakoram, and which bends down on the west side of the Pamirs, on the north side of the Tien Shan, and eastward slowly to Mongolia and steeply to China proper.

This grandiose arch of the arid region is surmounted by mountain ridges covered with eternal snow. The snow-line makes a similar arch over Central Asia which culminates at more than 22,000 feet in that region, where the arid line reaches highest, in Western Tibet north of the Karakoram. From here it dips down gently in all directions. In Eastern Tibet and on the Pamirs it is met with at 18,000 feet; this is also its height on the southern border of the Tarim basin on the Kunlun. It is still over 14,000 feet on the northern border of the ridges of the Tien Shan, but in that mountain chain it sinks down rapidly to the north, as shown by a map of Machatschek. The same occurs west of the Pamirs on a smaller scale, along the Nan Shan in the east, and in the Himalaya on the south. Here the snow-line lies about 7000 feet lower than in the adjoining parts of Tibet. But the bending down of the arid line is far more considerable. It sinks below the Himalayas, and where it reappears on the south-western foothills of that mountain chain in the Salt range it has no greater height than 2000 feet. It curves down 16,000 feet, more than twice as much as the snow-line does.

The arches of the arid line and the snow-line in Central Asia are due to the high elevation of the continent just where the arid belt of the old world ends, the beginning of which is at the shores of the Sahara, from whence it extends through Arabia and Persia. Central Asia is dry on account of the arrangement of the climatic belts and its aridity is enforced by the arrangement of the surface features. The high mountains of the Himalayas, of the Pamirs, of the Tien Shan, and of the Nan Shan keep off the atmospheric moisture from the interior plateau of Tibet and from the basin of the Tarim which is surrounded on three sides by high mountains, and which is only partially open on that side from which no sea breezes can come, that is, towards the north-east. The insignificant moisture that can be brought to Central Asia is precipitated on the outer sides of its mountainous border, and only a very small part can enter the interior. Therefore both the arid and the snow-line lie here very high, and

bend down everywhere on the circumference. By this, Central Asia is a unique part of the world, and it is unique also by the fact that the arid-line comes here very near to the snow-line (3000 feet), so near that it may be questioned what is intercalated between them. It is not a well-watered humid region which extends here. There is a country covered with snow during the winter and pretty dry during the summer. It may be called seminival and can be compared to a certain degree with the arctic Tundra region. The distance between the two limits increases if we approach the circumference. Here it becomes everywhere 7000–10,000 feet, and it is only here that we find a true humid climate between the two lines with forests and the possibility to practise agriculture without irrigation. That zone is absent from the interior of Central Asia.

There is still another region of the world where we meet with similar features, that is the Puna de Atacama, where we have the sea coast in a desert country and where we ascend through arid regions until we reach heights which during the winter are snow covered and are dry during the summer. Here, too, the arid region touches the seminival one, but only a few mountain tops merge into the region of eternal snow, while in Central Asia extended mountain chains are covered with nevé and feed glaciers. This causes the difference between the Puna and Central Asia. There are no rivers arising from the Puna, while Central Asia gives rise to an important number.

Central Asia owes its daryas to the nival and subnival climate of its roof; all derive their water from the melting of snow or glaciers. Their feeding by rain or springs is insignificant. In spring or in summer they are fullest, during the winter feeble. They bring water into the arid region and carry with themselves from the high regions enormous quantities of debris which they deposit in the form of alluvial fans at the foot of the mountains. They have a freight of sand and mud which accompanies them until they disappear. This freight is then seized by the wind which blows the sand into dunes and carries away the mud in the form of dust. This is the origin of the vast deserts of sand which extend in the north of Central Asia, of the kums of Turan, and of the dunes in the desert Taklamakan in the basin of the Tarim. Here and there the sands are accompanied by loess, whilst along those rivers of Central Asia which reach the sea there are neither sand-fields nor loess, with the exception of the Hwang Ho.

Richthofen has the great merit of having recognized loess as an aeolian deposit. But it has not its origin in the decomposition of the rocks of deserts or steppes; it comes like the sand of many dunes from river deposits which are rearranged by the wind. The mud is transported farther by the wind until it was redeposited. This happens even on the barren ridge of the Kunlun up to 14,000 feet, as observed by Sir Aurel Stein; this is the rule in corners at the foot of the mountains which in Central Asia are surrounded by a belt of loess. In the Lop Nor region older river or lake deposits are strongly eroded by the wind, and many loess deposits may come from here, but others are derived directly from the mud which annual floods have left behind, and which was not fixed by vegetation. Rivers which are very broad during the summer and narrow in the winter are the birthplaces of many loess deposits. Thus it is nowadays in Central Asia, thus it was in South-Eastern Europe during the

Ice Age. Then the Danube was swollen during the summer months by the waters coming from the alpine glaciation, and very low in the winter which was dry in the east of the ice caps of Northern Europe and of the alpine glaciation. The mud left by the Danube in the low plains of Hungary and near the Black Sea was whirled up by continental winds and spread over the neighbouring land.

This is also the origin of the loess of China. During the Ice Age the Hwang Ho brought thither in the summer months the waters and the mud derived from the Central Asiatic glaciation, which in winter was swept farther and deposited as loess in great thickness on the hills and mountains of Shansi, Shensi, Kaṇsu, and Honan. From here it is eroded nowadays by rivers in innumerable gorges and brought to the great plains where it becomes again the prey of the wind so that the air is often full of dust. Thus it was during the Ice Age in the basin of the Mississippi. This mighty river was then during the summer full of the muddy melting water of the North American inland ice, whilst it was low in winter. Then the mud left behind by the flood was carried by the wind into the neighbourhood. Along the Mississippi are the loess deposits of North America, and not in the neighbourhood of the salt-steppes of the Great Basin. There is no loess in the steppes and deserts of Africa, and if storms bring dust from the interior of the Sahara, the deposit in Tripoli is not true loess. The origin of the loess is a very complex one; different causes—glaciers, rivers, and wind, nival and arid conditions—must work together. This happened during the Ice Age in the northern hemisphere, but at present it occurs only in Central Asia.

Central Asia is only a part of that belt of arid climate which extends from the Atlantic through the Sahara, through Arabia and Persia, into the interior of Asia. The plains of Turan are arid too, partly desert; but they have no rivers of their own, and on account of their low altitudes they do not touch the nival or subnival climate. Mongolia belongs also to the dry regions of Asia, its Gobi is in part a true desert, but except in its western basins it does not receive rivers from the neighbourhood. Its arid climate is always separated from the nival and subnival one of those mountains by a humid belt with forests. Only in Central Asia the arid zone comes so near to the region of perpetual snow that the humid climate which elsewhere is intercalated between both plays a rôle only on the circumference. That is the consequence of the meeting together of a climate originally arid with very high and continuous elevations. Such conditions do not occur in Turan and Mongolia; in both regions very extensive peneplanations have taken place; the mountains which once existed in the neighbourhood of their sandy deserts are perfectly worn down and the sands of the Gobi are as it seems to be derived from sandstones. Northern Turan and the Gobi represent a state of evolution which Central Asia will reach only after millions of years, and being very far from that terminal state, it differs essentially from its desert neighbourhood. It belongs to that belt of recent elevations which we trace from the Alps through Southern Asia, but from a tectonic standpoint it is no unit. The thrust structure of the Himalayas meets with regions of recent uplift of different kind which on the plateau of Tibet was accompanied by volcanic action.

The snow-line and the arid line are the most important border lines for

human life on the land. The snow-line is nearly impassable for human habitations; only in Europe are a few houses to be found above it: cabins for mountaineers and meteorological observatories. The arid line acts not so sharply. Man can penetrate into the region of arid climate and abide there if water can enter it, either in the form of rivers or in a subterranean way, as ground-water appearing in springs. Springs allow grazing and hunting in extensive arid regions, but they do not afford water enough for the settlement of a great number of men. Only where rivers flow into arid lands and bring much water into them are the conditions given for a large population even in an arid region.

In Central Asia extensive tracts in the arid region are quite uninhabitable. Nearly everywhere a broad belt below the snow-line is devoid of men; where in Tibet the arid line is only 3000 feet below the snow-line, the country is totally deserted. On a surface of 230,000 square miles there is not a single human abode, there are no herds, only now and then hunters or gold-diggers enter that vast tract, and caravans cross it from India to the basin of the Tarim. Another extensive region of Central Asia is as empty of men: the sand desert of Taklamakan is uninhabited and uninhabitable; the same holds good for the rocky deserts east of Lop Nor. At least 150,000 square miles in the basin of the Tarim are totally devoid of men. On 380,000 square miles of Central Asia there is no inhabitant, and on 1,000,000 other square miles there are nearly none. It is difficult to say anything on their number. If we take the data of the anökumene which Machatschek gives for Russian Turkistan, it can be assumed that we may have here two inhabitants to a square mile. This would give two millions in the arid regions of Central Asia, besides those large deserts we have already mentioned, and which are not the only deserts of our region: there are still many others sprinkled over the arid ground. They are included in our 1,000,000 square miles, which may have a somewhat denser population now and then where springs rise or little rivers disappear.

Narrow is that peripheral belt of Central Asia where agriculture is possible without irrigation, and its narrowness is strengthened by its mountainous character. Only on the bottom of valleys and on gentle slopes are fields possible, as in parts of South-Eastern Tibet, in Tajikistan, and in the valleys of the Northern Tien Shan. But nearly everywhere agriculture is helped here by irrigation. Near to that belt of agriculture the arid conditions are less severe than usual, and the population can become larger than elsewhere in the arid regions; there may be altogether 300,000–350,000 square miles within the circumference of Central Asia which on account of their semi-arid to humid conditions could nourish ten to twelve inhabitants to the square mile; they may contain three to four million inhabitants.

The essential scenes of human life in Central Asia are its oases. Most of them lie in lower altitudes, many near to the sandy desert. In general they extend over the alluvial fans which are accumulated by the rivers at the foot of those mountains from whence they come. Here the rivers can be easily divided into the branches necessary for irrigation, or their water trickles down into the loose soil of the fan and reappears farther down in moist places which allow cultivation. Widespread is the method of catching these waters subterraneally by galleries. In Russian Turkistan the cultivated area of the oases is estimated

at 70,000 square miles; it is far less in Chinese Turkistan in the province Sinkiang. Sir Aurel Stein has indicated its extent on a map of the Tarim basin. A rough evaluation gives less than 5000 square miles. If we assume the same figure for the oases north of the Tien Shan, especially in the valley of the Ili, we get for the area of all the oases in the Chinese part of Central Asia approximately 10,000 square miles: a seventh part of the surface of the oases in Russian Turkistan. If the density of the population is assumed to be the same here and there, we have a population of six millions on 80,000 square miles of the oases. More than half the population (11·5 millions) of Central Asia lives in the oases which occupy less than one-twentieth part of its whole surface (1,790,000 square miles).

The following table shows what we believe that the distribution of the population of Central Asia may be in comparison with its actual political divisions and their assumed population.

Deserts	380,000	square miles	—	inhabitants
Other arid land	1,000,000	,, ,,	2,000,000	,,
Semi-desert and humid	330,000	,, ,,	3,500,000	,,
Oases	80,000	,, ,,	6,000,000	,,
	1,790,000	,, ,,	11,500,000	,,
Russian Turkistan* ..	400,000	square miles	7,000,000	inhabitants
Sinkiang	580,000	,, ,,	2,500,000	,,
Tibet	810,000	,, ,,	2,000,000	,,
	1,790,000	,, ,,	11,500,000	,,

All life in the oases depends on the quantity of water which the rivers bring down from the nival and seminival regions. The most important daryas are fed by glaciers. The rivers of Central Asia can be compared with thermometers in which the variations of the expansion of the quicksilver in the bulb are expressed by ample oscillations in the tube. Little variations in the nourishment of the rivers greatly affect their length. These variations may be due to variations in the snowy precipitation of the higher regions or to variations of the temperature there, which increase or diminish the melting of the glaciers. They can be large in wet years or in dry ones. A decision as to which will be the case is impossible on account of the want of observations. Let us imagine that a river of a width of 50 metres which terminates in the sands gains 100 kilometers length, then its surface increases by 5,000,000 square metres. If we assume that the evaporation is the same as on Lake Aral, that is, 1 metre in the year, then evaporation has to take away 5,000,000 cubic metres more than before during the year. That corresponds to $\frac{1}{6}$ cubic metre in the second. Such a little amount of the quantity of water in a river would increase its length for 100 kilometres.

It must be borne in mind however that when entering the Tarim basin the rivers are not only consumed by evaporation but also by the soaking of their

*The former General Government of Turkistan excluded the Transcaspian province and the greater part of the province Sir Darya, excluded Khiva, but included Bokhara. Intentionally only round figures are given.

water into the sand. A lengthening of a river for 100 kilometres will therefore be accompanied by a far greater loss of water than $\frac{1}{6}$ cubic metre per second by evaporation. Let us assume that loss to be ten times as great, then a prolongation of 100 kilometres of a river will be due to an augmentation of its discharge of 2 cubic metres per second. That is a quantity which in a large river cannot be recognized without exact measurement. Therefore, if there are ruined places in the desert of Taklamakan even more than 100 kilometres below the actual settlements it is not necessary to assume a considerable change of climate: a slight diminution of the river discharge can be the cause. This diminution may be due as much to a temporary lowering of the precipitation in higher regions as to the disappearance of some glacier tongues which had extended in a preceding time. I do not believe these quantities of ice to be the relics of the Ice Age; it is not probable that any of them have survived the seven thousand years which we know to be the length of post-glacial time. I think it will be the case of one of those post-glacial extensions of glaciers which now become also known in the Alps.

The question is however a rather complex one. The over-saltening of the soil may be the cause of the migration of a settlement. If in an oasis all water is consumed by irrigation, the soil becomes finally too salt and infertile; the oasis must be left and new irrigation will only be possible at a place upstream. This new irrigation will consume the water which was formerly used in the old oasis, and the latter will become deserted. We make these reflections, which could be easily extended, in order to show that it is not at all well founded to conclude, from the shifting of the oases in the Taklamakan desert, that there have been climatic changes in historical time. Sir Aurel Stein has accumulated such an amount of evidence by his finds in the Lop Nor region and in other oases that there can be no doubt of the persistence of desert conditions in the basin of Tarim for more than two thousand years, and Leo Berg has shown how insufficiently founded is the belief in the desiccation of Russian Central Asia. Minor oscillations in the heights of the snow-line and of the arid line cannot be doubted; these minor oscillations become very effective here on account of the plateau conditions of the high ground and they affect the life in the low regions by means of the rivers.

With its $11\frac{1}{2}$ millions of inhabitants Central Asia has no great weight in the population of Asia and of the whole Earth. In the future too it cannot be otherwise. A region which over more than three-quarters of its surface suffers from a pronounced arid climate can never become rich in men. But it may become more populated than it is now. It may be that by the construction of wells in suitable places the grazing-ground in the arid regions could be extended so that there would be more inhabitants to the square mile—let us say four instead of two; this would mean that we had to reckon in that region with 4,000,000 souls instead of 2,000,000. It is probable that in the semi-arid and humid regions the population could be far denser than nowadays—there are whole valleys in the Northern Tien Shan which have been abandoned by their inhabitants. It seems to be possible that those regions could nourish 10,000,000 instead of 3,500,000—a density of thirty to a square mile is met with in the high valleys of the Alps—but more is not probable. As to the oases, not all the water is used for irrigation. Amu Darya and Sir Darya bring into Lake Aral every second 2000 cubic

metres, that means that on its surface evaporation takes off 1 metre of water from its surface. An area equal to that of the lake could be covered annually with 1 metre of water which is not used for irrigation. That is more than the precipitation would yield, but irrigation in Turkistan uses one litre per second on a hectare, that means in the year 3 metres of water on the irrigated surface. Therefore only the third part of the area of Lake Aral could become irrigated by the water which evaporates useless on its surface. The same reasoning is good for Lake Balkhash. An area of about 11,000 square miles more than at present could be irrigated in Russian Turkistan if all available water was used. But it is a question if this can be possible, for only that water can be used for irrigation which can be brought to a place which can be cultivated. If the surface features do not allow the construction of irrigation canals, water will run away without being used. Therefore an augmentation of the cultivated ground in Western Turkistan by 11,000 square metres, that is by 16 per cent. of its present area, will be the uttermost limit which could be imagined.

The situation in Eastern Turkistan is a different one. Here, too, not all the water is consumed by irrigation. For a distance of 750 miles the Tarim flows through a perfectly dry country before it disappears, but there is no longer a permanent terminal lake, and at the first glance it seems that all running water is evaporated directly from the rivers, which in the whole basin may have a length of 1600 miles. If we assume that each has a width of one-thirty-second of a mile they represent a surface of evaporation of 50 square miles on which only 4 cubic metres could evaporate in the second. The discharge of the Tarim observed by Sven Hedin is far greater. There must be therefore still other surfaces of evaporation besides the rivers. We recognize them partly in those thirty-five ground-water lakes which accompany the lower Tarim, and besides these there are many swampy regions along the river which become inundated during its high-water stage. These evaporation surfaces are far greater than that of the rivers; they do not seem to extend over more than 800 square miles. The mean discharge of the Tarim consumed by evaporation does not surpass 60 to 70 cubic metres in the second, which is in accordance with Sven Hedin's measurements. If it was used totally by irrigation, the cultivated surface could be increased along the Tarim only by 270 square miles. If we take into a similar account those rivers of its basin which do not reach it or lose much water in swamps or "köls" the whole surface which could be added to the cultivated ground of the Tarim basin can be estimated at 1000 square miles, the eleventh part of what can be imagined for Western Turkistan.

There are only limited possibilities of extending the oases of Central Asia. An increase of the cultivated surface of the Earth by 12,000 square miles is not much, and if it were populated at the same density as the existing oases it would afford only room for 900,000 men. But I do not believe that only seventy-five inhabitants to 1 square mile are an adequate number for a well-cultivated oasis. This figure may be doubled or raised threefold, but it does not seem to me possible that the Central Asian existing and future oases could support more than 25,000,000 inhabitants. The maximum capacity of Central Asia for mankind will be less than 40,000,000 inhabitants under the present best methods of irrigation and cultivation and the present standard of life, which is very low in Central Asia.

Also in the future Central Asia will not, by the number of its inhabitants, play an important rôle on the Earth. Its inhabitants will always be divided into nomads, whose herds will graze in arid regions, and farmers, who live in the oases. The number of the nomads will always be low. That of the farmers can become pretty high, but both are limited. The proportion of both parts of the population changes according to the state of civilization. It is now 2:6 and may become 4:25; in former times it may have been 1:2 and more. The sedentary population can easily be subdued by foreign rulers and change their national character. The nomads will never lose all their freedom. Though always migrating, they are the more stable part of the population. The more prosperous the oases are, the less influence however will they exercise. Lying on the highway between the occident and the far orient, Central Asia has been influenced from both sides and its dry soil has perfectly conserved the relics of old civilizations, religions, and peoples. But it did not much influence its neighbourhood. In this respect it is inferior to Mongolia, from which nomadic tribes, not numerous but very active, have conquered vast parts of Asia and have extended their rule even to Europe. In Mongolia the oases do not play the same rôle as in Central Asia; the nomadic population is not controlled in the country itself by the sedentary one in the oases, it is attracted by neighbouring lands which are conquered but not subdued as to the race of their inhabitants. The latter absorb the conquerors and they disappear.

In more than two thousand years of historical times and probably also in those prehistoric ones which extend over the seven thousand years of the post-glacial period, the surroundings of men have undergone no important changes in Central Asia. But in the glacial period the state of things was different from what we see now. There is convincing evidence that the snow-line in the Tien Shan and in the Pamirs lay much lower than nowadays, and there are reasons to believe that this has been so too on the high plateau of Tibet. It must be assumed that the arid line was depressed too. The low regions of both Turkistans were more habitable, the rivers which allowed irrigation greater. Therefore Central Asia seems to have had in that time a more friendly aspect, and it may have had at that time a more important position in human life. But this remains conjectural as long as we have no convincing evidence. There are still many anthropo-geographical problems to be solved in Central Asia.

PALESTINE AND THE STABILITY OF CLIMATE IN HISTORIC TIMES

PROFESSOR J. W. GREGORY, F.R.S.

THE evidence of Palestine as to the stability of climate during historic times is of special value as the conditions of life there during the past 3000 years are recorded in what is still the best-known of all early literature. The Bible contains contemporary records, and traditions that may be accepted as reliable, for two millenniums and a nearly continuous record from about 1200 B.C. to the beginning of the Christian era. The conditions in mediaeval times are revealed by the experiences of the Crusaders and early travellers.

The President then called upon Sir Francis Younghusband, Lord Lugard, Sir Martin Conway, Sir Halford Mackinder, and Mr. Wordie in this order.

THE MUZTAGH PASS IN 1887

LIEUT.-COL. SIR FRANCIS YOUNGHUSBAND, K.C.S.I., K.C.I.E.

THE Muztagh Pass is a pass across the main watershed between India and Central Asia. On the one side the glaciers at its base flow down towards India, and the water from them eventually reaches the Indus and flows into the Arabian Sea; and on the other they flow into the Yarkand River and eventually lose themselves in the sands of the Gobi Desert. It also stands in a position almost on the direct line between Yarkand (the starting-point of the caravans which make for India from Central Asia) and Srinagar in Kashmir, the point of their arrival. But the caravans instead of using the Muztagh Pass have for centuries—perhaps thousands of years—made use of the more circuitous route by the Karakoram Pass to the east.

Why have they done this? Why have they not used the more direct pass? For long it had been known that some people used the Muztagh Pass. It was marked on old maps, and old travellers mentioned it. Was it still used, and of what value was it for trading purposes—and therefore for military purposes? These were the questions I was asked to answer in 1887. I had then just arrived in Yarkand on a journey from Peking to India. I had been preceded a month before by Colonel Mark Bell, the then head of the Intelligence Department in India. He had to travel by the usual caravan route over the Karakoram Pass, as he had heard there was too much water at that season—August—in the rivers on the way to the Muztagh Pass. But he asked me to try the Muztagh Pass.

This was an enterprise well after my own heart. But I had had no experience of mountaineering, and had no Alpine equipment—not even a pair of nailed boots, still less an ice-axe. And I had no money. I had already travelled nearly 3000 miles across the Desert of Gobi and the plains of Turkistan. And now I was asked to cross the Himalaya by an unknown pass. It was just the kind of call I liked. Inexperienced though I was I had the advantage of youth, and Asiatics love to follow a young man. They like to take charge of him, yet feel that he is there to lead them when the crisis comes. Colonel Bell had sent back to help me an ideal caravan leader—Muhammad Isa—who, seventeen years later, accompanied me to Lhasa and afterwards died with Sven Hedin in Tibet. Indian merchants in Yarkand confidingly lent me money on the security of a note from me to a banker in Kashmir. They and Muhammad Isa got together a number of ponies and the necessary supplies and, most important of all, got a man named Wali, who had crossed the pass twenty-five years before, to act as a guide. Since then the pass had fallen into disuse, but Wali was confident he could find the way.

So on 8 September 1887 with eight men and thirteen ponies I left Yarkand. Except the Chinese servant, Liusan, who had come the whole way from Peking with me, all the men were from the Indian side of the Himalaya and three had

been captured by those Hunza raiders who then used to infest the trade route and against whom we had to be on our guard. After crossing the Aghil range and the Shaksgam river, both of which were hitherto unknown, we came to the glacier which descends from the Muztagh Pass. I had never seen a glacier before and was amazed at the sight of this great river of solid ice a couple of hundred feet thick filling the valley-bottom. How we ascended this glacier and eventually crossed the pass I will now describe by quoting from the letter I wrote to my father on my arrival at Skardu on the Kashmir side. I wrote:

"Since my guide had crossed, an immense glacier had descended completely blocking up the valley with ice and immense boulders. Over this for three days I dragged my horses. Twice I gave it up and ordered the horses to go round by Ladakh while I went on with a few men; and twice I renewed the struggle till I got them on to the smooth snow on the high part of the mountain. It was terribly hard work. All day long from daybreak till after dark I was on my legs, first exploring ahead, then returning and bringing on the party; and at the great elevation I was, as one gets, very exhausted—and at night I lay on the ground in the open very warmly wrapped up in sheepskin, as the Kanjuti (Hunza) robbers are said to have a nasty habit of letting the tent down on top of you when you are asleep at night inside.

"On the third day of the ascent proper I sent two men on ahead to report on the pass. They returned at night to say that the pass which used to be practical for horses was now quite impassable through ice having collected, and that the only thing now was to go by the other pass (there are two separate passes—the real Muztagh Pass, and another, 10 miles distant, which is the one that had been practicable for horses) and bring back a number of men from the upper valleys of the district to make a road for the horses.

"So on the next day, September 28, I set out to explore the pass, leaving three men with the horses and baggage. This pass is over the main axis of the Himalaya . . . so we might expect something of a pass, and it is one of the highest and most difficult in the Himalaya. The ascent was easy enough over smooth snow, but we went very slowly on account of the difficulty of breathing. On reaching the summit we looked about for a way down, but there was nothing but a sheer precipice and great blocks of ice broken and tumbled about in such a way as to be quite impracticable. I freely confess that I myself could never have attempted the descent, and that I—an Englishman—was afraid to go first. Luckily my guides were better plucked than myself, and, tying a rope round the leading man's waist, the rest of us hung on to the end while he hewed steps across the ice slope which led down to the precipice.

"Step by step we advanced across it, all the time facing the precipice and knowing that if we slipped—and the ice was very slippery—we should roll down the icy slope and over the precipice into eternity. Halfway across my Ladakhi servant (Muhammad Isa), whom Colonel Bell had sent to me as a man thoroughly acquainted with Himalaya travel, turned back, saying he was trembling all over and could not face the precipice. It rather upset me, seeing a born hill-man, who had travelled in nearly every part of the Himalayas, so affected, but I pretended not to care a bit and laughed it off *pour encourager les autres*, as the thing had to be done. After a time—and a very nasty time it

was—we reached *terra firma* in the shape of a large projecting ledge of rock, and from there began the descent of the precipice.

"The icy slope was a perfect joke to this. We let ourselves down very gradually from any little ledge and projecting piece of rock. On getting some way down I heard my Ladakhi servant appealing to me from above. He had mustered up courage to cross the icy slope and descended the precipice for a few steps, and was now squatting on a rock salaaming profusely to me with both hands and saying he dare not move another step and that he would go back and take my horses round by the Ladakh road. So I sent him back.

"For six hours we descended the precipice, partly rock and partly icy slope, and when I reached the bottom and looked back it seemed utterly impossible that any man could have come down such a place. For several hours after we trudged on in the moonlight over snow with crevasses every 50 yards or so. Often we fell in, but had no accident. At last, late at night, we reached a dry spot, and I spread my rugs behind a rock while one of the men made a small fire of some dry grass and a couple of alpenstocks to cook some tea. After taking some biscuits with the tea I rolled myself up in the sheepskin and slept as soundly as I ever did."

Such is the account I wrote at the time of the crossing of the Muztagh Pass. I should note that we had no ice-axes but only sticks with a metal point at the end, and that I, like all the men, wore only the native boots, which were really leather stockings—good on rocks but most dangerous on ice. Three days after crossing the pass we reached Askole, the first village on the Indian side, and from there sent back supplies to the party left behind. And the latter, including my Chinese servant, eventually reached India by the Karakoram Pass. That these Askole men should have been able to cross and recross the pass was indeed a remarkable performance.

Fifteen years later the Muztagh Pass was climbed by the German, Ferber; and last year the Duke of Spoleto's party crossed it on their way to the Shaksgam Valley. From the photograph which first Ferber and then the Duke of Spoleto brought back it is evident that the ice has been much advancing of recent years. When I crossed it forty-three years ago there was much more ice on it than when it was in use thirty or forty years before. In Ferber's time there was more ice than in mine. And last year there was more ice than in Ferber's time. In old days there was probably quite a feasible way up the ravine to the col. Then ice came down on to the col and flowed over more and more into the ravine.

I had no hesitation in reporting to my chief that it was impracticable for military purposes, which was all I was concerned about. But it obviously is quite a feasible way for properly equipped mountaineering expeditions.