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hold the Society's conversaziones in our own house, which would be preferable to the Natural History Museum, attractive as that building undoubtedly is.

In connection with this discussion as to the enlargement of our premises, a suggestion has been made that a hall should be built by the Society, which would serve a double purpose. In the first place, it would serve as the meeting-place for the Society, with the various advantages which I have just suggested. In the second place—and this is the point to which I wish more especially to draw your attention—if it were suitably designed and decorated, it might also serve to commemorate the deeds of great British explorers and geographers to whom not only science, but our nation owes so much. By drawing attention to the combined effects of the lives of these discoverers, such a hall would tend to enhance the value placed on each individual performance. Many noble names are not now adequately appreciated by the public, and it is a fitting object for the Society to show that these great countrymen of ours are still duly honoured in their own country. To erect an Explorers' Hall, as it might be called, is, therefore, an idea which must appeal to many sympathizers with geographical science throughout the Empire. We are frequently visited by foreign geographers, and surprise has often been expressed that the greatest geographical society in the world, as they sometimes describe it, should be lodged in such comparatively poor premises. I submit that the time has come for the Society both to set its house in order and at the same time to fitly memorialize those deeds which have for several centuries forced the universal acknowledgment that this country has been second to none in the race for geographical discovery.

EXPLORATIONS IN CENTRAL ASIA, 1906-8.*

By Dr. M. AUREL STEIN.

EVER since, in 1901, I had returned from my first journey into Chinese Turkestan happy recollections of congenial labour spent in its mountains and deserts had made me long for a chance of fresh explorations. There was reason to hope that the ruins of sites long ago abandoned to the desert would yield more relics of that ancient civilization which, as the joint product of Indian, Chinese, and classical influences, had once flourished in the oases fringing the Tarim Basin, and upon which it had been my good fortune to throw light by my former excavations. But the scientific elaboration of the results then secured cost time and great efforts, having to be carried on largely by the side of exacting official duties, and it was not until the summer of 1904 that I was able to

* Read at the Royal Geographical Society, March 8, 1909. A map will be issued in a later number of the *Journal*.

submit to the Government of India detailed proposals about another journey which was to carry me back to my old archæological hunting-grounds around the Taklamakan desert and thence much further eastwards, to Lop-nor and the Great Wall of China.

Owing to the kind interest shown by Lord Curzon, then Viceroy of India, and the help of devoted friends able to realize the close bearing of further explorations upon the antiquarian and historical interests of India, my scheme obtained already in 1905 the approval of the Indian Government. Its favourable decision was facilitated by the generous offer of the Trustees of the British Museum to contribute two-fifths of the estimated cost of the expedition, against a corresponding share in the prospective "archæological proceeds," as official language styles them.

From the very first I was resolved to use every possible opportunity for geographical exploration. Even if all my personal tastes and instincts had not drawn me so forcibly towards this additional task, there would have been for it the fullest possible justification in the fact that nowhere probably in Asia is the dependence of historical development on physical conditions so strikingly marked, and on the other hand the secular changes of these conditions so clearly traceable by archæological evidence. The Survey of India Department, now under the direction of Colonel F. B. Longe, R.E., was as willing as ever to assist me in the execution of my geographical tasks, and agreed to depute with me one of its trained native surveyors and to bear all costs arising from his employment. But quite as valuable for my geographical work was the moral support which, in addition to the loan of a number of instruments, the Royal Geographical Society gave me. Those who like myself have to struggle hard for chances of serving their scientific aims in life, will understand and appreciate the encouragement which I derived from the Society's generous recognition of the results of my first Turkestan explorations. Whether preparing for my second journey in the course of solitary official tours along the Indo-Afghan border, or when launched at last upon the lonely desert plains and high ranges of Central Asia, I always felt the vivifying touch of the friendly interest and unfailing sympathy which the letters of your incomparable secretary, Dr. Keltie, conveyed to me. My gratitude for this help and advice will be lifelong.

I had originally tried hard for permission to start during the summer of 1905. But the freedom from official routine work which I needed for the completion of my Detailed Report on the previous journey, itself an indispensable preliminary to fresh work, could not be secured until the following autumn and winter. So it was only in April, 1906, that I could set out from Kashmir, where by six months' incessant desk work, more fatiguing to me than any hard marching or digging, I had managed to finish, and even to see through the press in distant Oxford, those two stout quarto volumes of *Ancient Khotan*.

For my entry into Chinese Turkestan I had chosen this time a route singularly interesting for the student of early geography and ethnography, but practically closed now to the European traveller. It was to take me from the Peshawar district, on the Indian administrative border, through the independent tribal territory of Swat and Dir, into Chitral, and thence across the Baroghil to the Upper Oxus valley and the Afghan Pamirs. My lamented late chief, Sir Harold Deane, K.C.S.I., that truly great Warden of the Marches, then Chief Commissioner of the North-West Frontier Province, had readily agreed to my project. H.M. the Amir of Afghanistan, too, had granted me permission to cross a portion of his territory not visited by any European since the days of the Pamir Boundary Commission, with a promptness I had scarcely ventured to hope for. But the apprehensions entertained locally as to the possibility of safely crossing with baggage the difficult Lowarai pass, then deeply buried under snow, still interposed a formidable barrier. The official correspondence on the subject grew quite imposing.

But in the end a hint from His Excellency the present Viceroy, Lord Minto, who favoured me with an interview at Peshawar, and who subsequently followed my travels with the kindest interest, helped to clear the way for me, and on April 28, 1906, I was able to leave Fort Chakdarra, the scene of much hard fighting during the last great tribal rising. In the meantime I had been joined by my Indian assistants, Rai Ram Singh, the excellent native Surveyor who had accompanied me on my former journey, and by worthy Naik Ram Singh, a corporal of the First (Bengal) Sappers and Miners, who through effective special training provided by his regimental authorities had qualified to assist me in photographic work, making of plans, and similar tasks requiring a "handy man." With the Rai Sahib came Jasvant Singh, the wiry little Rajput, who had acted as his cook on my previous journey, and who in the meantime had enlarged his extensive practical experience of Central Asia by crossing Tibet on Major Ryder's expedition. Never have I seen an Indian follower so reliable in character and so gentlemanly in manners, and how often have I regretted that his high caste precluded his giving to myself the benefit of his ministrations. Our small party besides included my faithful old Yarkandi caravan man, Muhammadju, who had braved the wintry passes in order to join me, and had narrowly escaped with his life early in the month, when an avalanche swept away and buried half a dozen of his fellow travellers on the Burzil, and an Indian Muhammadan, who was supposed to act as my cook, and about whose qualities, professional and personal, the less said the better. Taking into account that our equipment comprised a considerable quantity of scientific instruments, several thousands of photographic glass plates, a raft floated by numerous goatskins which were to be utilized also for transport of water in the desert, and indispensable stores of all kinds, likely to last

for two and a half years, I had reason to feel satisfied at fourteen mules sufficing for the whole baggage.

My journey was to take me not to distant regions alone, but also far back in the ages. So it was doubly appropriate that its first stages should lead through trans-border valleys which twenty-two centuries ago had seen the columns of the conquering Macedonian pass by, and where now the possibility of fanatical outbreaks still obliges the European officer to move with tribal escort and armed. There were ruins of Buddhist times to be surveyed and interesting ethnographic observations to be gathered already on the rapid marches which carried me up to Dir. But how could I stop for details if this paper is to give, be it only in barest outline, a survey of travels so protracted? May 3 found us at the foot of the dreaded Lowarai pass (circ. 10,200 feet), and our crossing effected before daybreak through gorges deeply choked with the snows of avalanches, some quite recent, showed that the difficulties had scarcely been exaggerated. Over fifty stout tribesmen, started in several detachments to lessen risks, were needed for the transport of our belongings. With this obstacle once safely taken, I could rapidly push up the deep-cut valley of the Chitral river to Fort Drosh, where the hospitality of the officers of the 39th Garhwal Rifles holding this northernmost outpost of British power in India made me readily forget that my eyes had seen no sleep practically for the last forty hours.

A long double march next day by the river past lofty slopes of rock and detritus, and with the huge icy mass of the Tirich-mir peak (about 25,000 feet) in full view northward, carried me to the Chitral capital, a charming little oasis in this maze of barren steep mountains. During the few days of halt there the kind help of my friend, Captain Knollys, Assistant Political Agent for Chitral, enabled me to gather an ample anthropometrical harvest. In its autochthon population Chitral holds an important branch of that 'Dard' race which by its antiquity and ethnic and linguistic affinities may well claim the special interest of the historical student and ethnographer. But the mountain fastnesses of Chitral have again and again offered shelter also to remnants of tribes unable to hold their own elsewhere, and thus it came that among the many exact anthropological measurements I was able to take with my assistants, those of Iranian-speaking hill-men from across the Hindu-kush and of wild-looking immigrants from Kafiristan (Fig. 1) were also largely represented. The physical affinity between these tribes, all approximating the *Homo Alpinus* type as seen more or less purely in the inhabitants of the high valleys drained by the Oxus, seems marked, and this helps to throw light on more than one problem connected with the early ethnology of Central Asia and the Indian North-West.

The survival of much ancient lore in customs, traditions, crafts, and even in domestic architecture makes Chitral and the adjacent valleys a fascinating field for the student of early Indian civilization. It

FIG. 1.—KAFIRS AT CHITRAL.

was with regret, therefore, that I yielded to a variety of cogent practical reasons urging me onwards, to the Oxus and the "Roof of the World." But rapid as my marches up the Yarkhun river and through Mastuj had to be I was able, thanks to local information carefully collected before, to trace and survey an interesting series of early Buddhist rock carvings, sites of pre-Muhammadan forts, etc. It was curious to note how often local tradition connected the latter with dimly remembered periods of Chinese over-lordship—a significant fact in view of what the Chinese Annals tell us of the temporary extension of imperial power under the T'ang dynasty right across the Pamirs and even to the south of the Hindu-kush. The accuracy of these records with regard to local topography was strikingly illustrated by the discovery that a large stretch of arable land now almost completely waste but showing ample evidence of ancient cultivation in the shape of terraced fields, stone enclosures, etc., still bears the name of *Shuyist*, the Chinese reproduction of which is applied by the T'ang Annals to the chief place of the territory of Shang-mi or Mastuj in the eighth century A.D. It is true that this tract, far larger than any other actually cultivated area in Mastuj, seems at present not exactly inviting, its elevation, circ. 10,500 feet above the sea, probably in combination with the recent advance of a huge glacier in the side valley opposite, making its climate distinctly cold. But whether or not this part of the Mastuj valley has been affected by important climatic changes during the last twelve hundred years, there remains the interesting fact that since the British pacification of the country the incipient pressure of population is now leading to the re-occupation of this as well as other but smaller areas, where cultivation had ceased for centuries.

But it was on far more interesting ground that I was soon able to verify the accuracy of those Chinese annalists who are our chief guides in the early history and geography of Central Asia. Reasons which cannot be set forth here in detail had years before led me to assume that the route by which, in 749 A.D., a Chinese army coming from Kashgar and across the Pamirs had successfully invaded the territories of Yasin and Gilgit, then held by the Tibetans, led over the Baroghil and Darkot passes. I was naturally very anxious to trace on the actual ground the route of this remarkable exploit, the only recorded instance of an organized force of relatively large size, having surmounted the formidable natural barriers which the Pamirs and Hindu-kush present to military action. The ascent of the Darkot pass, circ. 15,400 feet above the sea, undertaken with this object on May 17, proved a very trying affair; for the miles of magnificent glacier over which the ascent led from the north were still covered by deep masses of snow, and only after nine hours of toil in soft snow hiding much-crevassed ice did we reach the top of the pass. Even my hardy Mastuji and Wakhi guides had held it to be inaccessible at this early season. The observations

gathered there, and subsequently on the marshes across the Baroghil to the Oxus, fully bore out the exactness of the topographical indications furnished by the official account of Kao-hsien-chih's expedition. As I stood on the glittering expanse of snow marking the top of the pass and looked down the precipitous slopes leading some 6000 feet below to the head of the Yasin valley, I felt sorry that there was no likelihood of a monument ever rising for the brave Corean general who had succeeded in moving thousands of men across the inhospitable Pamirs and over such passes.

On May 19 we crossed the Hindu-kush main range over its lowest depression, the Baroghil, circ. 12,400 feet above sea. Owing to the abnormally heavy snowfall of that year, the masses of snow covering this otherwise easy saddle were so great, and their condition so bad, that but for the timely assistance sent from the Afghan side, it would have been quite impossible to get our loads across. It was delightful for me to reach once more the headwaters of the Oxus, and to feel that I had got again a step nearer to the fascinating regions lower down its course, upon which my eyes had been fixed since my early youth. Access to them was still barred for me, as it has been since many years for all Europeans. But for my progress eastwards to the Chinese border on the Pamirs every help which the scanty resources of barren upper Wakhan would permit of had been provided for under H.M. the Amir's orders.

At Sarhad, the highest village on the Oxus, and a place of ancient occupation, the kindest reception awaited me. Colonel Shirin-dil Khan, commanding the Afghan frontier garrisons from Badakhshan upwards, had been sent up weeks before with an imposing escort. The presence of this delightful old warrior, who had fought through all the troubled times preceding and immediately following Amir Abdurrahman's accession, would alone have been an inducement to tarry by the Oxus; for I found him not only full of interesting information about ancient remains in Badakhshan and old Bactra—goals still, alas! inaccessible to me—but himself also, as it were, a fascinating historical record. Was it not like being shifted back many centuries, to find myself listening to this amiable and gentlemanly old soldier, who in his younger days had helped to build up pyramids of rebel heads just to establish order in the time-honoured fashion of Central Asia? But regard for the hardships already too long undergone by my military hosts—and touching applications of the peaceful Wakhi villagers, upon whom they were largely subsisting—urged me onwards, yet not before I had surveyed interesting ruins of fortifications intended to guard the route leading from the Baroghil, and probably of early Chinese origin.

Our marches up the Oxus were exceptionally trying, owing to the fact that the winter route in the Oxus bed was already closed by the flooded river, while impracticable masses of snow still covered

the high summer track. It was wonderful to watch the agility with which our Badakhshi ponies scrambled up and down precipitous rock slopes; but I confess the pleasure would have been greater without having to take one's share in these acrobatic performances. Again and again only the incessant watchfulness of our Afghan escort saved the baggage from bounding down into the river. A bitterly cold day spent at the Kirghiz camp of Bozai-Gumbaz enabled me to visit the Little Pamir lake and observe the geographically curious bifurcation by which one of its feeders, coming from the Chilap Jilga, discharges its waters partly towards the Murghab draining the lake and partly into the Ab-i-Panja. It was the uppermost course of the latter which brought us on May 27 to the foot of the Wakhjir pass (circ. 16,200 feet) and the glaciers where Lord Curzon has placed, I think rightly, the true source of the Oxus. Of the long day of toil which saw us crossing the pass, and with it the Afghan-Chinese border, I cannot attempt a description here. We started by 3 a.m., after a hearty farewell to the kindly Afghan colonel, who remained camped at the foot to make sure that our Wakhi transport would not desert halfway. Enormous masses of snow still covered the Wakhjir, and in spite of a minimum temperature of 25 degrees of frost in the morning, their surface grew soon so soft that the powerful Kirghiz yaks had to be abandoned. Fear alone of our Afghan protectors induced the Wakhis and Kirghiz to persevere in the efforts of carrying our baggage across. But it was not until midnight that I found rest at the first point on the Chinese side, where fuel and a dry spot to lie down on were available.

Moving down the Taghdumbash Pamir, I found myself once more on the ancient route which Hsüan-tsang, the great Chinese pilgrim, had followed when returning about 642 A.D. from his long travels in India. I had traced his footprints before to so many sacred Buddhist sites, and was now setting out to follow them up so much further to the east, that I felt special gratification at being definitely able to identify here the ruined rock fastness where a curious local legend related by the pilgrim supposed an imperial princess from China to have been imprisoned in ancient days. The fortifications which I traced on the top of the almost completely isolated rock spur of *Kiz-kurghan*, "the princess's tower," rising with precipitous crags fully 500 feet above a gloomy defile of the Taghdumbash river, must have been long in ruins already in Hsüan-tsang's days. Yet such is the dryness of the climate in these high valleys that the walls defending the only possible approach to this ancient place of refuge could still be clearly traced in spite of the material being mere sun-dried bricks with regular layers of juniper twigs embedded between their courses.

At Tash-kurghan, where I revisited the site of the old capital of Sarikol as described by Hsüan-tsang, I divided our party. Rai Ram Singh was to carry on survey work in the eastern portion of the

Muztagh-ata range, supplementary to our labours of 1900, while I myself moved on to Kashgar by the direct route across the high Chichiklik Dawan and a succession of minor passes. Rapid as my marches had to be—I covered the distance of close on 180 miles in six days in spite of serious difficulties on account of melting snows and flooded streams—I was able to ascertain by unmistakable topographical evidence that the route was the same which my Chinese guide and patron-saint, Hsüan-tsang, had followed more than twelve centuries ago.

At Kashgar, which I reached on the night of June 8, after a 60 miles' ride fittingly closing with a duststorm, my old friend, Mr. G. Macartney, C.I.E., then the political representative of the Indian Government and now H.M.'s Consul, offered me the kindest welcome. The fortnight I passed under his hospitable roof was pleasant indeed, yet a time of much hard work. A host of practical tasks connected with the organization of my caravan, the purchase of transport animals, etc., kept me busy from morning till evening, not to mention the late hours of night spent over voluminous batches of proof-sheets which had followed me all the way from Oxford. Mr. Macartney's kind offices, supported by his personal influence and to some extent also by a recollection of my previous archæological labours about Khotan, were of great help in securing the goodwill of the provincial Chinese Government for my fresh explorations.

But it was a service of quite as great importance, and one which I shall always remember most gratefully, when he recommended to me a qualified Chinese secretary in the person of Chiang-ssŭ-yieh. For the tasks before me the help of a Chinese scholar had appeared from the first indispensable. Having always had to carry on my scholarly labours amidst struggles for leisure, I had never had a chance of adding to my philological equipment by a serious study of Chinese, however much I realized its importance. It was a piece of real good fortune which gave me in Chiang-ssŭ-yieh not merely an excellent teacher and secretary, but a devoted helpmate ever ready to face hardships for the sake of my scientific interests. Chiang's exceedingly slight knowledge of Turki counted for little in the lessons I used to take in the saddle while doing long desert marches, or else in camp whenever it was pitched early enough in the evening. But once I had mastered the rudiments of conversational practice in Chinese, his ever-cheerful companionship was a great resource during long months of lonely travel and exertion. With the true historical sense innate in every educated Chinese, he took to archæological work like a young duck to the water, and whether the remains to be explored were Chinese or foreign in origin, he watched and recorded everything with the same unfailing care and thoroughness. Slight and yet wiry of body, he bore the privations and discomforts of desert life with a cheerful indifference quite surprising in a *literatus* accustomed during all his life to work near the fleshpots of the Yamêns.

And with all his interest in remains dead and buried, the faithful companion of my labours had a keen eye for things and people of this world and an inexhaustible stock of humorous observations. How often have I longed since we parted for my ever alert and devoted Chinese comrade!

When on June 23 I started from Kashgar refreshed by the busy days spent under friendly shelter, Khotan was my goal. But owing to the great summer heat of the plains the work of exploring ancient sites in the desert, which I wished to begin from there, could not be thought of until September. So I was free in the mean time to turn my attention to geographical and other tasks. During a few days' halt at Yarkand needed for the completion of my caravan, in men as well as animals, I was joined by Rai Ram Singh, who had in the mean time carried a systematic survey by theodolite and plane-table along the eastern slopes of the Muztagh-ata range. In the course of it he had penetrated through a difficult and previously unexplored portion of the Tash-kurghan river gorge.

We then turned eastwards, and made our way through hitherto unsurveyed ground along the right bank of the Tiznaf river to the outer Kun-lun hills about Kök-yar. There, with my tent sheltered in a shady garden of the small oasis, with the barren mountains around assuring relative coolness, and yet near enough to the desert to receive almost daily a steady rain of fine dust carried up by the winds from the dunes and deposited here to form fresh loess, I worked hard for a fortnight. Besides finishing off the last literary tasks which bound me to Europe, I found my hands fully occupied with collecting anthropological measurements and data about the little-known people of Pakhpo. It was no easy matter to get hold of these interesting hill nomads. At first they fought terribly shy of leaving their high valleys, just as if real live heads were to have been taken instead of mere measurements and photographs with perfectly harmless instruments. But the trouble was amply repaid by the evidence that this small tribe in its alpine isolation had preserved remarkably well the main physical features of that race, represented by the present Galchas of the Pamir region and probably like these of Iranian speech, which in ancient times appears to have extended right through to Khotan and even further east.

It is impossible to spare space here for details concerning the little-known route leading through the barren outer hills by which I made my way to Khotan by the close of July. Nor can I do more than just mention the remarkable exploit of Rai Ram Singh, whom I had despatched two weeks earlier for a survey of the snowy range towards the Kara-kash river. After reaching the latter under great difficulties, he successfully pushed over the Hindu-tash pass (circ. 17,400 feet), closed since many years by the advance of a great glacier. He thus gained access to the last bit of *terra incognita* in the difficult mountain

region between the middle courses of the two great Khotan rivers, the Yurung-kash and Kara-kash, and after crossing a series of deep-cut side valleys of the latter under serious risks from floods rejoined me at Khotan. Glad as I had been myself to return after over five years' absence to my old haunts in this flourishing great oasis, I could spare but a few days for putting myself into touch with the local Chinese authorities, and setting on foot through Turki friends inquiries likely to guide me in my subsequent archæological search. There remained just four weeks for the task I had in view of supplementing our surveys of 1900 in the high Kun-lun range south of Khotan by ampler topographical details about the great glaciers which feed the headwaters of the Yurung-kash. Pushing up rapidly by the route over the Ulughat-Dawan and Brinjak pass discovered in 1900, we reached the Nissa valley after the middle of August, and were soon busily engaged mapping the huge ice-streams which descend towards its head both from the main Kun-lun watershed, and great side spurs thrown out by it northward.

The effects of far-advanced disintegration of rocks, due evidently to extremes of temperatures, were everywhere most striking. The precipitous ridges we had to climb for the sake of survey stations were composed on their crests of nothing but enormous rock fragments heaped up as by the hands of Titans, and quite bare of detritus from circ. 14,000 feet upwards (Fig. 2). Enormous masses of rock *débris* sent down from these ridges almost smothered the ice-streams below, and made their surface look for miles like that of huge dark torrents suddenly petrified in their wild course. Big ice falls and gaping crevasses showed indeed that these accumulations of *débris* were being steadily carried onwards by the irresistible force of the glacier beneath. But even there the exposed ice surface looked almost black, and when on the Otrughul glacier I had under serious difficulties clambered up for some 5 miles from the snout to an elevation of circ. 16,000 feet, the reaches of clear ice and snow descending in sharp curves from the highest buttresses of a peak over 23,000 feet high seemed still as far away as ever (Fig. 3).

The rate at which these glaciers discharge at their foot the products of such exceptionally rapid decomposition as appears to proceed along the high slopes of this part of the Kun-lun where permanent snow does not protect them, was brought home to me by the almost constant rumble of boulders sliding down the ice wall at the snouts whenever the sun shone through long enough to loosen the grip of the surface ice. Old moraines of huge size could be traced clearly at the head of the Nissa valley down for over 3 miles below the present foot of the Kashkul glacier, at circ. 13,300 feet elevation. Thick layers of loess deposited since ages by heavy clouds of dust such as we saw again and again swept up by the north wind from the great desert plains north had charitably covered up these ancient terminal moraines.

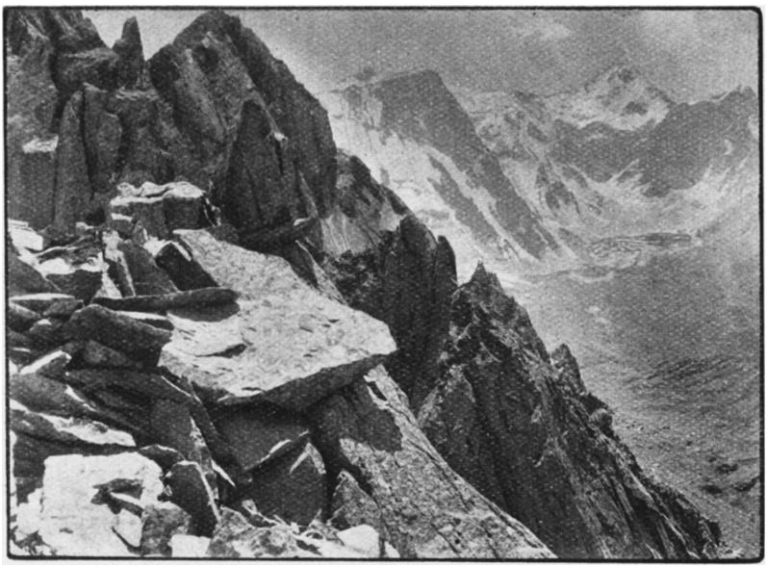


FIG. 2.—KASHKUL GLACIER ABOVE NISSA VALLEY.

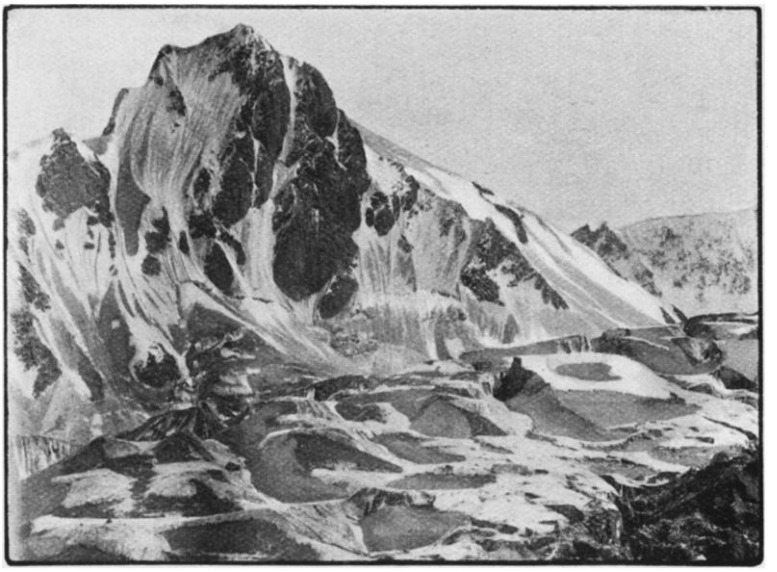


FIG. 3.—VIEW EASTWARDS FROM OTRUGHUL GLACIER.

On them alone, at an elevation between 12,500 and 13,000 feet, where moisture seems to be less deficient than elsewhere in these forbidding mountains, could I refresh my eyes by the sight of real green grass and a few alpine flowers. The barrenness of the valleys below, even at the relatively high elevation of 8000 to 11,000 feet, was great, and the bleak steep slopes of rock or detritus told plainly the story of rapidly progressing erosion.

The melting of the glacier ice was still proceeding at a great rate, and the flooded condition of the streams was a great source of trouble and risk in the deep-cut gorges. I shall not easily forget our experience in crossing the Kash river near Karanghu-tagh, the only permanently inhabited place of this desolate mountain region. The river was utterly unfordable for laden animals, and the only *soi-disant* bridge spanning its tossing waters at a point were they debouch from a rock defile narrowing to circ. 70 feet was equally impracticable for load-carrying men. The three rudely joined timber pieces composing it had parted company years before, and one rickety beam alone offered foothold. In trying our raft of inflated skins for effecting the passage, the half-inch twisted wire rope, from which the raft hung by a travelling pulley, snapped under the great strain of the current. Luckily the men on shore holding the guiding ropes clung to them for life, though nearly dragged off the rocky banks, and Musa, my young Yarkandi pony-man, who was on the raft with the waves breaking over him, was saved after anxious minutes. The loads, including my lively little fox terrier "Dash," the devoted comrade of my whole journey, were in the end safely slung across by the repaired wire rope, while we humans cautiously transferred ourselves over the rickety beam still in position.

But the difficulties we had to face were not entirely those of nature. For our supplies, transport, and guides we had to depend on the small settlement of semi-nomadic hillmen and select malefactors exiled from Khotan, who, counting probably less than two hundred souls, form the only population in this desolate mountain region. Their dread of participating in our glacier expeditions was genuine, and greater still their fear that they might be made to reveal to us the difficult route across the main Kun-lun range, by which communication with Ladak was maintained for a few years during the short-lived rule of the rebel Habibullah (1863–66), and which has long ago become completely closed and forgotten. So all means of obstruction were tried in succession by these wily hillmen, culminating at last, after miserable days spent under driving rain and snow right under the big glaciers of the Busat valley, in attempts at open resistance to Islam Beg, my faithful old Darogha, who accompanied us under the authority of the Amban of Khotan.

Fortunately, by the time when the evident exhaustion of the few available Yaks and the growing exasperation of the Taghliks made it advisable to make our way down to the high but less-confined valley of

Pisha, we had succeeded in clearing up many interesting details of orography in the rugged, ice-covered main range rising south of the Yurung-kash, and in establishing beyond doubt that that long-forgotten route led up the Chomsha valley. It had become equally certain that any advance through that very confined valley to its glacier-crowned head was quite impracticable during the summer months or early autumn. I also convinced myself that my long-planned attempt to reach the uppermost sources of the Yurung-kash itself would have to be made from the east.

By September 9, 1906, I had returned to Khotan, where preparations for my archæological campaign and the examination of miscellaneous antiques brought in by treasure-seekers detained me for some days. Hard at work as I was, I could not help attending a great feast which Chien-Ta-jên, the obliging prefect, was giving in my honour to the assembled dignitaries of the district. In spite of the time it cost to get through some thirty strange courses, I appreciated the attention the kindly mandarin desired thus to pay in acknowledgment of the labours I had devoted for years past to the elucidation of the history and geography of Khotan. Then I set out for the desert adjoining the oasis north-eastward, where I succeeded in tracing much-eroded but still clearly recognizable remains proving ancient occupation well beyond the great Rawak Stupa. I found the court of the latter even more deeply buried under dunes than when I carried on here excavations in 1901, and, alas! the fine stucco relievos then brought to light completelydestroyed by treasure-seekers in spite of careful reburial.

But when I subsequently surveyed the extensive débris-strewn areas known as *Tatis* fringing the north edge of the tract of Hanguya, where potsherds, fragments of bricks, slag, and other hard material cover square miles of ground once thickly occupied, but since long centuries abandoned to the desert, I had the satisfaction of recovering by excavation a mass of interesting small relievos in hard stucco which had once decorated the walls of a large Buddhist temple dating probably from the fifth to the sixth century A.D. In their style unmistakably derived from models of Græco-Buddhist art, these relievo fragments closely resembled the Rawak sculptures. Curiously enough, of the temple itself and the larger sculptures once adorning it, but the scantiest remains had survived in the ground. The probable explanation is that the site had continued to be occupied for some time after the temple had become a ruin, evidently through fire, and that only such smaller stuccoes as had become hardened by the latter into a likeness of terra-cotta could survive in soil constantly kept moist through irrigation.

The finds possessed special interest as proving that even sites so much exposed to wind-erosion and havoc wrought by human agency as 'Tatis' generally are, may preserve antiquarian relics of interest in lower strata which neither the slowly scrooping force of driven sand

nor the burrowings of treasure-seekers, etc., from the still inhabited area close by had reached. Another important feature was the prevalence of richly gilt pieces. This furnished striking confirmation of the hypothetical explanation I had given years before of the origin of the leaf gold washed from the culture strata of the old Khotan capital at Yotkan. I may notice in passing that just as elsewhere along the edges of the Khotan oasis cultivation in the fertile Hanguya tract is now steadily advancing in the direction of the areas previously abandoned to the desert. The present favourable economic conditions and the consequent increase in the population seem the chief cause for this extension of the cultivated area which struck me again and again on revisiting portions of the oasis surveyed six years before, and which may yet, given a continuance of those factors, lead to the recovery of a considerable portion of that desolate Tati overrun by dunes and elsewhere undergoing wind-erosion. But it appears to me equally certain that the water-supply at present available in the Yurung-kash could under no system whatever be made to suffice for the irrigation of the *whole* of the large tracts now abandoned to the desert, and for this broad fact desiccation alone supplies an adequate explanation.

From the Hanguya Tati I passed on to a group of small ruined sites exhibiting in a typical form the destruction to which ancient remains are exposed in the belt of sandy jungle often intervening between the still cultivated areas and the open desert of drift-sand. In 1901 I had passed some completely eroded dwellings, forming the northernmost of those sites, in a maze of tamarisk-covered sand-cones not far from the village tract of Domoko, on the route from Khotan to Keriya. But information about the rest had become available only since an enterprising villager, stimulated by my old desert guide, Ahmad "the Hunter," had begun to prospect there a few years later for "old papers" to sell in the antique market of Khotan. The site of Khadalik, from which the old man had extracted some manuscript remains of interest, and to which the promise of a good reward now induced him to take me, seemed disappointing at first sight; for its principal ruin, which soon proved to be that of a large Buddhist temple, presented itself merely as an extensive low *débris* heap covered with sand. But scarcely had we begun systematic clearing of it when pieces of paper manuscripts began to crop out in numbers.

It soon became evident that the destructive operations of those who in early days had quarried the ruined temple for timber, and the more recent burrowings by "treasure-seekers" like my guide Mullah Khoja, had failed to disturb the votive offerings of the last worshippers, which, being mainly deposited on the floor, had long before passed under a safe covering of sand. So we were able to recover here, in spite of the almost complete disappearance of the superstructure, a large number of manuscript leaves in Sanskrit, Chinese, and the "unknown" language

of Khotan, besides many wooden tablets inscribed in the same language, and some in Tibetan. Most of them probably contain Buddhist texts, like some excellently preserved large rolls, which on one side present the Chinese version of a well-known Buddhist work, with what evidently is its translation into the "unknown" language on the other. The clue thus offered for the decipherment of the latter may yet prove of great value. Plentiful remains of stucco relievos and fresco pieces once adorning the temple walls, together with painted panels, had also found a safe refuge in the sand covering the floor. Their style pointed clearly to the same period as that ascertained for the Buddhist shrines I had excavated six years before at the site of Dandan-Oilik in the desert northward, *i.e.* the latter half of the eighth century A.D. It was gratifying when the subsequent discovery in a second shrine close by of stringed rolls of Chinese copper pieces, no doubt deposited by some of the last worshippers, supplied definite numismatic confirmation of this dating.

We worked hard here with a large number of diggers, and in spite of heat and smothering dust practically without interruption from daybreak until nightfall. Yet it took us fully ten days to clear these temples together with some smaller adjoining shrines and dwellings. I was eager to move on to the east towards sites further away in the desert, and hence likely to have been abandoned far earlier. Yet I was doubly glad in the end to have spared the time and labour for Khadalik at the outset; for when I returned to this tract nearly eighteen months later I found that the area containing the ruins had just been brought under irrigation from the stream which passes within three miles of it.

I cannot do more than allude here to a problem of geographical interest presented by Khadalik and another small site, Mazar-toghrak, near the opposite (southern) edge of the Domoko oasis, where I subsequently excavated a considerable number of records on wood both in Chinese and the Brahmi script of old Khotan, indicating, as at Khadalik, abandonment about the end of the eighth century A.D. Now it is noteworthy that the same period must have seen the desertion of the large ruined settlement of Dandan-Oilik, which I explored in 1900, and which, as duly recognized also by my friend Mr. E. Huntington, who has carefully studied since the physiography of this whole region, must have received its water from the same drainage system. Dandan-Oilik is situated fully 56 miles further north in the desert, and if shrinkage of the water-supply needed for irrigation were to be considered as the only possible cause of abandonment of these sites, the chronological coincidence in the case of localities dependent on the same streams and yet so widely separated would certainly be curious.

I cannot stop to describe the interesting instances of successful fight with the desert which I noticed in certain recently opened colonies on my way to Keriya, the chief oasis of an administrative

district mainly desert, which extends nearly five degrees of longitude eastwards to beyond Charchan. It is a fit region for producing "ships of the desert," and the seven big camels which I purchased at Keriya after a great deal of sifting and testing, proved the mainstay of my transport thereafter. They, together with four baggage ponies, sufficed amply for equipment and stores of our large party. But, of course, when it came to the carrying of antiques, water-supply for the desert, or the impedimenta of large bands of labourers, I had to supplement our train as well as I could by hired animals. On archæological expeditions into the desert, such as I had to conduct, the cares and difficulties about "transport and supplies" are apt to become truly forbidding, and often used I to think wistfully of the relative ease with which I might have effected my desert wanderings if I could but have restricted myself to purely geographical exploration and a few hardy followers. But my brave own camels from Keriya never caused me worry. They held out splendidly against all privations and hardships, and were, after nearly two years' travel, so fit and fine-looking that when I had at last to dispose of them before my departure for India, they realized over 50 per cent. profit—of course, for the Government of India. (How I wished to be with them again instead of being a frequenter of bustling trains!)

At Niya, the last small oasis eastwards, which I reached on October 14, I had to prepare rapidly for fresh exploration at the ancient site in the desert northwards, where, on my first visit in 1901, I had made important discoveries among ruins deserted already in the third century A.D. It was encouraging to learn from my old "treasure-seeking" guide Ibrahim that the further search I had enjoined him to make for ancient dwellings hidden away amidst the dunes had been fruitful, and equally pleasing to see how readily my old Niya diggers rejoined me. I was resolved this time to take out as many labourers as I could possibly keep supplied with water. So it was encouraging that, what with the example set by my "old guard" and the influence still possessed here by Ibrahim Beg, my energetic old Darogha, whom luckily, as it proved, a little local conspiracy had turned out of his Beg's office just in time to make him available for me, a column of fifty men, with additional camels and supplies for four weeks, could be raised within a single day's halt.

Three rapid marches lay through the luxuriant jungle belt which lines the dying course of the Niya river northward, and were made delightful to the eye by the glowing autumn tints of wild poplars and reed beds. Picturesque parties of pilgrims returning from the lonely shrine of Imam Jafar Sadik added a touch of human interest to the silent sylvan scenery. At the supposed resting-place of that great holy warrior, with its quaint collections of rags, yak-tails, and other votive offerings, we left behind the last abode of the living, and also the present end of the river. Two days later I had the satisfaction of

camping once more amidst the bare dunes close to the centre of that long-stretched, sand-buried settlement to which a special fascination had made my thoughts turn so often since those happy days of labour in the winter of 1901. The bitter cold then experienced was now absent; but when, in the twilight of that first evening, I strolled across the high sands to a ruin sighted then but reluctantly "left over" for unavoidable reasons, and lighted upon a fine carved cantilever since laid bare by the slight shift of a dune, I felt almost as if I had never been away, and yet full of gratitude to the kindly Fate which had allowed me to return.

Already that day's route, slightly diverging from that followed on my first discovery of the site, had taken me past a series of ruined dwellings, rows of gaunt trunks of dead fruit trees, and other signs of ancient occupation which had not been seen by me on my previous visit. A little experimental scraping had even revealed in the corner of a much-eroded modest dwelling some wooden tablets inscribed in that ancient Indian Kharoshthi script and of the curious type with which my previous excavations had rendered me so familiar. The encouraging promise thus held out to us soon proved true when, after tramping next morning some 4 miles over absolutely bare dunes, I started our fresh diggings at the northernmost of the ruined dwellings which Ibrahim had discovered scattered in a line some 2 miles to the west of the area explored in 1901. High dunes had then kept from our view these structures, evidently marking what must have been the extreme north-western extension of the canal once fed from the Niya river.

The ruin we first cleared was a relatively small dwelling, covered only by 3 to 4 feet of sand, and just of the right type to offer an instructive lesson to my native assistants and the men. It occupied a narrow tongue of what owing to the depression produced around by wind erosion looked like high ground, extending in continuation of the line of a small irrigation canal still marked by fallen rows of dead poplars. As soon as the floor was being reached in the western end room Kharoshthi documents on wood began to crop out in numbers. After the first discovery of a "takhta" (tablet) had been duly rewarded with some Chinese silver, I had the satisfaction of seeing specimen after specimen of this ancient record and correspondence in Indian language and script emerge from where the last dweller, probably a petty official, about the middle of the third century A.D., had left behind his "waste paper." Rectangular tablets, of the official type, with closely fitting wooden covers serving as envelopes; double wedge-shaped tablets as used for semi-official correspondence; oblong boards and labels of wood serving for records and accounts of all kinds, were all represented among the finds of this first ruin (Fig. 4). It added to my gratification to see that a number of the rectangular and wedge-shaped letter tablets still retained intact their original string fastenings, and a few even their clay seal impressions. How cheering it was to

FIG. 4.—WOODEN TABLETS INSCRIBED IN KHAROSHTHI, WITH COVERS AND CLAY SEALS, FROM NIYA SITE.

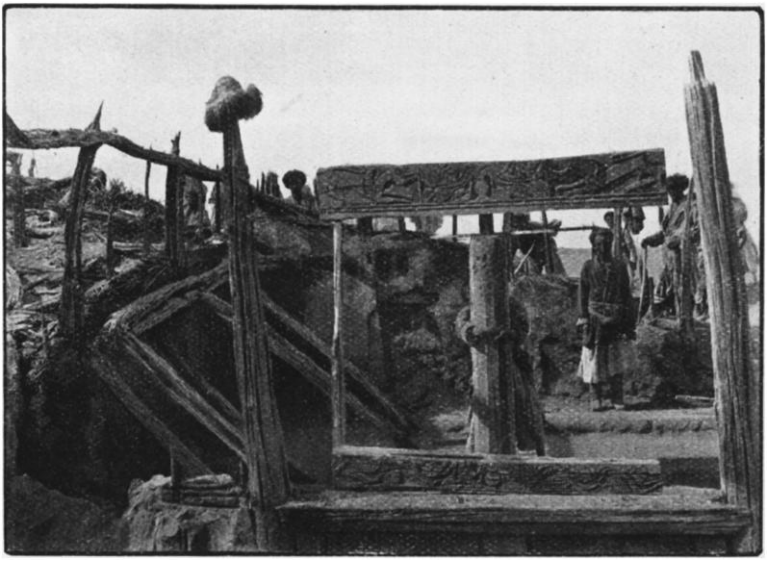


FIG. 5.—HALL OF ANCIENT DWELLING (THIRD CENTURY A.D.) AFTER EXCAVATION, NIYA SITE.

discover on them representations of Heracles and Eros left by the impact of classical intaglios! Just as familiar were to me the household implements which this ruin yielded. Remains of a wooden chair decorated with carvings of Græco-Buddhist style, weaving instruments, a boot last, a large eating tray, mouse-trap, etc., were all objects I could with my former experience recognize at the first glance just as the various methods employed in building the timber and plaster walls.

Our next task was the clearing of the remains of a far larger structure close to my camp. Here the walls and any objects which may have been left between them proved completely eroded, though the massive posts, bleached and splintered, still rose high, marking the position of the timber framework. But when I examined the ground underneath what appeared to have been an outhouse or stables, I realized quickly that it was made up of layers of a huge refuse heap. Of course, previous experience supplied sufficient reason for digging into this unsavoury quarry, though the pungent smells which its contents emitted, even after seventeen centuries of burial, were doubly trying in the fresh eastern breeze driving fine dust, dead microbes and all, into one's eyes, throat, and nose. Our perseverance in cutting through layer upon layer of stable refuse was rewarded at last by striking, on a level fully 7 feet below the surface, a small wooden enclosure which had probably served as a dustbin for some earlier habitation. There were curious sweepings of all sorts—rags of manifold fabrics in silk, cotton, felt; seals of bronze and bone; embroidered leather, wooden pens, fragments of lacquer-ware, broken implements in wood, etc. But more gratifying still was a find of over a dozen small tablets inscribed with Chinese characters of exquisite penmanship, apparently forwarding notes of various consignments. The localities mentioned are of considerable geographical and historical interest, as throwing light upon the connection maintained by this settlement or its Chinese garrison with distant parts on the route into China proper. Quite at the bottom of the enclosure we found a small heap of corn, still in sheaves and in perfect preservation, and close to it the mummified bodies of two mice.

I cannot attempt to give details of the busy days spent in searching the chain of dwellings stretching southward. Some had suffered badly from erosion; others had been better protected, and the clearing of the high sand which filled their rooms cost great efforts (Fig. 5). But the men, encouraged by small rewards for the first finds of antiquarian value, yielded their "Ketmans" with surprising perseverance, in spite of the discomfort implied by strictly limited water rations, and Ibrahim Beg's rough-humoured exhortations sufficed to keep them hard at work for ten to eleven hours daily. Kharoshthi records on wood, whether letters, accounts, drafts, or memos, turned up in almost every one of these dwellings, besides architectural wood carvings, household objects, and implements illustrative of everyday life and the prevailing industries. Though

nothing of intrinsic value had been left behind by the last dwellers of this modest Pompeii, there was sufficient evidence of the case in which they had lived in the large number of individual rooms provided with fireplaces, comfortable sitting platforms, etc. Remains of fenced gardens and of avenues of poplars or fruit trees could be traced almost invariably near these houses. Where dunes had afforded protection, the gaunt, bleached trunks in these orchards, chiefly mulberry trees, still rose as high as 10 to 12 feet.

With so much of these ancient homesteads in almost perfect preservation, and being constantly reminded of identical arrangements in modern Turkestan houses, I often caught myself wanting, as it were, in antiquarian respect for these relics of a past buried since nearly seventeen centuries. But what at first fascinated me most was the absolute barrenness and the wide vistas of the desert around me. The ruins at this end of the site lie beyond the zone of living tamarisk scrub. Like the open sea, the expanse of yellow dunes lay before me, with nothing to break their wavy monotony but the bleached trunks of trees or rows of splintered posts marking houses which rose here and there above the sandy crests. They often curiously suggested the picture of a wreck reduced to the mere ribs of its timber. There was the fresh breeze, too, and the great silence of the ocean.

For the first few days I found it difficult to limit my thoughts to the multifarious archæological tasks which claimed me, and not to listen inwardly to the Sirens' call from the desert northward. A variety of matter-of-fact observations did not allow me to indulge in dreams of "buried cities" far away in that direction. Yet I longed to leave behind all *impedimenta* and scholarly cares for a long plunge into the sand ocean. So it was perhaps just as well for my ample antiquarian tasks in hand and before me when Rai Ram Singh, whom I had despatched on a reconnoitring tour to the north and north-east as soon as we reached the site, returned after a several days' cruise with the assurance that he had failed to trace any signs of ancient occupation beyond the line of the northernmost ruins already explored by us. Curiously enough, though the dunes were steadily rising, the surveyor had at his last camp found a group of living wild poplars, evidence perhaps of the subsoil drainage of the Niya river coming there nearer to the surface.

I must forego any attempt at detailed description of the results here yielded by a fortnight of exacting but fruitful work. Yet a particularly rich haul of ancient documents may claim mention were it only on account of the characteristic conditions under which it was discovered. I was clearing a large residence in a group of ruins on the extreme west of the site which had on my previous visit been traced too late for complete exploration, and which I had ever since kept faithfully *in petto*. Fine pieces of architectural wood carving brought to light near a large central hall soon proved that the dwelling must have been that of a

well-to-do person, and finds of Kharoshthi records of respectable size, including a wooden tablet fully 3 feet long, in what appeared to have been an ante-room, suggested his having been an official of some consequence.

The hope of finding more in his office was soon justified when the first strokes of the Ketman laid bare regular files of documents near the floor of a narrow room adjoining the central hall. Their number soon rose to over a hundred. Most of them were "wedges" as used for the conveyance of executive orders; others, on oblong tablets, accounts, lists and miscellaneous "office papers," to use an anachronism. Evidently we had hit upon office files thrown down here and excellently preserved, under the cover of 5 to 6 feet of sand. The scraping of the mud flooring for detached pieces was still proceeding when a strange discovery rewarded honest Rustam, the most experienced digger of my "old guard." Already during the first clearing I had noticed a large lump of clay or plaster near the wall where the packets of tablets lay closest. I had ordered it to be left undisturbed, though I thought little of its having come to that place by more than accident. Rustam had just extracted between it and the wall a well-preserved double wedge tablet when I saw him eagerly burrow with his hands into the floor just as when my little terrier is at work opening rat-holes. Before I could put any questions I saw Rustam triumphantly draw forth from circ. 6 inches below the floor a complete rectangular document with its double clay seal intact and its envelope still unopened. When the hole was enlarged we saw that the space towards the wall and below the foundation beam of the latter was full of closely packed layers of similar documents.

It was clear that we had struck a small hidden archive, and my joy at this novel experience was great; for apart from the interest of the documents themselves and their splendid preservation, the condition in which they were found furnished very valuable indications. The fact that, with a few exceptions, all the rectangular documents, of which fully three dozen were cleared in the end, had their elaborate string fastenings unopened and sealed down on the envelope, manifestly confirmed the conjectural explanation I had arrived at in the case of a few previous finds of this kind, that these were agreements or bonds which had to be kept under their original fastening and seals in order that in case of need their validity might be safely established. Characteristically enough, the only two open records proved letters addressed in due form to the "Hon'ble Cojhbo Sojaka, dear to gods and men," whose name and title I had already before read on many of the official notes dug up in the scattered files. The care which had been taken to hide the deposit and at the same time to mark its position—for that, no doubt, was the purpose of the clay lump, as Rustam had quite rightly guessed—showed that the owner had been obliged to leave the place in

an emergency, but with a hope of returning. This may help to throw light yet on the conditions under which the settlement was deserted.

Great care had to be taken in the removal to save the clay sealings from any risk of damage. It was amply rewarded when I discovered on clearing them at night, in my tent, that almost all had remained as fresh as when first impressed, and that most of them were from seals of classical workmanship representing Heracles with club and lion-skin, Eros, Pallas Promachos, helmeted busts, etc. It was strange how victoriously the art of the Greek die-cutter had survived in this distant region, and strange, too, to know myself the *de facto* possessor of Sojaka's deeds probably referring to lands and other real property buried since long centuries under the silent dunes. Where was the law court which might help me to claim them?

As our work proceeded to the south of the site the surroundings grew, if anything, more sombre and almost lugubrious, in spite of the appearance of still living scrub. The ruins had to be searched for amidst closely set sand-cones raising their heads covered with tangled masses of tamarisk, dead or living, to 40 or 50 feet. Ruins just emerging from the foot of sandhills with deeply eroded ground on the other side made up weird pictures of solitude. The dust haze raised by a cold north-east wind added an appropriately coloured atmosphere. It was almost with a feeling of relief that we emerged at last upon somewhat more open ground towards the southern end of the site. The ruined dwellings were small there; but an inspection of the ground near by, as reproduced in a photographic panorama (Fig. 6), revealed features of interest.

Only some 60 yards off the ruin which had yielded the first tablets, there stood a square of dead mulberry trees raising their trunks up to 10 feet or more, which had once cast their shade over a tank still marked by a depression. The stream from which the canal once feeding it must have taken off was not far to seek; for behind the nearest ridge of sand to the west there still lay a footbridge about 90 feet long stretched across an unmistakable dry river-bed. Of the trestles which had carried the bridge two still stood upright. Beyond the left bank stretched shrivelled remains of arbours for upwards of 200 yards, to where steep banks marked a large square reservoir. For over 2 miles to the north-west we could follow the traces of the ancient river-bed, in places completely covered by drift-sand, but emerging again amongst low dunes and patches of dead forest. Finally it seemed to join a broad valley-like depression stretching far away with living wild poplars and tamarisks, and flanked by big ridges of sand. This great nullah, and others like it which Ibrahim had vainly searched for ruins west of it, had certainly seen no water for long ages. Over all this strange ground desiccation was written most plainly.

The 400 odd miles of desert through which my marches took me in November, from the Niya site past Charchan to Charklik, offered

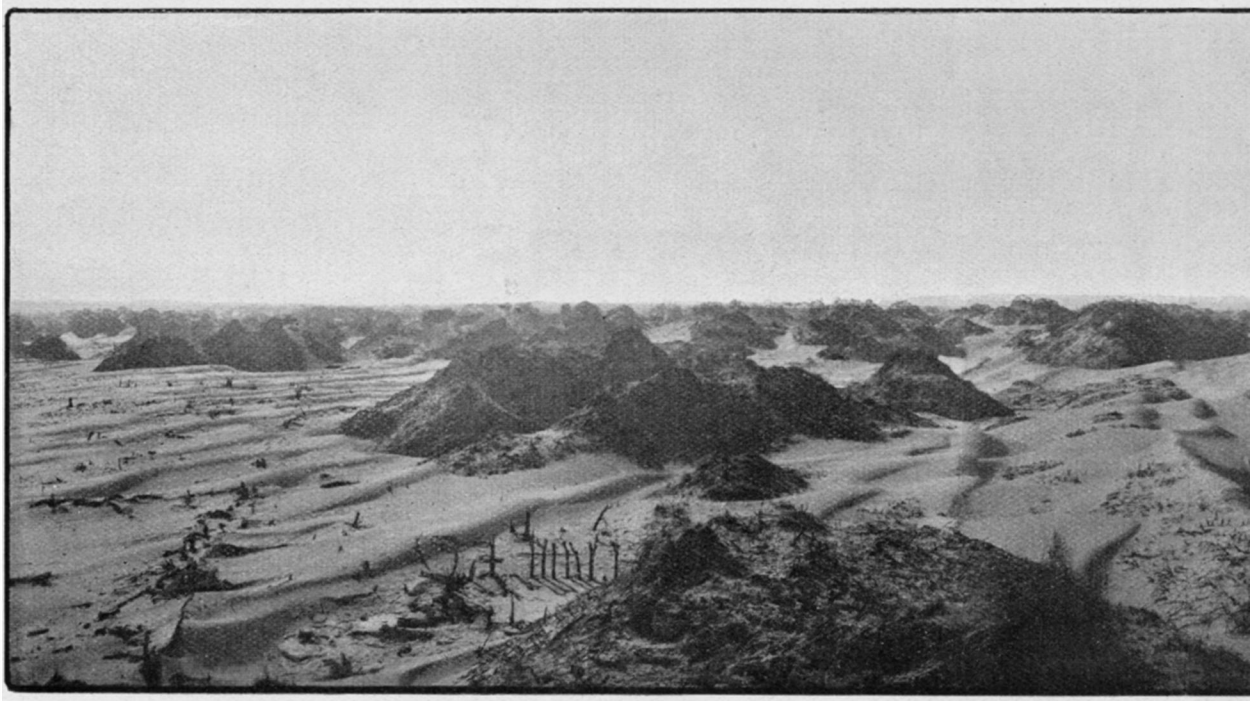


FIG. 6.—PANORAMIC VIEW OF GROUND NEAR SOUTH END OF NIYA SITE, WITH TAMARISK-COVE

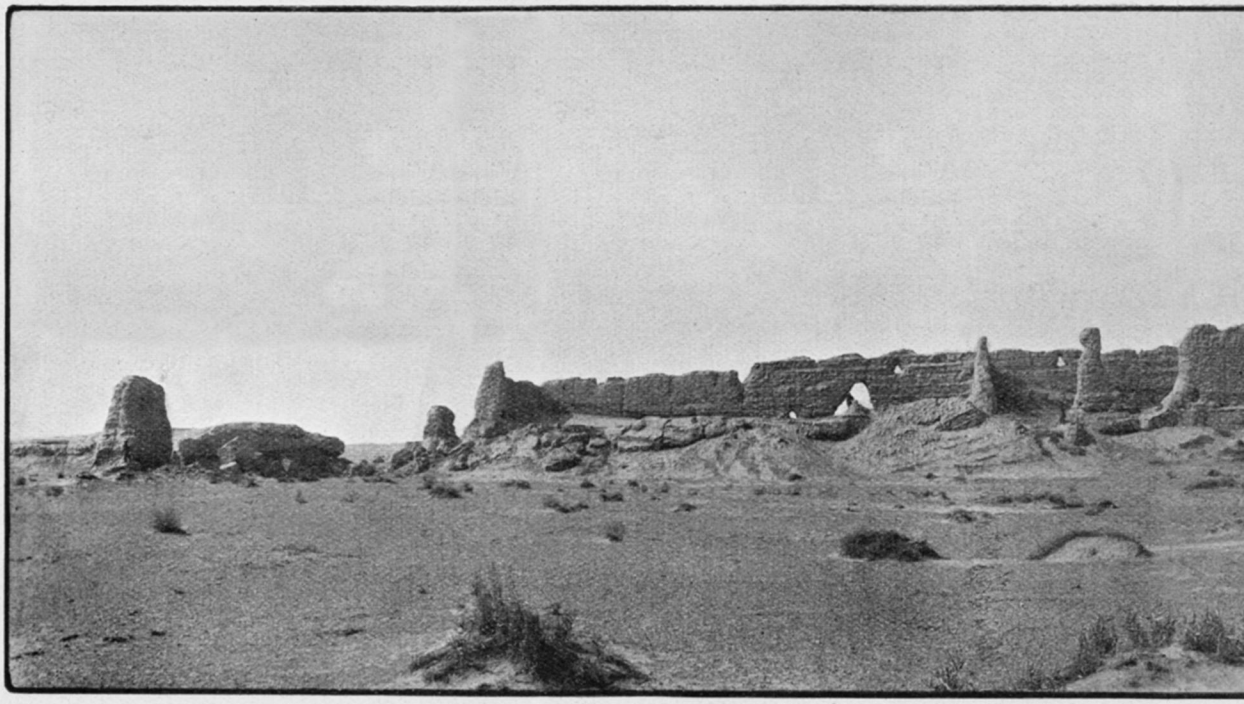
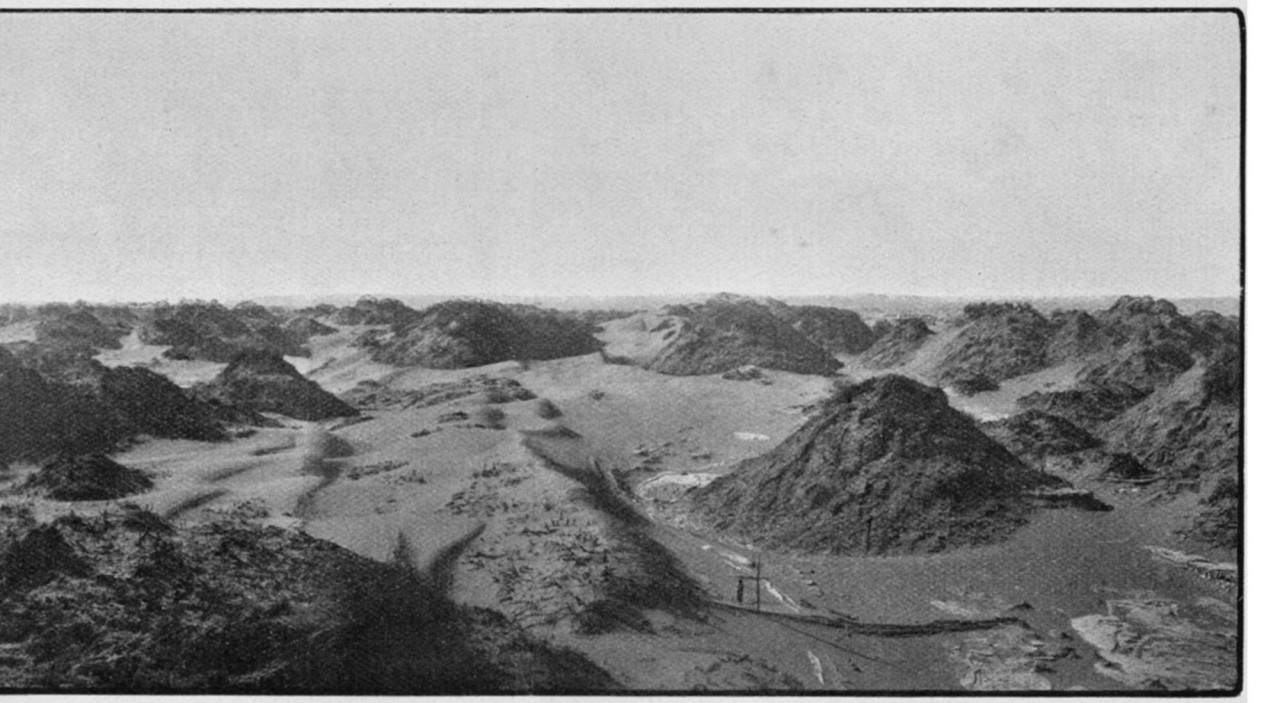
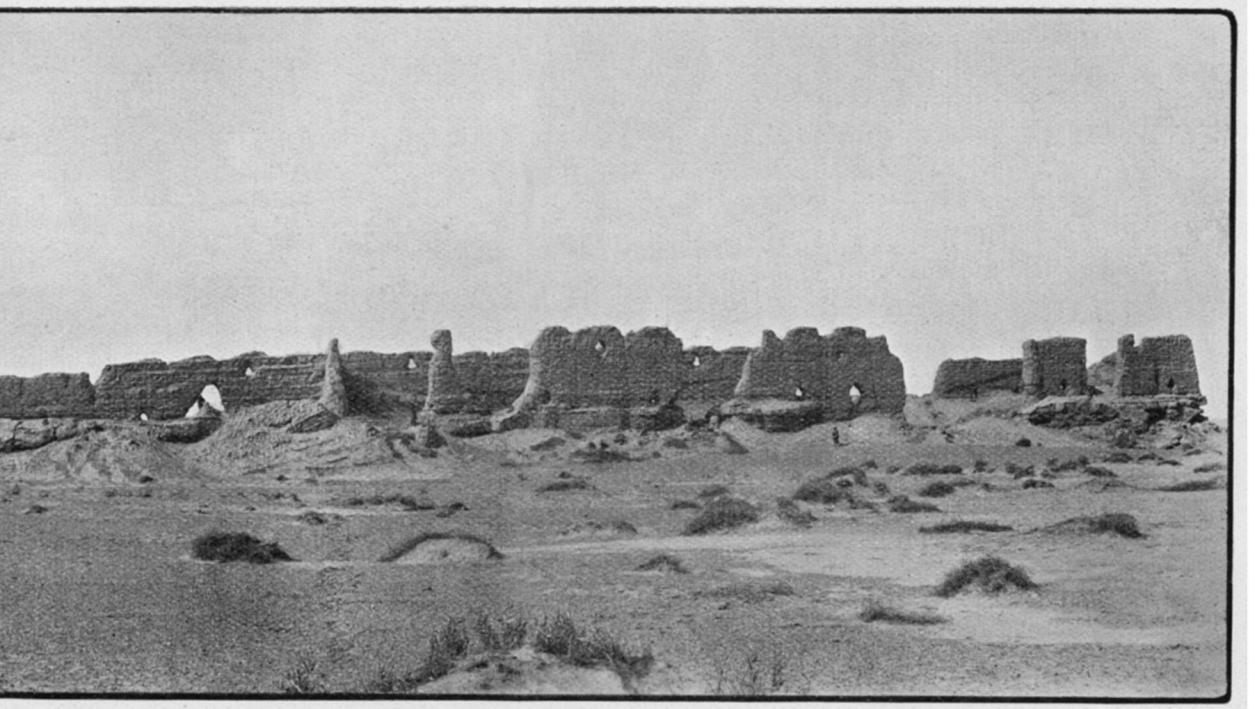


FIG. 11.—RUINS OF GREAT MILITARY MAGAZINE, BUILT IN FIRST CENTURY B.C., ALONG ANCIENT CHINESE FRO

Ancient footbridge over dry river-bed.



GROUND NEAR SOUTH END OF NIYA SITE, WITH TAMARISK-COVERED SAND HILLS AND DUNES.



, BUILT IN FIRST CENTURY B.C., ALONG ANCIENT CHINESE FRONTIER-WALL IN DESERT WEST OF TUN-HUANG.

opportunities for interesting work at more than one point. But I can pause now only to mention the solution which some fortunate archæological finds at an ancient site near the Endere river afforded for a problem of antiquarian and geographical interest. In 1901 I had excavated there the sand-buried ruins of a fort which epigraphical and other finds proved to have been occupied about the first decades of the eighth century A.D., and abandoned during the Tibetan invasion soon after. Now it was curious that Hsüan-tsang, the great Chinese pilgrim, who had passed by the same route from Niya to Charchan about 645 A.D., found no inhabited place on the ten days' march, but distinctly mentions in a position corresponding exactly to the Endere site ruins of abandoned settlements which the tradition of his time described as " old seats of the Tukhara " famous in Central-Asian history.

That we have here a definite historical instance of an old site abandoned to the desert having been reoccupied after the lapse of centuries, was conclusively proved by discoveries made on this second visit. A shifting of the low dunes near the fort had exposed much-eroded remains of ancient dwellings. When carefully clearing the consolidated refuse heaps which had saved them from complete destruction, we came upon Kharoshthi records on wood which clearly belonged to the second or third century A.D.—and thus to the very period of Tukhara, *i.e.* Indo-Scythian ascendency. Further striking evidence of the often-proved accuracy of my Chinese guide and patron saint came to light when I discovered that the rampart of the fort built within a generation or two of his passage was in one place actually raised over a bank of refuse which belonged to the first centuries of our era as proved by a Kharoshthi document on leather. It is significant that the time which saw Hsüan-tsang's ruined settlement brought to life again coincides with the re-establishment of Chinese power in the Tarim Basin assuring peace and security,

At the small oasis of Charklik, which a variety of indications prove as the true location of the *Lou-lan* of the old Chinese pilgrims and Marco Polo's *Lop*, the preparations for my long-planned expedition to the ruins north of Lop-nor, first discovered by Dr. Hedin on his memorable journey of 1900, proved an exacting task. Within three days I had to raise a contingent of fifty labourers for proposed excavations ; food supplies to last all of us for five weeks; and to collect as many camels as I possibly could get for the transport, seeing that we should have to carry water, or rather ice, sufficient to provide us all on a seven days' march across waterless desert, then during a prolonged stay at the ruins as well as on the return journey. The problem looked indeed formidable when I found that, exhausting all local resources, I could raise the number of camels only to twenty-one, including our own and some animals hired from Charchan. Fortunately, Liao-Daloi, the Chinese magistrate of this forlorn tract, counting all in all between four

and five hundred homesteads, proved most helpful, and soon I was joined too, by two hardy hunters from Abdal, who had seen service with Hedin and were not frightened like the rest of the men by the risks of such a desert expedition. On the eve of my start Rai Ram Singh too arrived; he had carried separate surveys along the foot of the Kun-lun and succeeded in extending a net of triangles connected with fixed points of Captain Deasy's surveys and of the Indian Trigonometrical Survey all the way from Polur to beyond Charchan. The cold which was so welcome to me, as giving me hope of being able to carry our water-supply in the more convenient form of ice, had been severe in the foothills of the great range, and caused the surveyor's old trouble, rheumatism, to reappear in a measure which seriously handicapped him during the remainder of these trying winter months.

Eager as I was to push on to our goal north of the Lop-nor desert and to husband time and supplies, I could not forego the temptation of trial excavations at the ruins of Miran, on the way from Charklik to Abdal, the last fishing hamlet on the Tarim. The "finds" brought to light there, in the shape of early Tibetan records from a ruined fort and of sculptural remains from a temple of far more ancient date, were so encouraging that I determined in any case to revisit the site. Then, on December 11, 1906, crossing the deep and still unfrozen Tarim, I started my desert column from Abdal. For one day we followed the incipient Lop nor marshes eastwards, and luckily found good ice already available in one of the fresh-water lagoons. Every available camel was loaded with big bags full of ice, and in addition some thirty donkeys, which were to march on for two days further and leave their ice there for a halfway depôt. Of course, they themselves needed water; but with a two days' thirst and relieved of loads they could be trusted to return quickly to the Tarim. The route we now struck, to the north-north-east, led necessarily near the one followed by Hedin in 1900, in the reverse direction. But there was nothing to guide us, only the position of the ruins as indicated in his route-map and the compass; neither of the Lop hunters had ever visited the ruins from this side. A notable change had taken place in the physical aspects of this dismal ground since Hedin had traversed it. The great newly formed lagoons, in which the waters of the Tarim then spread northward, had since almost completely dried up. The water of the rare pools left behind in salt-encrusted depressions was so salt that, in spite of the great cold, it had not yet frozen.

On the morning of December 15 we had left the last depression with dead poplars and tamarisks behind us, and very soon after we passed into that zone of excessive erosion which constitutes so striking a feature of the northern portion of the Lop-nor desert. The succession of steep clay banks and sharply cut nullahs between them, all carved out by wind erosion and clearly marking the prevailing direction of the

winds, north-east to south-west, was most trying to the camels' feet (several of the poor beasts had to be "re-soled"—a painful operation), and did not allow us to cover more than 14 miles a day at the utmost, though I kept men and beasts on the move from daybreak until nightfall. There could be no doubt about this ground forming part of a very ancient lake-bed. Yet curiously enough we had scarcely entered it when frequent finds of flint arrow-heads and other implements of the Stone Age, together with fragments of very coarse pottery, supplied evidence that it must have been occupied by man in prehistorical times. An equally important discovery was that of small bronze objects, including early Chinese coins, together with plentiful fragments of well-finished pottery, at a point still fully 12 miles to the south of Hedin's site.

By that time we were already in the clutches of an icy north-east wind, which in the middle of the following night nearly blew my tent down. With short intervals it continued during our whole stay in this region; with minimum temperatures rapidly falling below zero Fahr., it made life exceedingly trying for the next weeks. Had it not been for the plentiful fuel supplied by the rows of bleached dead tree-trunks, evidently marking ancient river-beds, the men would have suffered even more from exposure than they did. In spite of the sun shining brightly, a double supply of my warmest wraps and gloves failed to keep head and hands warm.

So it was a great relief for us all when, on December 17, the first great mound indicating proximity of the site was duly sighted, exactly where Hedin's sketch-map had led me to expect it. By nightfall I was able to pitch camp at the foot of the ruined Stupa which stands out in this weirdly desolate landscape as the landmark of the main group of ruins (Fig. 7). The excavations which I carried on unremittingly for the next eleven days, with a relatively large number of men, enabled me to clear all remains traceable at the several groups of ruins, and yielded plentiful results. Among the dwellings, constructed of timber and plaster walls exactly like those of the Niya Site, wind erosion had worked terrible havoc. Its force and direction may be judged by the fact that of the solid walls of stamped clay once enclosing the principal settlement, those facing east and west had been completely carried away, while the north and south walls could just be traced.

But, luckily, in various places a sufficient cover of drift sand or consolidated refuse had afforded protection for many interesting relics. In a large rubbish heap, fully 100 feet across, extending near the centre of what proved to have been a small fortified station, we struck a particularly rich mine. The finds of written records, on wood and paper, also on silk, proved remarkably numerous, considering the limited size of the settlement and the number of dwellings which had escaped erosion. The majority of the records are Chinese, apparently chiefly of an administrative character: their detailed examination is likely to

throw light on questions connected with the use of the ancient Chinese trade route which passed once here along the south foot of the Kuruk-tagh and north of Lop-nor into Kan-su, and also on matters of geographical nomenclature.

Kharoshthi documents were also numerous. Their character and the observations made as to their places and conditions of discovery justify the important conclusion that the same early Indian language as found in the records of the Niya Site was in common local use also in the Lop-nor region for indigenous administration and business. Considering how far removed Lop-nor is from Khotan, this uniform extension of an Indian script and language to the extreme east of the Tarim basin has a special historical interest. Fine architectural wood carvings, objects of industrial art, metal seals, etc., brought to light in considerable number show the same close dependence on models of Græco-Buddhist art brought from India as the corresponding finds of the Niya Site. The resemblance to the latter is so great that even without the evidence of dated Chinese documents and of the very numerous coin finds, it would have sufficed to prove that the ruins which from the salt springs situated a long march northward may for the present be called those of Altmish-bulak, were abandoned about the same time as the Niya Site, *i.e.* the latter half of the third century A.D.

The results of our excavations prove clearly that the principal group of ruins represents the remains of a small fortified station garrisoned by Chinese troops, and intended to control an important ancient route which led from Tun-huang (Sha-chou), on the extreme west of Kan-su to the oases along and to the north of the Tarim. We knew from Chinese historical records that this route, opened through the desert about 110 B.C., served for the first expansion of Chinese political influence and trade westwards, and remained in use through the whole period of the Han dynasty. But it was only in the course of the explorations of this winter and spring that its exact direction and the starting-points east and west of the absolute desert intervening could be determined with certainty.

There was a series of indications to show that the settlement around this western station derived its importance far more from the traffic with China which passed through it than for the resources of local cultivation. Yet even allowing for this, how impressive is the evidence of the great physical changes which have overtaken this region, mainly through desiccation! For over 150 miles to the east no drinkable water could be found now along the line which the route must have followed towards the westernmost point of the ancient frontier-line subsequently discovered by me in the desert west of Tun-huang, and no possible canal system from the Tarim could now carry water for anything like that distance beyond the Altmish-bulak site, nor even as far probably as the latter. The springs of Altmish-

bulak and some to the west of them where we sent such of our camels as could be spared from transport work proved so salt that the poor beasts, even with the thirst of a fortnight, would not touch their water. For the same reason no ice had as yet formed on them, in spite of the minimum temperatures during our stay at the ruins having fallen as low as 45° below freezing point.

With the hoped-for supply from the springs north failing, our ice store was getting very low. Cases of illness among the men showed how exposure to the continuous icy blasts was telling on them. I myself was frequently shaken inwardly with recurring attacks of malarial fever brought from the Indian North-West Frontier. So it was just as well that by December 29, 1906, the exploration of all structural remains traceable was completed. The main camp in charge of the surveyor was sent back to Abdal with the "archæological proceeds," while I set out with a few men through the unexplored desert south-westwards. It was an interesting though trying tramp, which after seven days brought us safely to the ice of the Tarim lagoons. Progress was far more difficult than on the journey from Lop-nor, owing to the steadily increasing height of the ridges of drift sand we encountered. The curious erosion trenches forsook us just when they would have favoured progress in the intended direction. Also otherwise the desert crossed showed marked differences in its physical aspects. The ground, where not covered by the lines of high dunes running north to south, bore here, too, indications of having formed part of an ancient lake-bed. But the rows of dead trees so frequently met on the former route, and marking the banks of lagoons or river courses of a subsequent period, disappeared here soon. The resulting difficulty about fuel was a serious matter for us, considering that just then we experienced the lowest temperatures of the winter, down to 48° below freezing point. Curiously enough, relics of the Stone Age, including a fine jade axe, cropped up here too on the rare patches of eroded bare ground.

After surveying some localities of archæological interest on the lower Tarim and Charchan rivers, I hurried *via* Charklik to resume my excavations at Miran. This, too, was a very desolate spot situated at the foot of the absolutely barren gravel glacis which stretches down from the mountains towards the westernmost portion of the Lop-nor marches. The latter had probably within historical times receded fully 10 miles or so to the north of the position occupied by the ruins. But luckily a small stream which had once been used to irrigate the area, still passes within a few miles of the ruins. In the narrow jungle belt on its banks our hard-tried camels found such grazing as dead leaves of wild poplars and dry reeds can offer, and we ourselves were spared the usual anxieties about water transport. But none of our party is ever likely to forget the misery we endured during those three weeks of hard work from the icy gales almost always blowing. There

were days when all my assistants were on the sick-list with the exception of bright, alert Chiang-ssŭ-yieh.

But the results achieved offered ample reward to me. The ruined fort quite fulfilled the promise held out by the first experimental digging. The rooms and half-underground hovels which had sheltered its Tibetan garrison during the eighth to ninth century A.D. were rough enough in design and construction, but proved to contain in some respects the most remarkable refuse accumulations it has ever fallen to my lot to clear. Rubbish filled them in places to a height of 9 to 10 feet, and right down to the bottom the layers of refuse of all kinds left behind by the occupants yielded in profusion records on paper and wood, mostly in Tibetan, but some in a script which looks like *Kök-turki*, the earliest Turki writing. The total number rose in the end to close on a thousand. Similarly the remains of implements, articles of clothing, arms, etc., were abundant. Their condition, I am sorry to say, illustrated only too well the squalor in which these Tibetan braves must have passed their time at this forlorn frontier post. Evidence often of a very unsavoury kind seemed to indicate that the rooms which alone could have given shelter against the inclemencies of the climate, continued to be tenanted to the last, while the refuse accumulations on the floor kept steadily rising. In some places they actually reached up to the roofing. I have had occasion to acquire a rather extensive experience in clearing ancient rubbish heaps, and know how to diagnose them. But for intensity of absolute dirt and age-persisting "smelliness" I shall always put the rich "castings" of Tibetan warriors in the front rank.

There can be no doubt that the stronghold was intended to guard the direct route from the southern oases of the Tarim basin to Tun-huang (or Sha-chou). Like the branch previously mentioned as leading north of Lop-nor, this must have been a main line of communication into China from the last centuries B.C. onwards, and must have still grown in importance when the former became impracticable after the early centuries of our era. But older in date and of far wider interest were the art remains which we brought to light from the *débris* mounds of some Buddhist shrines surviving erosion in the vicinity of the fort. These must have been in ruins at least four centuries before the Tibetan occupation led to the erection of the fort. From one of them (Fig. 8) emerged remnants of colossal stucco relievos, representing seated Buddhas, and showing in their modelling closest relation to Græco-Buddhist sculpture as developed in the extreme north-west of India during the first centuries of our era.

The influence of classical art was reflected with surprising directness in the much-damaged yet remarkable frescoes which covered what remains of the walls of two circular domed temples enclosing small Stupas. The paintings of the main frieze, on a background of Pompeian

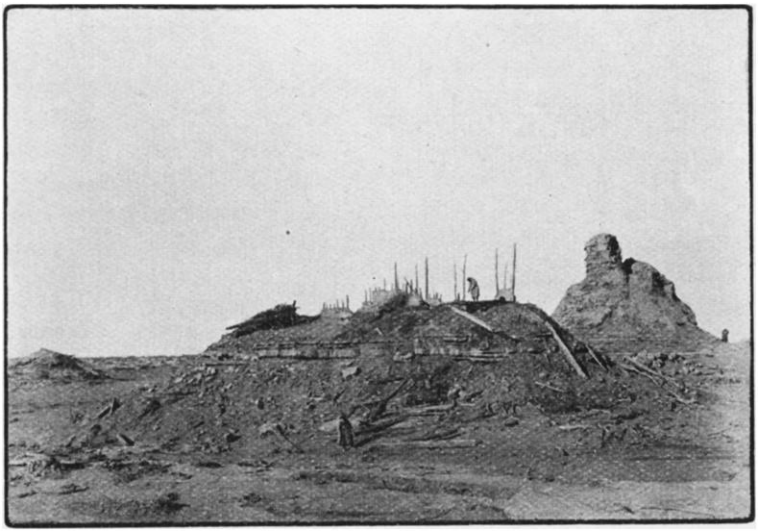


FIG. 7.—REMAINS OF ANCIENT DWELLING ON ERODED CLAY TERRACE NEAR RUINED STUPA, ALTMISH-BULAK SITE.

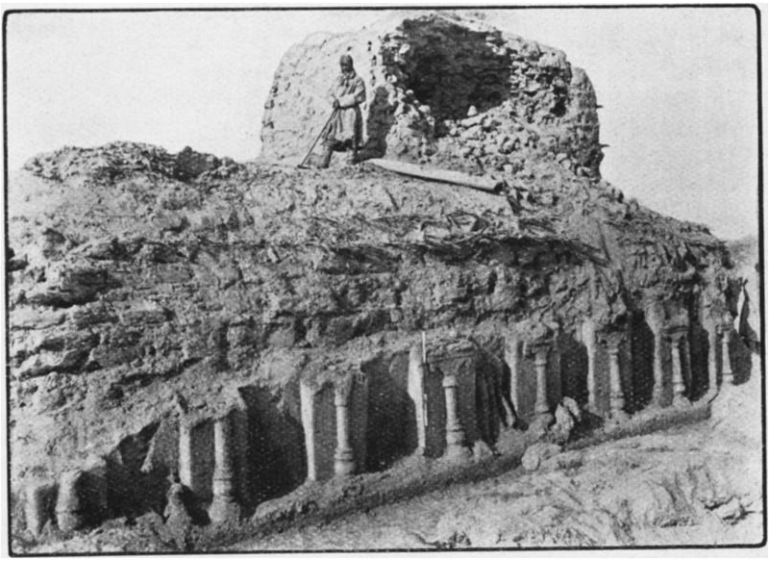


FIG. 8.—BASE OF RUINED BUDDHIST SHRINE, MIRAN.

red, illustrating scenes of Buddhist legend or worship, showed the same clever adaptation of classical forms to Indian subjects and ideas which constitutes the chief characteristic and charm of Græco-Buddhist sculpture, but which in the pictorial art of that period can no longer be studied within Indian limits, owing to the destruction of all painted work through climatic vicissitudes. But even more interesting were the figures of the elaborate fresco dadoes. These were so thoroughly Western in conception and treatment that when they first emerged from the *débris* I felt tempted to believe myself rather among the ruins of some Roman villa in Syria or Asia Minor than those of Buddhist sanctuaries on the very confines of China proper. There were half-length figures of beautiful winged angels, and, more curious still, a cycle of youthful figures in a gracefully designed setting of garland-carrying *putti*, representing the varied pleasures of life. It was such a strange contrast to the weird desolation which now reigns in the desert around the ruins. Kharoshthi inscriptions painted by the side of some frescoes and pieces of silk streamers bearing legends in the same script indicate the third century A.D. as the approximate date when these temples were deserted. Unfortunately, the very confined space and the semi-Arctic weather conditions made photographic work very difficult, and what of frescoes we succeeded in safely removing still awaits unpacking.

After all the exposure undergone at Miran a week's halt at Abdal seemed pleasant, however humble the shelter which its reed huts offered, and however busy I was kept with packing my archæological finds of the last four months. A large caravan entrusted to two veteran Turki servants, who had suffered too much to follow me further, was to take them back to Mr. Macartney's care at Kashgar. Then on February 21, 1907, I started on the long desert journey which was to take us from the dreary Lop-nor marshes right through to Tun-huang on the westernmost border of Kan-su and China proper. It was the same route by which Marco Polo had travelled "through the desert of Lob." Six centuries before him it had seen a traveller scarcely less great, Hsüan-tsang, the pilgrim of pious memory, returning to China laden with Buddhist relics and sacred books after many years' wanderings in the "Western Regions."

Ever since the end of the second century B.C., when the Chinese first brought the Tarim Basin under their political influence, this desolate desert track close on 350 miles in length had served as an important caravan route during successive periods, only to be forgotten again when Chinese power westwards weakened or a policy of rigid seclusion strangled trade. Some twenty-five years ago it had thus to be re-discovered. Mulla, the quaint honest Loplik who had helped me at Altmish-bulak and Miran, was one of the small party who guided a plucky Chinese official through. Captain Kozloff, to whose excellent pioneer work in the Pei-shan and westernmost Nan-shan it affords me special pleasure to bear testimony, had followed it in 1894, and since

then, just a year before me, also Colonel Bruce with Captain Layard. Now the rapidly rising tide of prosperity and commercial enterprise in the southern oases of Turkestan is bringing the route into favour again with traders from Khotan and Kashgar, but only during the winter months when the use of ice makes it possible to overcome the difficulties arising from the want of drinkable water at a succession of stages.

The seventeen long marches in which, with men and beasts now well broken to even more trying ground, we accomplished the desert journey, still ordinarily reckoned as in the days of Marco at twenty-eight stages, offered plentiful opportunities for interesting geographical observations. But of these only the briefest indication can be given here. After skirting for about one-third of the route the dreary shores of a vast salt-covered lake-bed marking the extent of the Lop-nor marshes at a relatively recent period, we found ourselves proceeding in a well-marked depression between the foot of the barren low hills of the Kuruk-tagh on the north and great ridges of steadily rising sand towards the snowy range of the Altun-tagh on the south. As we followed this depression, where in spite of low dunes water was easily reached by digging wells, we found that it gradually narrowed into a regular valley descending from the north-east. Our detailed survey clearly indicated that we had here the passage through which the waters of the Su-lai-ho and Tun-huang rivers had, at a period perhaps not so very remote, made their way down to Lop-nor. The geographical importance of this observation is obvious, seeing that the true eastern-most limit of the great Turkestan basin is thus shifted from circ. 92° to circ. 99° of longitude. I may add here, in passing, that the close affinity shown by practically all physical features in the Tun-huang-Su-lai-ho drainage area to those of the eastern Tarim Basin fully agrees with this observation.

Where the valley just mentioned again expands east of the halting stage known from its little group of living poplars as Besh-toghrak, we came upon ground very puzzling at first sight. In a wide basin enclosed to the north by the sombre and absolutely sterile slopes of the Kuruk-tagh, and by high ranges of dunes on the south, we found a succession of unmistakable dry lake beds, and between and around them a perfect maze of high clay terraces remarkably steep. The lake-beds, salt-covered in parts, looked quite recent. Yet the lake shown as Khara-nor in the maps, where the Su-lai-ho and Tun-huang rivers were hitherto believed to end and from which alone water sufficient to fill this great basin could come, lay still more than a degree further to the east. The explanation was furnished two months later when, in the course of resumed surveys, we discovered that a considerable river flows out of the Khara-nor during the spring and summer floods, and after draining a series of smaller lakes and marshes lower down, carries its water right through to the lake beds we had passed so much further

west. The deep-cut bed of this river could easily escape discovery owing to the very deceptive way in which its course is masked by what looks an unbroken flat glacis of gravel.

After emerging from this terminal river basin and at a point still five long marches from the edge of the Tun-huang oasis, I first sighted remains of ruined watch-towers, and soon came upon traces of an ancient wall connecting them. A lucky chance rewarded already the first scraping of the ground near a watch-tower with relics of manifest antiquity, including a Chinese record on wood, and a variety of archæological indications rapidly gathered as we passed onwards, made me feel convinced that these ruins belonged to an early system of frontier defence corresponding in character to the extant 'Great Wall' on the Kan-su border. So as soon as men and animals had recovered from the preceding fatigues by a short halt at Tun-huang, I returned to the still wintry desert in order to explore this ruined *limes* in detail. It proved a fascinating and fruitful task, but also one of uncommon difficulty. The ground over which the line of the wall ran was, from the old frontier town of An-hsi westwards, practically all an absolute desert of gravel, broken only at rare intervals by belts of sandy scrub or thin jungle near the river or marshes.

Nothing was known of the ruins to the magistrate and other educated Chinese officials of Tun-huang, who all took a very friendly interest in my work and would have been ready enough to help us. On the other hand, the deep-rooted secretiveness of the local Chinese population effectively prevented any of the hunters or shepherds who occasionally visit the nearer of the riverine jungles from coming forward with guidance. So all the tracking of the ancient wall, often completely effaced for miles, and frequently crossing most deceptive ground, had to be done by myself. Still more serious was the trouble about adequate labour for excavations. The slum-dwelling coolies, whom only exercise of special pressure on the magistrate's part could induce to venture into the dreaded desert, were, in spite of very liberal treatment, ever ready to desert—or else to get lost in the desert through their helplessness as confirmed opium smokers. Yet, by moving first to the north of the oasis, and subsequently striking the ancient *limes* by a new route right through the desert west of Tun-huang, we succeeded, in the course of two months, in accurately surveying its line all the way from An-hsi to its westernmost point, a distance of more than 150 miles, and in exploring the ruins of all watch-stations, sectional headquarters, etc., which adjoined it.

The fine massive watch-towers (Fig. 9), usually rising at intervals of 2 to 3 miles along the wall, were my best guides in tracking the line. Almost invariably I could trace near them ruins of the modest quarters which had sheltered the detachments échelonned along the wall. From the Chinese records, mostly on wood or bamboo, which the excavation of

almost every ruin yielded in plenty, I soon made certain with the scholarly help of my indefatigable Chinese secretary, Chiang-ssŭ-yieh, that this frontier-line dated back to the end of the second century B.C., when Chinese expansion into Central Asia first began under the emperor Wu-ti. Exactly dated documents commencing with the year 99 B.C. showed that the regular garrisoning of the border wall continued throughout the first century B.C., and probably for the greatest part of its length down to the middle of the second century A.D. But the outlying westernmost section appears to have been already abandoned earlier. The main purpose of this *limes* was undoubtedly to safeguard the territory south of the Su-lai-ho river, which was indispensable as a base and passage for the Chinese military forces, political missions, etc., sent to extend and consolidate Chinese power in the Tarim basin. It is equally certain that the enemy whose irruptions from the north had to be warded off were the Hsiong-nu, the ancestors of those Huns who some centuries later watered their horses on the Danube and Po. It is an important geographical fact, brought out by the very existence of this defensive line, that the desert hill region north of the Su-lai-ho marshes, now quite impracticable owing to the absence of water, must then still have been passable, at least for small raiding parties.

The very character of the ground through which the fortified frontier-line ran from An-hsi westwards, almost all of it already in ancient times a real desert, had presented exceptionally favourable conditions for the preservation of antiques. Whatever objects had once passed under the protection of a layer of gravel or *débris*, however thin, were practically safe in a soil which had seen but extremely scanty rainfall for the last two thousand years, was far removed from any chance of irrigation or other interference by human agency, and had suffered on its flat surface but rarely even from wind erosion.

So it was natural enough that the hundreds of inscribed pieces of wood, bamboo, silk, the remains of clothing, furniture, and equipment, etc., all the miscellaneous articles of antiquarian interest, which the successive occupants of these desolate posts had left behind as of no value, should have survived practically uninjured. Sometimes a mere scraping on the surface of what looked like an ordinary gravel slope adjoining the ruined watch-station sufficed to disclose rubbish heaps in which files of wooden records, thrown out from the office of some military commander before the time of Christ, lay amongst the most perishable materials, straw, bits of clothing, etc., all looking perfectly fresh. The Chinese documents, of which, including fragments, I recovered in the end over two thousand, refer mainly to matters of military administration, often giving details as to the strength, movements, etc., of the troops échelonned along the border; their commissariat, equipment, and the like. There are brief official reports and, more curious still, private letters addressed to officers full of quaint actualities, family news from their distant homes, etc.

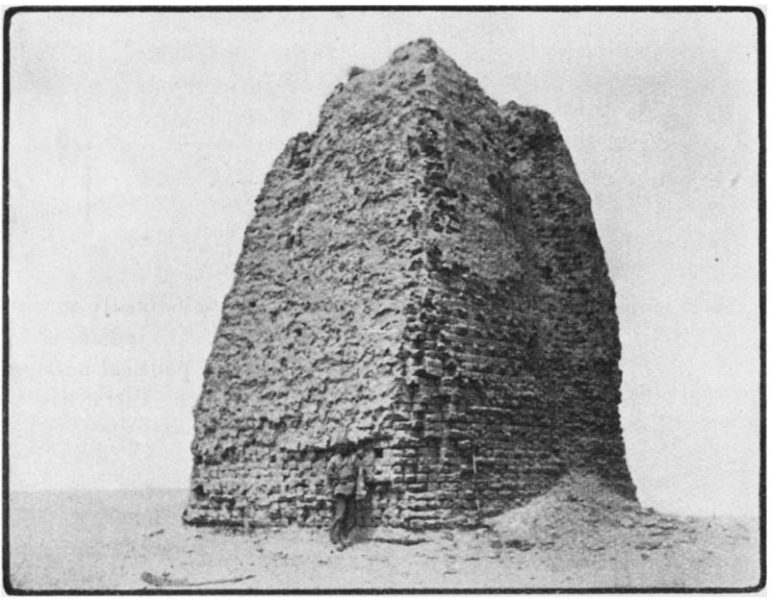


FIG. 9.—RUINED WATCH-TOWER ON ANCIENT FRONTIER-LINE IN DESERT WEST OF TUN-HUANG.

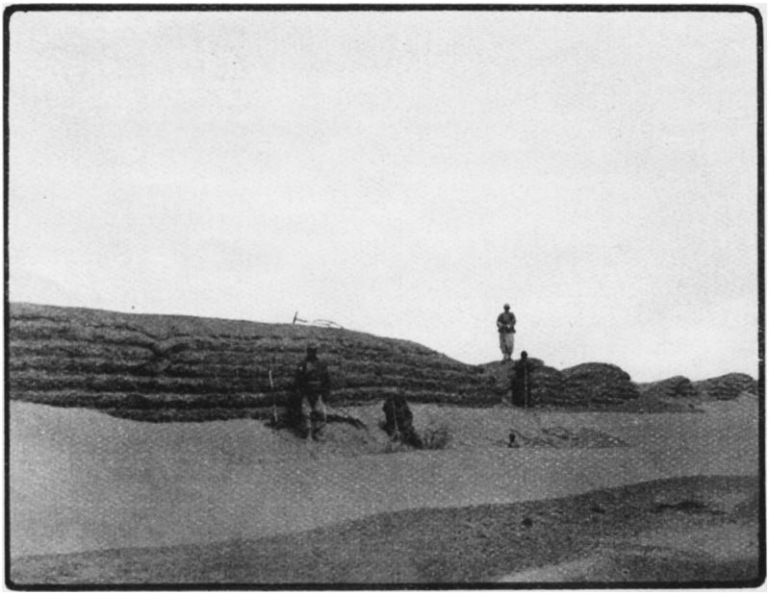


FIG. 10.—REMAINS OF ANCIENT FRONTIER WALL (BUILT AT CLOSE OF SECOND CENTURY B.C.) IN DESERT NORTH OF TUN-HUANG.

The careful study of these miscellaneous records, far older than any which have as yet in original come to light in Central Asia or China, together with that of the actual remains of quarters, furniture, arms, etc., will suffice to restore an accurate picture of the life led along this most desolate of borders. But in addition to this evidence I recovered very interesting relics of the traffic from the distant west, which once passed along the line guarded by the *limes* in the form of silk pieces inscribed with Indian Kharoshthi and Brahmi and in a number of letters on paper found carefully fastened, containing writing in an unknown script resembling Aramaic. Are these perhaps in some Iranian tongue, and were they left behind by some early traders from Persia or Western Turkestan coming for the silk of the distant *Seres?*

The construction of a regular defensive line across so extensive a stretch of desert, bare of all resources, must have been a difficult task, and it was interesting to find again and again evidence of the skill with which the old Chinese engineers had attacked it. Guided by a sharp eye for all topographical features, they had cleverly used the succession of salt marshes and lakes to supplement their line by these natural defences. For the wall itself they had had recourse to materials which, though of little apparent strength, were particularly adapted to local conditions, and have stood the stress of two thousand years, on the whole, remarkably well. Between layers of stamped gravel, about 1 foot high, they interposed carefully secured rows of fascines, about as high, made of neatly cut and strongly tied bundles of reeds, which were obtained from the marshes (Fig. 10). The salts contained everywhere in the soil and water soon gave to the strange rampart thus constructed a quasi-petrified consistency, which in such a region could well hold its own against man and nature—all forces, in fact, but that of slow grinding but almost incessant wind erosion.

Again and again I noted in the course of my surveys how well preserved the wall rose along those sections which lay parallel to the prevailing direction of the winds, while where the line lay across it and in any way barred the progress of driving sand, wind erosion had badly breached or completely effaced the rampart. The winds which now blow over this desert with remarkable violence and persistence come mainly from the east and north-east. The observation derives additional importance from the fact that those winds make their effect felt even far away in the Tarim basin, as I have had ample occasion to observe in the climatic conditions and surface formations about Lop-nor. The extent and character of the damage which the various sections of the wall have suffered prove that the same conditions must have prevailed for the last two thousand years. "Aspiration," due to the higher temperatures which the atmosphere of the low-lying desert around and west of Lop-nor must generally attain as compared with the great plateaus

of stone and gravel which rise on either side of the Su-lai-ho depression, suggests a likely explanation.

The wall shows everywhere a uniform thickness of 8 feet, and still rises in places to over 10 feet. But that its builders knew how to make greater efforts where needed in spite of all difficulties about labour, materials, etc., is proved by the watch-towers, which are ordinarily built of sun-dried bricks of considerable strength, rising in one solid square mass to heights of 30 feet or more. One small fort, marking probably the position of the gate station of Yü-mên, long vainly sought for by Chinese antiquaries, at a period when its original position at the westernmost extension of the wall had already been abandoned, about the commencement of our era, showed high and solid walls of stamped clay fully 15 feet thick. Still more imposing is a solid block of halls nearly 500 feet long and with walls of 6 feet thickness still rising to 25 feet or so, which at first puzzled me greatly by its palace like look and dimensions, until finds of dated records of the first century B.C. near by proved that it had been constructed as a great magazine for the troops garrisoning the line or passing along it (Fig. 11).

(*To be continued.*)

THE LONGITUDINAL SECTION OF THE NILE.*

By Captain H. G. LYONS, F.R.S., F.R.G.S.

THE reopening of the Sudan after the capture of Omdurman and the defeat of the Dervish army in 1899 enabled the detailed investigation of the Upper Nile and its tributaries to be commenced, and it has been diligently prosecuted for the last eight or nine years. Our knowledge of the geography of the Nile basin has been greatly increased thereby, and the regimen of the main stream and of each of its tributaries has now been elucidated, although there are many points of detail which will repay further study.

The yearly increasing demands of the cultivator in the Nile valley and the Delta have led to the preparation of several projects for increasing the available water-supply during the early summer months, when the cotton crop requires to be regularly watered. The first step in this direction was the completion of the Delta barrage, 12 miles north of Cairo, which enables the river to be maintained at such a level as will supply the main canals of the Delta; the second was the construction of the dam at Aswan (1898–1902), by which some 80 kilometres (50 miles) of the Nile valley in Lower Nubia were converted into a reservoir from January to June, in which the water of November and December, which is surplus to the needs of the country at that season, is stored to augment

* Map, p. 120.

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EXPLORATIONS IN CENTRAL ASIA, 1906-8.*

By Dr. M. AUREL STEIN.

I MIGHT talk for hours about the strange observations and experiences which, in the course of those fascinating months spent along the ancient Chinese frontier wall in the desert, made me forget, as it were, the lapse of long ages. A few touches must suffice here. Never did I realize more deeply how little two thousand years mean where human activity is suspended, and even that of nature benumbed, than when, on my long reconnoitring rides, the evenings found me alone amidst the *débris* of some commanding watch-station. Struck by the rays of the setting sun, tower after tower far away, up to 10 miles' distance and more, could be seen glittering in a yellowish light. As they showed up from afar, with long stretches of the wall between them, often clearly rising as straight brownish lines above the grey bare gravel desert, how easy it was to imagine that towers and wall were still guarded, that watchful eyes were scanning the deceptive plateaus and nullahs northward! The arrow-heads in bronze which I picked up in numbers near the wall and towers, were clear proof that attacks and alarms were familiar incidents on this border. Unconsciously my eye sought the scrub-covered ground flanking the salt marshes where Hun raiders might collect before making their rush in the twilight.

But the slanting rays of the sun would reveal also things far more real. Then the eye caught quite clearly a curiously straight, furrow-like line keeping parallel to the wall, and about 20 feet within it, wherever there was a well-preserved stretch of it. Repeated examination proved that it was a shallow but well-defined track worn into the fine gravel soil by the patrols and others who had tramped along here for centuries. In spite of the persistence with which this strange

* Read at the Royal Geographical Society, March 8, 1909. A map will be issued in a later number of the *Journal*. Continued from p. 36.

uncanny track reappeared along wall sections situated miles away from the caravan route, I might have doubted this simple explanation had I not again and again had occasion to convince myself of the remarkable persistence with which this gravel soil retains and preserves all impressions. Thus, the footprints we had left on our first march to Tun-huang, looked two months later absolutely as fresh as if we had just passed there. Yet we knew by sad experience the force of the gales which had blown here almost daily.

I may quote another curious observation in illustration of the extraordinary preserving power of this desert soil and climate. At a number of watch-stations I had noticed a series of queer little mounds, arranged in regular cross rows (*quincunx* fashion), each about 7 feet square and about 6 feet in height. Closer examination revealed that they were built up entirely of regular reed fascines, laid crosswise in alternate layers, and intermixed with a slight sprinkling of coarse sand and gravel. Through the action of the salts once contained in them, the reeds had acquired a quasi-petrified appearance and considerable consistency, though each reed, when detached, still showed flexible fibres. I was at first greatly puzzled as to the real meaning and purpose of these strange little structures until it dawned upon me, in consequence of various conclusive observations, that they were nothing but stacks of the reed fascines, such as used in the construction of the *agger*, kept ready at the posts for any urgent repairs. Of course, they at once reminded me then of the stacks of wooden sleepers seen neatly piled up at a railway station.

I cannot touch here upon the various questions of physical conditions and changes regarding which this border-line, drawn through the desert more than twenty centuries ago, serves for us as an accurate historical gauge. Its value for this purpose is greatly increased by the fact that the ground it traverses has remained wholly untouched by the manifold and often complex factors connected with human activity. To the important evidence which the remains of the wall supply as to the winds prevailing since two thousand years I have already alluded.

We suffered a great deal from the almost daily gales and the extremes of the desert climate. Against the icy blasts which continued well into April our stoutest furs were poor protection. On April 1, 1907, I still registered a minimum temperature of 39° below freezing-point. But before the month was ended the heat and glare had already become very trying (on April 20 the thermometer showed 90° Fahr. in the shade), and whenever the wind fell, perfect clouds of mosquitoes and other insects would issue from the salt marshes, near which we had to camp for the sake of water, to torment men and beasts. For weeks I had to wear a motor-veil day and night to protect myself. Even the wild camels, which we frequently sighted, must dread these pests; for we found their fresh resting-places out on the absolutely bare gravel plateaus far away

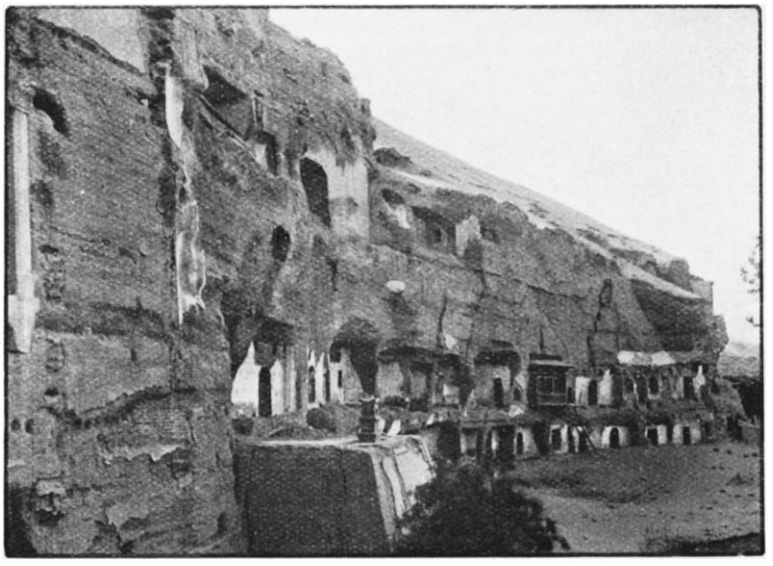


FIG. 12.—SOUTHERN SERIES OF CAVE TEMPLES AT THE "HALLS OF THE THOUSAND BUDDHAS."

from the grazing. Another source of trouble was the saltiness of the water, even in the springs of the marshes. When the excavations had been completed, by the middle of May, it was high time to return to the oasis. That under such conditions we managed to keep to the last our Chinese labourers at work, all opium-smokers, and of great *vis inertiæ*, like most of the people of Tun-huang, seemed a wonder, due largely to the unfailing tact and good nature of my invaluable Chinese secretary and helpmate.

An important archæological task made me doubly eager to return to Tun-huang. In 1902, my friend, Prof. L. de Lóczy, the distinguished head of the Hungarian Geological Survey, and President of the Geographical Society of Hungary, had called my attention to the sacred Buddhist grottoes, known as the 'Halls of the Thousand Buddhas,' to the south-east of Tun-huang, which, as member of Count Széchenyi's expedition and thus as a pioneer of modern geographical exploration in Kan-su, he had visited as early as 1879. His glowing description of the fine fresco paintings and stucco sculptures which he had seen there and the archæological importance of which he had quite rightly recognized, without himself being an antiquarian student, had then greatly impressed me, and had been a main cause inducing me to extend the plans of my expedition so far eastwards into China.

When, soon after my arrival at Tun-huang, in March, 1907, I had paid my first flying visit to the sacred caves carved into the precipitous conglomerate cliffs at the mouth of a barren valley some 12 miles to the south-east of the oasis (Fig. 12), I had found my expectations fully verified, and now I was drawn back by the remembrance of a wealth of art treasures waiting for closer study. There were hundreds of grottoes, large and small, honeycombing in irregular tiers the sombre rock-faces, and my first hurried inspection showed that almost all of them had on their plastered walls a profusion of beautiful and more or less well-preserved frescoes. In composition and style they showed the closest affinity to the remains of Buddhist pictorial art as transplanted from India to Eastern Turkestan, and already familiar to me from the ruined shrines I had excavated in the Khotan desert. The sculptural remains in these grottoes were equally plentiful, and bore equally interesting testimony to that early art connection between India and China proper; but much of this statuary in friable stucco had evidently suffered both from the hands of iconoclasts—and the zeal of pious restorers (Fig. 13).

Plentiful antiquarian evidence, including a series of fine Chinese inscriptions on marble, proved beyond all doubt that a very great portion of the shrines and art relics belonged to the period of the T'ang dynasty (seventh to ninth century A.D.), when Buddhism had greatly flourished in China and when for nearly two centuries this westernmost outpost of China proper had enjoyed imperial protection against invasions, both from the Turks in the north and the Tibetans southward. The

vicissitudes of the succeeding period, when, until the establishment of paramount Mongol power, these Marches, then already outside the 'Great Wall,' had been abandoned to barbarian inroads of all sorts, must have sadly diminished the splendour of the temples and the numbers of the monks and nuns established near them. Yet, in spite of all changes and devastations, Tun-huang had evidently managed to retain its traditions of Buddhist piety even then; for as I examined one grotto after the other, noting the profusion of large images on their platforms, and the frequency of colossal figures of Buddhas in a variety of poses, I felt convinced that it was the very sight of these colossal statues, some reaching nearly 100 feet in height, and the vivid first impression of the cult paid to them, which had made Marco Polo put into his chapter on *Sa-chui*, *i.e.* Tun-huang, a long account of the strange idolatrous customs of the 'people of Tangut.'

The good folk of Tun-huang have, indeed, remained to this day attached with particular zeal to such forms of worship as represent Buddhism in the queer medley of Chinese popular religion, and it scarcely needed the experience of a great annual religious fair which drew the villagers and townspeople of the oasis by the thousands to the 'Thousand Buddhas' just about the time of my return, to make it clear to me that the cave temples, notwithstanding all apparent decay, were still real cult places "in being." I knew well, therefore, that my archæological activity at them, as far as frescoes and sculptures were concerned, would, by every consideration of prudence, have to be strictly platonic, *i.e.* to remain confined to the study of the art relics by means of photography, drawing of plans, etc.; in short, to such work as could not reasonably arouse popular resentment with all its eventual risks.

Yet when by May 20, 1907, I established myself for a prolonged stay in camp at the sacred site which then had once more resumed its air of utter desolation and silence, I confess what kept my heart buoyant were secret hopes of another and more substantial kind. Two months before I had heard vague rumours about a great hidden deposit of ancient manuscripts, which had been accidentally discovered by a Taoist monk about two years earlier, while restoring one of the temples. The trove was jealously guarded in the walled-up side chapel, where it was originally discovered, and there were good reasons for caution in the first endeavours to secure access to it.

The Taoist priest who had come upon and taken charge of it, proved a very quaint person, as ignorant of what he was guarding as he was full of fears concerning gods and men. He was at first a difficult person to handle, and the story of our lengthy struggle with his objections, conscientious and otherwise, must be left to be told hereafter. But I may confide here that our success in the end was, apart from Chiang-ssŭ-yieh's tactful diplomacy, due mainly to what the priest was prepared to accept as a special interposition on my

behalf of my Chinese patron saint, the great Hsüan-tsang. Already the fact of my well-known attachment to the memory of the saintly traveller had been helpful; for curiously enough the Tao-shih, though poorly versed in, and indifferent to, things Buddhist, was quite as ardent an admirer in his own way of 'T'ang-sên,' the "great monk of the T'ang period," as I am in another. It is true the fantastic legends which have transformed Hsüan-tsang in popular belief into a sort of saintly Münchhausen, and which accounted for the Tao-shih's worship, are not to be found in the great pilgrim's genuine Memoirs. But why should that little difference matter? When the first specimens which we at last prevailed upon the priest to pick up from the hidden manuscript store and show us in secret, proved by mere chance to be fine rolls of paper containing Chinese versions of certain Buddhist texts, which the colophons declared to have been brought from India and translated by Hsüan-tsang, the priest and even my zealous secretary were greatly impressed by the portent. Was it not Hsüan-tsang himself, so the latter declared, who had at the opportune moment revealed the hiding-place of that manuscript hoard in order to prepare for me, his disciple from distant India, a fitting antiquarian reward on the western-most confines of China proper?

Under the influence of this quasi-divine hint the Tao-shih then summoned up courage to open before me the rough door closing the entrance which led from the side of the broad front passage of his temple into the rock-carved recess, and which, previous to accidental discovery through a crack, had been hidden behind a frescoed wall. The sight of the small room disclosed was one to make my eyes open wide. Heaped up in layers, but without any order, there appeared in the dim light of the priest's little oil lamp a solid mass of manuscript bundles rising to 10 feet from the floor and filling, as subsequent measurement showed, close on 500 cubic feet. It was impossible to examine anything in this "black hole." But when the priest had brought out some bundles, and had allowed us to look rapidly through the contents in a side room of the newly built porch, where we were well screened from any inquisitive eyes, my contentment rose greatly.

The thick rolls of paper, about one foot high, which turned up first, contained Chinese Buddhist texts in excellent preservation, and yet showing in paper, arrangement, etc., unmistakable signs of great age. To discover exactly dated records in these big rolls opening out to 10 yards' length and more was not easy at first. But when I lighted on the reverse of a Chinese roll upon an extensive text in a cursive form of Indian Brahmi script, I felt relieved of all doubt. Here was indisputable proof that the bulk of the manuscripts deposited went back to the time when Indian writing and some knowledge of Sanskrit still prevailed in Central-Asian Buddhism. All the manuscripts were manifestly preserved exactly in the same condition they were in, when

deposited. Nowhere could I trace the slightest effect of moisture. And, in fact, what better place for preserving such relics could well be imagined than a chamber carved out of the rock in these terribly barren hills, and hermetically shut off from what moisture, if any, the atmosphere of this desert valley ever contained?

How grateful I felt for the protection thus afforded when, on opening a large packet wrapped in a sheet of stout coloured cotton, I found it full of fine paintings on silk and cotton, ex-votos in all kinds of silk and brocade, with a miscellaneous mass of paper pictures, streamers in various fabrics, fragments of embroidered materials, etc. The silk and cotton paintings had served as temple banners, and were found neatly rolled up. When unfurled they displayed beautifully painted figures of Buddhas and Bodhisattvas, either quite Indian in style, or else illustrating in a very interesting fashion the adaptation of Indian models to Chinese taste. Below the divine figures or scenes there appear frequently representations of worshippers, in the characteristic monastic dress of the period. And it was not long before Chiang-ssŭ-yieh had discovered dedicatory legends, with dates of the ninth and tenth century A.D. The silk used for these paintings was almost invariably a transparent gauze of remarkable fineness. Hence, when we came upon larger pictures of this sort, up to 5 or 6 feet in length, closely folded up at the time of their deposition, and much creased in consequence, the opening out of them could not be attempted from obvious risks of damage. Nor was there time then for any closer study. My main care was how many of these delicate graceful paintings I might hope to rescue from their dismal imprisonment and the risks attending their present guardian's careless handling. To my surprise and relief, he attached little value to these fine art relics of the T'ang times. So I could rapidly put aside "for further inspection" the best of the pictures, without the risk of displaying too great *empressement*.

It was probably the priest's indifference to remains of this kind, and his secret hope of diverting by their sacrifice my attention from the precious rolls of Chinese canonical texts, which made him hand out now more readily bundles of what he evidently classed under the head of miscellaneous rubbish. I had every reason to be satisfied with this benevolent intention; for in the very first large packet of this sort I discovered, mixed up with Chinese and Tibetan texts, a great heap of leaves in the variety of Indian script, known as Central-Asian Brahmi. They proved on arrangement to belong to half a dozen different MSS., several of considerable size and some quite complete. None of my previous finds in Sanskrit or the "unknown" ecclesiastical language of Turkestan written in this script equalled them in this respect or in excellence of preservation. So Chiang-ssŭ-yieh and myself worked on without a break that first day until it got quite late, picking out sometimes stray Indian leaves even from regular Chinese or Tibetan bundles,

or else Chinese texts with Central-Asian versions and notes. Though our honest Tao-shih grew visibly tired with climbing over MS. heaps and dragging out heavy bundles, I could see that our appreciation of all this, to him valueless, lore flattered and reassured him.

It is impossible for me to describe here how the search was continued day after day without remission, or to indicate all the interesting finds with which this curious digging was rewarded. It was particularly the bundles filled with miscellaneous texts, painted fabrics, papers of all sorts, which yielded such finds in plenty. One of the most important among them was a large and remarkably well-preserved Sanskrit MS. on palm-leaves, apparently containing some text from the northern Buddhist Canon. The material makes it quite certain that the MS. had been brought from India, and palæographical features indicate its having been written earlier than any so far known Sanskrit MS. Tibetan texts, both in form of big rolls and Pothis, were abundant. But not from the south alone had the old temple library, which had lain hidden here for long centuries, received its additions. Considering how flourishing Buddhism was under the Uighur kingdom, which existed in the north-east of Turkestan up to the twelfth century, and at one time probably also held Tun-huang, I was not surprised when Uighur MSS. cropped up in various miscellaneous bundles. Kök-turki, too, and even the peculiar form of Syriac script, usually employed for Manichæan writings, were represented.

Less attractive at first sight but in reality of particular antiquarian value were the miscellaneous records in Chinese, such as letters, monastic accounts, etc., which filled those bundles of apparent "waste paper." They not only throw instructive light on monastic organization as prevailing here in the ninth to tenth century, but the plentiful dated documents found among them soon enabled me to determine that the walling-up of the chamber must have taken place soon after 1000 A.D. There can be little doubt that the fear of some destructive invasion had prompted the act. But the well-sheltered small cave had in all probability served for a long time previously as a place of deposit for all kinds of objects sanctified by their use but no longer needed. That these objects must have been very often of considerable antiquity already at the time when the deposit was finally walled up, was obvious from the first. Yet it was to me a most gratifying assurance when the partial examination of our Chinese collection which became possible a year later, disclosed in fact among it quite a series of manuscripts showing exact dates which extend certainly as far back as the third century A.D. But it will yet need protracted scholarly labours before the time of the earliest pieces can be definitely established.

When long days of anxious work had resulted in the rapid search of all miscellaneous bundles piled up on the top and the selection of all manuscripts of special interest, pictures, and other relics I was

eager to rescue, we attacked the solid rampart of hard-tied uniform packets of Chinese manuscript rolls. This was a troublesome undertaking in more than one sense, though discreet treatment and judiciously administered doses of silver did much to counteract the Tao-shih's relapses into timorous contrariness. The labour of clearing out the whole chamber might by itself have dismayed a stouter heart than his. However, in the end, it was amply rewarded by the discovery, quite at the bottom, of more miscellaneous bundles with to us precious silk paintings, etc. Rapid as our search of the rest had to be, it led also to the recovery of more manuscripts in Central-Asian Brahmi and other foreign scripts which had got embedded among the great array of Chinese rolls. The negotiations about the compensation to be offered to the Tao-shih in the form of a liberal present to the temple, which by his restoration he could claim to have annexed as his own with all its contents known or unknown, were necessarily protracted. But by that time most of the "selections for closer study," as our polite convention styled them, had already been safely transferred to my improvised store-room without any one, even of my own men, having received the slightest inkling.

How this was accomplished, mainly through Chiang's devotion, and how our acquisitions were safely packed without arousing any attention, is "another story." When the Tao-shih had received a weighty proof of our fair dealing in the form of a goodly number of silver ingots or "horseshoes," and had by a temporary visit to the oasis gathered assurance that his spiritual influence, such as it was, had suffered no diminution, he became almost ready to recognize that I was performing a pious act in rescuing for Western scholarship all those relics of ancient Buddhist literature and art which were otherwise bound to get lost earlier or later through local indifference. I received gratifying proof of the peaceful state of his mind when on my return four months later he agreed to let depart for a certain seat of learning in the distant West a fair share also of the Chinese and Tibetan manuscripts. But my time for feeling true relief came when all the twenty-four cases, heavy with the manuscript treasures rescued from that strange place of hiding, and the five more filled with paintings, embroideries and similar art relics from the same cave, had safely been deposited in London.

The strain of these labours had been great. So, when by the middle of June I had completed also the examination and photographing of all the more notable frescoes and sculptures of old date in the "Halls of the Thousand Buddhas," I was heartily glad to exchange archæological work in the torrid desert plains for geographical exploration in the western and central Nan-shan. After leaving my collections in the safe keeping of the Yamên at An-hsi, I moved towards the great snowy range south, which forms the watershed between the Su-lai-ho and the river of Tun-huang. On my way there I discovered a large ruined site

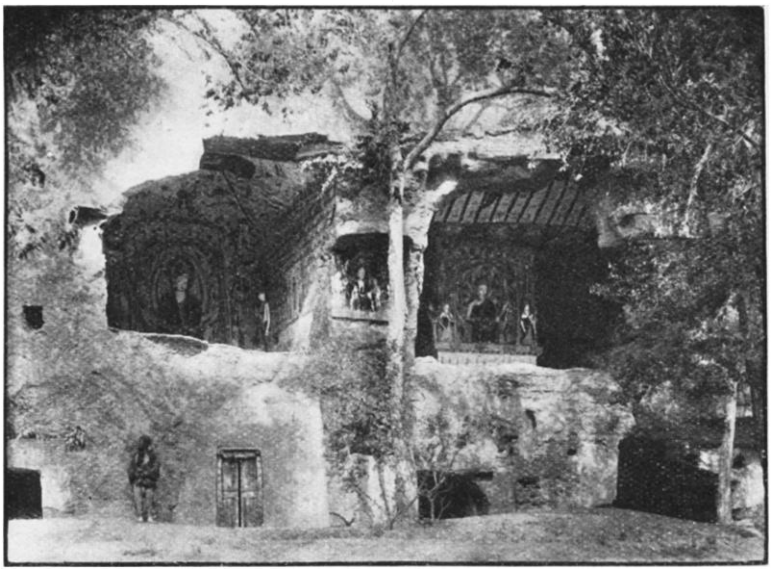


FIG. 13.—CAVE TEMPLES WITH FRESCOES AND SCULPTURE AT THE "HALLS OF THE THOUSAND BUDDHAS," SOUTH-EAST OF TUN-HUANG.

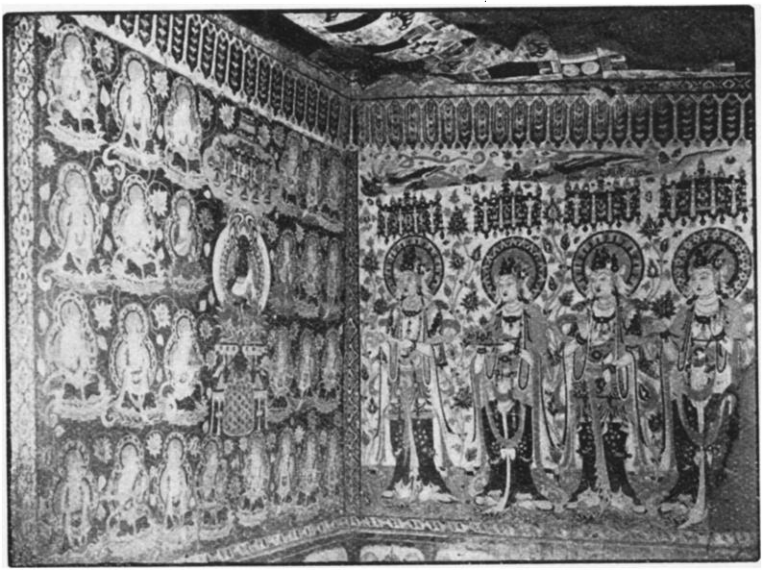


FIG. 14.— FRESCOED WALL IN CAVE TEMPLE AT "THE TEN-THOUSAND BUDDHAS."

near the village of Chiao-tzŭ, between the lowest two of the barren outer ranges. The great change in physical and economic conditions which desiccation has worked in this lower hill region, was illustrated by the fact that the stream from which a canal still traceable for a long distance brought water to the town and the once cultivated area around it has completely disappeared.

Though the damage done by extensive erosion and the height of the dunes left little scope for excavation, yet enough archæological evidence was secured to show that the walled town must have been occupied up to the twelfth to thirteenth century A.D. All the more striking was the proof which its walls afforded of the effects of wind erosion since that period. In spite of very massive construction all lines of walls facing east have been completely breached through the driving and scouring sand, and in many places practically effaced, while the walls facing north and south and thus lying parallel to the direction of the prevailing east winds, have escaped practically uninjured. When I subsequently ascended the cañon-like valley in which the stream of Ta-hsi cuts through the second outer range, I came upon a very picturesque series of Buddhist cave temples, known as *Wang-fu-hsia* ("Valley of the Ten-thousand Buddhas") and still forming a pilgrimage place. In character and date they showed close affinity to the "Halls of the Thousand Buddhas." The large and well-preserved fresco compositions decorating their walls furnished fresh illustrations of value for the study of Buddhist pictorial art as practised in this region from the eighth to the twelfth century A.D (Fig. 14).

After surveying the great chain of glacier-crowned peaks which overlook the terribly barren detribus plateaus of the Nan-shan west of the Su-lai-ho, we descended to the pleasant little oasis of Chong-ma. Then crossing the river there we made our way through a hitherto unexplored mountain tract where even at this favourable season want of water was a serious difficulty, to the famous Chia-yü-kuan Gate of the still extant Great Wall. Here I succeeded in clearing up an archæological problem of considerable historical interest. All books and maps, whether European or Chinese, represent the imposing line of wall which bends round the westernmost part of the Su-chou oasis to the very foot of the Nan-shan, as the termination of the ancient Great Wall protecting the northern border of Kan-su. Since centuries the big fortified gate leading through it has been greeted by travellers coming from Central-Asia as the threshold of true Cathay. Yet certain early Chinese records seemed to place the position of that famous gate much further to the west, and the remains of the ancient frontier wall I had discovered in the desert of Tun-huang spoke still more emphatically against that assumption. Careful examination on the spot sufficed to solve the problem. I was able to trace near Chia-yü-kuan the junction of two defensive lines of widely different age and purpose. One line

represented by the crumbling wall of stamped clay which runs along the whole northern border of the Su-chou and Kan-chou districts, proved to have been originally connected with the *limes* of Tun-huang and An-hsi and to date like this from the second century B.C. Its purpose was to protect the narrow belt of oases along the north foot of the Nan-shan which since Chinese expansion westwards had commenced under the first Han dynasty, was indispensably needed as a passage into Eastern Turkestan. The second line, which meets this ancient wall at right angles and through which one now passes by the Chia-yü-kuan gate, is of far more recent construction and was built for the very opposite purpose, that of closing the great Central Asian route at a time when China had resumed its traditional attitude of seclusion.

At Su-chou, the first town within the wall, I had to overcome considerable difficulties before we could start by the close of July on our expedition into the Central Nan-shan. The local authorities, though just as well disposed as I always found them elsewhere, were full of apprehensions about attacks of Tangut robbers, etc., and even when they had reluctantly resigned themselves to my going, the collection of the necessary transport still proved a very difficult task. The Chinese settlers of the Kan-su oases are swayed by a perfect dread of the mountains, which to them remain a *terra incognita* beyond the outermost range, and the men with hired ponies whom the well-meaning magistrate of Su-chou succeeded at last in raising, *recte* pressing, for our service, would no doubt never have started but for a firm hope of forcing us soon into an early return. We could obtain guides only as far as the broad plateau-like valley between the Richthofen and Tolai-shan ranges, where we found gold-pits at an elevation of circ. 13,000 feet worked by small parties of more venturesome people from the Hsi-ning side.

After leaving these exposed mining camps, where the snow had just melted, we did not sight human beings until towards the close of the month we came upon a few Mongols grazing in the valleys south of Kan-chou. Fortunately the well-defined character of the four great ranges in which the Nan-shan rises towards the uplands of the Khara-nor and Koko-nor region (Fig. 15), and the open nature of the main valleys between them, proved a great advantage for systematic survey work and made the want of all guidance less serious. The excellent grazing met with almost everywhere at elevations between 11,000 to 13,000 feet was a great boon for our hard-tried animals, and saved us from all serious losses. But the relatively abundant moisture of which it is the result, and which makes the contrast so striking to the barren slopes of rock and detritus presented by the Western Nan-shan, made itself felt also in a less pleasant way. We all suffered a great deal from almost daily downpours of icy rain and sleet, and the trouble arising from the extensive bogs we encountered at the head of the great valleys and even on the broad watershed plateaus.

The natural difficulties unavoidable in such inhospitable solitudes were increased very considerably by the helplessness of our Chinese ponymen and what I may politely call their deep-rooted physical aversion from taking risks. Now, these dreaded mountains were to them full of risks, imaginary as well as real, and instead of using such intelligence as plentiful opium smoking had left them to guard against these, they tried their best to run away from them altogether. Again and again they made organized attempts at desertion which threatened to leave us without transport, but luckily could be suppressed without frustrating our plans. Chiang-ssŭ-yieh and myself used to talk of them as our "senile babies." They saw risks everywhere, like aged men worn out by much hard experience, yet were like babes in a wood when it came to obviating any of them. They, as well as the small party of Chinese soldiers whom the Su-chou authorities had insisted upon sending along as an escort, were, owing to their own improvidence, soon threatened by starvation. Luckily we managed to ward this off by using for them rations of the barley which could somehow be spared from the ponies. But Chiang had bravely to set an example in eating it himself before they took to this unorthodox food-stuff. Then a few wild donkeys we managed to shoot came to the rescue.

By marches aggregating to over 400 miles, we managed during August to cross and survey in detail the three northernmost ranges of the Central Nan-shan, all rising to snowy peaks of 18,000 to 19,000 feet, between the longitudes of Su-chou and Kan-chou. In the course of these surveys all rivers descending to the oases as well as the Su-lai-ho were explored to their glacier-fed sources. Wherever it was possible we made for routes and passes different from those taken by the Russian explorers, MM. Obrucheff and Kozloff, who had first traversed parts of this mountain region. The magnificent ice-crowned range which divides the headwaters of the Su-lai-ho from the Khara-nor and Koko-nor drainage, was surveyed along its north face, and proved to rise both in height of individual peaks and of crest-line considerably above the northern ranges. From the wide mountain-girt basin some 13,000 feet high, where the Su-lai-ho gathers its main sources amidst a curious combination of marshes and drift-sand areas, we made our way over bog-covered uplands to the headwaters of the Ta-t'ung river, the northernmost large tributary of the Hoang-ho, where we touched the Pacific drainage. Thence we regained the upper valley of the Kan-chou river, and finally effected our passage through the Richthofen range over a succession of high transverse spurs. The flooded streams in the deep-cut tortuous valleys separating the latter gave much trouble. But for this I felt amply compensated by the sight of the luxuriant forest, mostly firs, which here clothes the mountain slopes, a delightful contrast to the barren wastes of rock, detritus or ice presented by the Western Nan-shan. The total mountain area covered by Ram Singh's

plane-table survey between An-hsi and Kan-chou amounted to close on 24,000 square miles.

From Kan-chou I started early in September on the long journey which was to take me back to the Tarim basin for my second winter campaign. Several considerations, archæological as well as practical, obliged me to follow on this journey the great caravan route *viâ* Hami and Turfan, which since the seventh century A.D. has supplanted the more ancient route past Lop-nor. While travelling along it to An-hsi I was able by a series of reconnaissances pushed northward, not only to survey that portion of the Great Wall which in a general way was known to flank the route as far as Chia-yü-kuan, but also to trace remains conclusively proving its earlier extension to An-hsi, as my explorations of the spring and early summer had led me to assume from the first. At An-hsi, Rai Ram Singh, who had rendered very valuable services in the Nan-shan, but whose health had proved unequal to the hardships of a second winter campaign in the desert, left me to regain India *viâ* Khotan. Advantage was taken of his journey to get also the more circuitous mountain route leading from Tun-huang to Charklik accurately surveyed. He was relieved by Surveyor Rai Lal Singh, who subsequently gave splendid proofs of exceptional zeal and fitness for surveying work under trying conditions, as tested before by many an expedition from Yemen to Eastern China.

Of the long journey commenced early in October, 1907, and covering close on 900 miles marching distance, which took me within about two months from An-hsi to Kara-shahr, in the extreme north-east of the Tarim basin, I cannot pause to give details here. Both at Hami and Turfan, the only oases breaking the monotonous stony waste between the Tien-shan and the Pei-shan, I devoted some time to visits of important ruined sites, though a variety of considerations precluded archæological operations on any scale. Advantage was also taken of these breaks for detailed surveys of those districts and the adjoining parts of the Tien-shan. At Turfan the inspection of the numerous and extensive ruins, dating chiefly from the time of the Uighur dominion (ninth to twelfth century A.D.), which had been largely explored by successive expeditions of Prof. Grünwedel and Dr. Von Lecoq, under the auspices of the Prussian Government, and had yielded a rich harvest, proved very instructive. To me it was interesting also to study the conditions which accounted for the survival of these ruins within or else quite close to the still cultivated area, particularly as I could well, after my desert experiences, appreciate the practical facilities thus assured to the archæologist.

On reaching Kara-shahr early in December, I lost no time in setting the spade to work. Sites of ancient towns of some size could be traced at several points of the great scrub-covered plain which encircles the northern shores of the Bagrash lake. But the vicinity of subsoil water,

often impregnated with salts, and the effects of a climate evidently less dry than in other parts of the great Turkestan basin, had completely destroyed all structural remains, and reduced even the clay-built town walls to mere shapeless earth mounds.

A far better field for systematic excavations was offered by an extensive collection of ruined Buddhist shrines, known to the local Muhammadans by the name of Ming-oi, "the Thousand Houses," which dot some low rock terraces jutting out from the foot of the hills, one march to the west of Kara-shahr. The disposition of the ruins in long rows of detached *cellas*, varying in size, but all similar in plan and construction, facilitated the employment of a large number of labourers. It soon became evident that, apart from the destructive effects of rain and snow, the temples had suffered much damage by a great conflagration, which, in view of coin finds reaching down to the ninth century A.D., is likely to have been connected with the earliest Muhammadan invasions. But in spite of all the destruction due to iconoclastic zeal and atmospheric influences, plentiful archæological spoil rewarded our systematic clearing. The deep *débris* layers filling the interior of the larger shrines yielded a great quantity of excellent relievo sculptures in stucco, once adorning the temple walls. From vaulted passages enclosing some *cellas* we recovered fine fresco panels which a timely burial had saved both from fire and moisture. Of the lavish adornment with votive gifts which these shrines once enjoyed, there survived evidence in finds of painted panels and delicately carved relievos once richly gilt. The style of these art relics displayed quite as clearly as the work of ancient Khotan, the predominant influence of Græco-Buddhist models brought from the extreme north-west of India. The frequency with which cinerary urns and boxes turned up around some of the shrines was a curious feature of the site; but of traces of the abodes of the living there were none. Was the great plain stretching eastwards already in old days that desolate waste of sand and scrub which it is now, notwithstanding the relative ease with which it could be brought under irrigation by canals from the large Kara-shahr river?

During the fortnight spent at Ming-oi we worked under quite Sarmatic conditions. Minimum temperatures down to 42° below freezing-point I should, perhaps, not have minded so much, had we only been saved those icy vapours sent forth by the great Bagrash lake south, which enveloped ruins and camp like a white fog, and did not lift for days. So it was a great relief for us all when the completion of my tasks just by Christmas allowed us to move up to the cold but sunny mountains of Khora, where information elicited with much trouble from reticent Mongol shepherds led to the discovery of Buddhist remains hitherto unnoticed. Lal Singh had rejoined me at Ming-oi after making his way from Turfan to Korla, mainly by previously unmapped routes through the barren ranges of the

Kuruk-tagh. He now used the opportunity for useful surveys on the range dividing the Kara-shahr valley from the great Turkestan plains, while I myself was clearing the ruined shrines, small but once richly decorated. Their picturesque seclusion had, alas! not saved them from the fury of iconoclast invaders.

The New Year of 1908 found us at Korla, where, close to the north-east end of the great sandy desert, I felt the satisfaction of having returned once more to my own ground. This old fascination of the Taklamakan induced me to test the firmly maintained reports which Korla hunters presented about "sand-buried towns," etc., they declared to have seen. The short expedition into the unsurveyed desert belt between the Inchike and Charchak river-beds was interesting enough geographically, showing in typical form the changes brought about by shifting river courses and general desiccation. But it revealed in the end that those elaborate reports had no more substantial foundation than the existence of early Muhammadan tombs and of rude shepherd huts amidst the dead jungle of earlier river-beds. Of course, my *soi-disant* guides were quite *bona fide* in their own way, and genuinely sorry that my supposed magic had not been powerful enough to overcome the evil genii hiding the walled towns, etc., which their own imagination had let them see before—apparently in a duststorm! They had honestly hoped that I with my "Wilayet arts" would secure them a chance of discovering all those hidden treasures of gold, etc.

On the Inchike Darya Lal Singh and myself separated and made our way by different routes through unsurveyed desert to the ancient oasis of Kuchar on the great caravan route north-westward. There I utilized a week's halt for visits to the interesting ruins close by, which had during the last five years been searched by successive Japanese, German, and Russian archæological parties, and had finally been cleared with remarkable thoroughness and method by the recent French Mission under Professor Pelliot. After this rapid survey I was free towards the close of January to resume my journey towards the south of the great desert. Inquiries set on foot by me since leaving the Khotan and Keriya region in 1906 had resulted in information reaching me about several ruined sites in the Taklamakan which had remained unexplored, and I was anxious to visit them before the heat and sand-storms of the spring made work on that ground impossible. A march due south from Kuchar through the Taklamakan to where the Keriya river dies away in the sands, was beset with serious difficulties and possible risks. But Hedin's pioneer journey of 1896 showed that it was practicable under certain conditions, and as there were ruins to be visited near the Keriya river course I decided to try the "short cut" and thus to save time.

I could not disguise to myself the difficulties to be faced with a relatively large caravan when I ascertained at Shahyar that the report

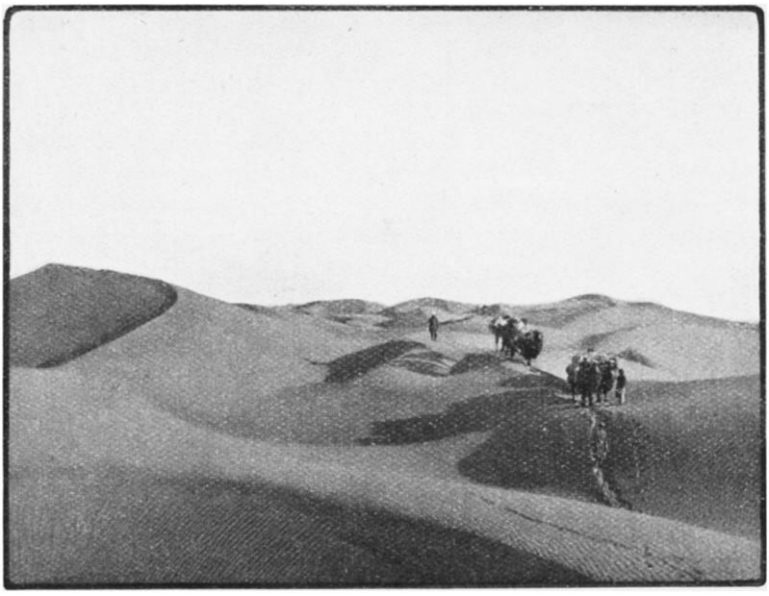


FIG. 16.—CROSSING HIGH DUNES IN TAKLAMAKAN TOWARDS KERIYA RIVER END.

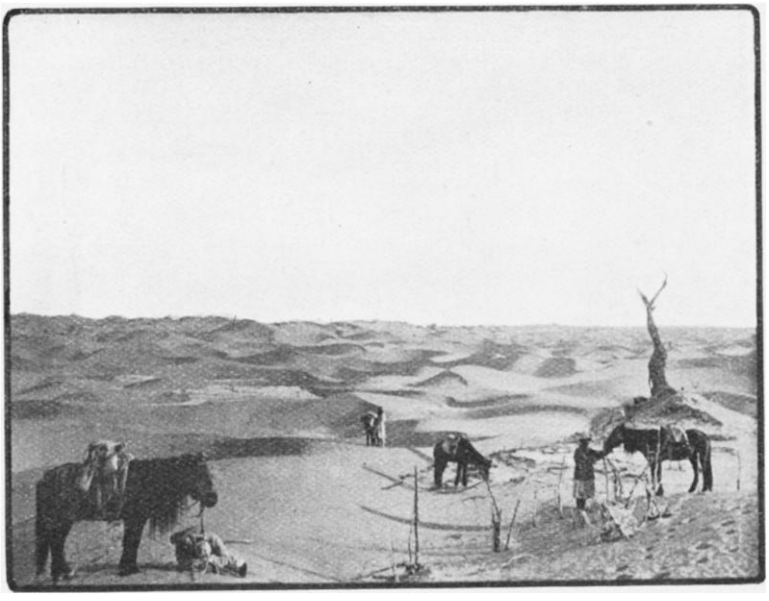


FIG. 17.—HALT IN DEAD DELTA NORTH OF KERIYA RIVER.

about available guides was quite wrong, and that no hunter from that side had ever been known to reach the Keriya river. While Hedin coming from the south had left the end of the Keriya river with the certainty of striking the broad goal of the Tarim right across his route at some point or other, our hope of reaching water within reasonable time depended solely on our steering correctly across some 150 miles of high dunes, towards a particular point, and on the assumption that the Keriya river still actually sent its water there. Now, I knew well by experience the difficulty of steering a correct course by the compass alone in a real sea of sand devoid of all directing features. I realized also that however justified my reliance in Hedin's mapping was, differences in calculated longitude were bound to be considerable on such deceptive ground, and in our case all depended on the assumed longitude being right.

On January 29, 1908, we left the last shepherd huts on the Tarim with eight labourers from Shahyar to help in well-digging and eventual excavations, and with food supplies to last one and a half months for our whole party, counting altogether twenty men. The fifteen camels we took along for transport were by no means too many, considering that at least eight were needed for the carriage of ice. Of course, everybody had to walk, though I had this time rather rashly agreed to take four ponies along too, in order to assure greater mobility for my Indian assistants and myself once we should have struck the river.

After a trying tramp of eight days over dunes rising often to 100 feet and more (Fig. 16), we reached the northern edge of the dried-up delta which the Keriya river had formed at some ancient period. It presented itself as a perfect maze of dry river-beds, all half buried under drift-sand and often completely disappearing amidst thick jungle of trees and scrub dead since long ages. Here our real trouble began; it was as if after navigating an open sea we had reached the treacherous marsh coast of a tropical delta without any lighthouses or landmarks to guide us into the right channel. And yet safety depended on our striking this channel, *i.e.* the particular dry bed which still receives subsoil water from the dying river, and thus would allow us to replenish our much reduced ice supply by digging wells.

Fortune seemed at first to favour us; for we managed to secure a modest quantity of water from a well dug just where we first came upon that forbidding dead delta after crossing huge ridges of sand heaped up to fully 300 feet or more. But the first buoyant hopes of easy progress which this raised in us all, soon died away as we tramped further and further south, always eagerly looking out for the strange dead river-bed which it seemed our best course to follow, and always losing it again amidst piled-up dunes and that deceptive expanse of dead forest (Fig. 17). Nowhere on my desert travels have I met ground so confusing and dismal. Attempts to dig wells failed again and again,

even at places where wind erosion had scooped out the dry bed to a depth of 25 feet and more below the original banks, and where these were marked by a few wild poplars of great age still living. The hearts of the men, except my brave Surveyor Lal Singh, and a few of my old followers like Ibrahim Beg, Jasvant Singh, and that plucky camelman Hassan Akhun, were sinking lower and lower. When five more weary marches had passed without bringing us to water the increasing alarm of the Shahyar men became a cause of serious concern. Thought of flight was ever tempting them to what was bound to prove destruction.

On the sixth day after we entered the delta, I was just arranging for Lal Singh and myself to push out on reconnaissances in opposite directions to west and east, when at last the view from a huge sand ridge of some 300 feet height, which I had opportunely persisted in climbing to the very top, revealed in that vast expanse of grey and yellow bleakness a few strange streaks of white. It was the glittering ice-sheet of the river, and the relief was intense when after a long tramp eastwards we arrived at it—and were sure that it was not merely some salt-encrusted marsh bed. It was time for us all to reach the river. The camels had tasted no water since fully a fortnight, and the poor ponies none for five days except a few glassfuls, all I could safely spare from the precious remnant of our ice supply. We humans had been rationed for the same time to the scanty allowance of about one pint per diem and man. The ever errant river had formed a new bed, some four years before, as I found out subsequently, at a considerable distance to the west of the one where Hedin had seen it, and the sands through which it now flowed were still absolutely sterile. It took several days more before we arrived at living forest and found the new river-bed branching off from the former one not far from Tonguz-baste, the northernmost shepherd's station I had reached in 1901.

The ground we had passed through had its own fascination, and survey work on it offered considerable geographical interest. Yet I was glad when after a day's rest I could resume archæological labour at the Kara-dong site, which the river by its latest change has approached again after long centuries. On my first visit in 1901 a succession of sandstorms had prevented a complete examination of the site, and the shifting of dunes had since laid bare ruined dwellings then too deeply buried beneath the sand. Their excavation now furnished definite antiquarian evidence that a small agricultural settlement, and not merely a frontier guard post, had existed here far away in the desert during the first centuries of our era. Having been joined on the Keriya river by a party of my old "treasure-seeking guides" from Khotan, I marched with them by a new route to the desert belt north of the oasis of Domoko. There in the deceptive zone of tamarisk-covered sand-cones they had succeeded in tracking an extensive but much scattered series of ruined dwellings, with several

Buddhist shrines which had previously escaped our search. Though these ruins had suffered much through the vicinity of 'Old Domoko,' a village site occupied until some sixty years ago, my excavations were rewarded in the end by valuable finds of well-preserved manuscripts in Indian script, Buddhist frescoes and paintings on wood, etc. The time of abandonment was here, too, about the end of the eighth century A.D.

March and April were thus spent in supplementary archæological labours along the desert fringing the oases from Domoko westwards to Khotan. Amongst the ruins newly traced it must suffice to mention the remains of a large Buddhist temple decorated with elaborate frescoes, which, completely buried under high dunes, came to light now in the desert strip between the Yurung-kash and Kara-kash rivers. Like the great Rawak Stupa, discovered in 1901, on the opposite bank of the Yurung-kash in a closely corresponding position, this temple belonged to the early centuries of our era. Unfortunately here, too, subsoil moisture had, as at Rawak, played havoc to such an extent that continued excavation would have resulted in complete destruction. We then set out northward for Aksu by the desert route which leads along the Khotan river-bed, then practically dry. While following it I had the satisfaction of discovering the ruins of a fort once guarding the route, on the curious desert hill of Mazar-tagh, which, as the last offshoot of a low and now almost completely eroded range from the north-west, juts out to the left bank of the Khotan river. The fort had been destroyed by fire, but on the steep rock slope below huge masses of refuse, thrown down by the occupants in the course of long years, had fortunately remained in excellent preservation, safe alike from moisture and driving sand. In the course of three days' hard work we recovered from them a great collection of documents on wood and paper, in a variety of scripts, and none apparently later than the eighth and ninth centuries A.D. Tibetan records predominated pointing, as in the case of the ruined fort of Miran, to the period of Tibetan invasions.

We reached Aksu early in May, after suffering a good deal *en route* from the heat of the desert and a succession of standstorms. There I arranged, through the kind help of my old Mandarin friend, Pan-Ta-jên, now Tao-tai, for the local assistance which Rai Lal Singh needed for the continuous survey he was to carry through the outer Tien-shan range as far as the passes north of Kashgar. I myself, after foregathering for a few days with that most learned of Mandarins and kindest of friends in China, travelled up the Uch-Turfan valley, where opportunities offered for useful anthropometrical work, and then made my way across a barren and yet remarkably picturesque range, previously unsurveyed, to the little-known oasis of Kelpin. The fantastically serrated peaks, often curiously recalling the Dolomites, reach up to 12,000–13,000 feet; but they carry very little snow, and throughout these mountains want of water is a serious trouble for the few Kirghiz

herdsmen who still cling to them. Apart from useful observations about obvious desiccation which I could gather here and in the equally barren outer ranges, it was of special interest to me to study conditions such as may be supposed to have prevailed in the now absolutely waterless hills of the Pei-shan south of Hami during the period when Hun raiders could still make their way through them towards Tun-huang and the great Chinese route to the west. In fact, Kirghiz raids of a similar kind upon the Aksu-Kashgar high-road are still a matter of living recollection, and might yet be revived in practice if the hold of the Chinese administration were relaxed.

Information opportunely secured through treasure-seekers of Kelpin subsequently enabled me to trace extensive *débris* areas marking ancient settlements in the desert between the arid outer hills of Kelpin and the lower course of the Kashgar river. Though far-advanced erosion had left little or no remains for excavation, I secured ample archæological evidence showing that this tract had been occupied down to the eighth century A.D. by large settlements, to which canals, still traceable in parts, carried water from the Kashgar river. I also ascertained the line of the ancient Chinese high-road to Kashgar which had passed through them. There was room here also for interesting topographical work, as I discovered in this previously unsurveyed desert belt a series of low parallel ranges clearly connected geologically with the curious rugged hills about Tumshuk and Maralbashi, which have hitherto figured in our maps as isolated rock islands.

The increasing heat and the thought of the many heavy tasks still before me obliged me to return now to Khotan, which I reached after a fortnight's rapid travelling, made specially delectable by a steady succession of sandstorms. Then followed, in the shelter of my favourite old garden palace at Khotan, six weeks of constant toil, absorbed entirely by the sorting and packing of my archæological collections—a task which, in view of the long journey before them and their often very fragile contents, required my utmost care. Never, perhaps, has the ancient oasis seen such making of cases, tinning, etc., as went on in the courtyards of my old palace during those long hot weeks. In the middle of all this toil I had the great grief of seeing Naik Ram Singh, my "handy-man," who had left me at the close of March for a supplementary task at Miran, return from his long journey eastwards suffering from complete loss of eyesight. He had left me in what seemed good health, and nothing then suggested the approach of the fell disease, glaucoma, which struck him with blindness first on one eye, and then on the other, while he clung with truly heroic doggedness to his task at that distant desert site. What anxieties and efforts it cost me to have the poor sufferer first taken to Yarkand, where the Rev. Mr. Raquette of the Swedish Medical Mission diagnosed the incurable disease, and thence conveyed, with all possible care for his comfort and safety, to India,

may well be imagined. On my return to India I did my utmost to urge the claims of this faithful companion to special consideration, and some months after I had the relief to know that the Government of India had generously provided for his and his family's needs by the grant of a special pension on an adequate scale.

Before the end of July my energetic surveyor, Lal Singh, rejoined me. After carrying his plane-table survey along the Tien-shan to Kashgar, he had succeeded in mapping the last portion of *terra incognita* on the northern slopes of the Kun-lun west of Khotan. On August 1 I was able at last to despatch my heavy convoy of antiques, photographic plates, etc., making up fifty camel-loads, safely to the foot of the Kara-koram passes, where it was to await me, and to start myself with Lal Singh on my long-planned expedition to the sources of the Yurung-kash river. It meant farewell to my old Khotan friends, and, alas! also to my devoted secretary and helpmate, Chiang-ssŭ-yieh. It was a sad parting, though I had the comfort of having, through my friend Mr. Macartney's kindness, obtained for him the amply deserved appointment as Chinese Munshi at the British Consulate in Kashgar. The Government of India have since marked their appreciation of his excellent services by the award of a valuable gold watch.

My previous explorations in the Karanghu-tagh region had convinced me that the Yurung-kash headwaters were quite inaccessible through the narrow and deep gorges in which the river has cut its way westwards. So a fresh effort was now to be made from the east, where that wholly unexplored mountain region adjoins the extreme north-west of the high Tibetan tableland. Climate and ground were sure to offer great obstacles in that inhospitable region. So I had been obliged to bestow much care and trouble on preparations about transport and supplies for this concluding expedition. But for these our undertaking could never have proved the complete success which it did in the end.

The difficulties began early when we made our way through the terribly confined gorges above Polur to the northernmost high plateau (circ. 15,000 feet above the sea) adjoining the outer main Kun-lun range. There we had the good fortune to fall in with a small party of yak-hunters from Keriya, one of whom, Pasa, a wily but experienced fellow, could after much trouble be prevailed upon to show us a track to the uppermost Yurung-kash gorge. Leaving behind a depôt of all supplies for men and beasts not immediately needed, we reached, under his guidance, first the deep-cut valley of Zailik, of which all knowledge had previously been denied by the reticent hillmen of Polur. There we found extensive gold-pits dug into the precipitous cliffs of conglomerate just above the gneiss of the stream-bed, and evidently worked since long ages. In the old days, when the digging was carried on by forced labour, this terribly rugged gorge, with its inclement climate, must have seen more human misery than one cared to think of.

Everywhere we noticed old pits with their mouths roughly walled up, the only available places where to bury the victims.

Forbidding as this valley of Zailik is, its discovery proved to us of great value. In spite of the very steep ridges confining it, we managed to ascend from it a series of high spurs coming straight down from the main Kun-lun range northward, and by establishing survey stations close under its crest-line (here showing an average height of 20,000 feet) to map with theodolite, plane-table, and photographic panoramas, the greater portion of the inexpressibly grand and wild mountain system containing the headwaters of the Yurung-kash. On the south, for a distance of over 60 miles, we could see them flanked by a magnificent range of snowy peaks, rising to over 23,000 feet, and all clad with glaciers more extensive than any I had so far seen in the Kun-lun. Now at last I could form a true idea of the unfailing stores of ice which supply the Khotan river with its enormous summer flood, and enable it then for a few months to carry its waters victoriously right through the thirsty desert.

The Zailik mines, accessible only during a few summer months, are now almost deserted. Yet we managed among the small groups of miners, practically all bond-slaves, still toiling in this gloomy gorge, to secure those eight to nine carriers without which it would have been quite impossible to transport our indispensable baggage and instruments over the very difficult ground before us. By crossing a succession of side spurs over passes 17,000 to 18,000 feet high and subsequently ascending the extremely confined gorge of the main river, we penetrated after eight trying marches to the great glacier-bound basin, circ. 16,000 feet above the sea, where the easternmost and largest branch of the river takes its rise (Fig. 18). The track we followed was that of wild yaks, and in places impracticable even for our hardy donkeys, unless unladen. The crossing of the glacier-fed side streams proved often dangerous, though the summer had now nearly passed from this elevated region. Compensation for all these difficulties offered in the excellent survey stations to which we could climb *en route* at heights from 18,000 to 19,000 feet. The formation of these rugged mountains and valleys presented abundant geographical and geological interest, and with a view to the latter, I did my best to secure geological specimens and records throughout this expedition.

After thus tracing the great river to its ice-bound head, we turned east to high but far easier ground near the Ulugh-kol lake, where our depôt of spare transport and supplies awaited us. There remained now the task of following the great snowy range which flanks the Yurung-kash headwaters on the south-east and south, along its southern slopes westwards until we reached the uppermost valley of the Kara-kash river. For this purpose we had first to march by the Polur-Lanak-la route to the elevated basin (circ. 17,000 feet above sea) where the

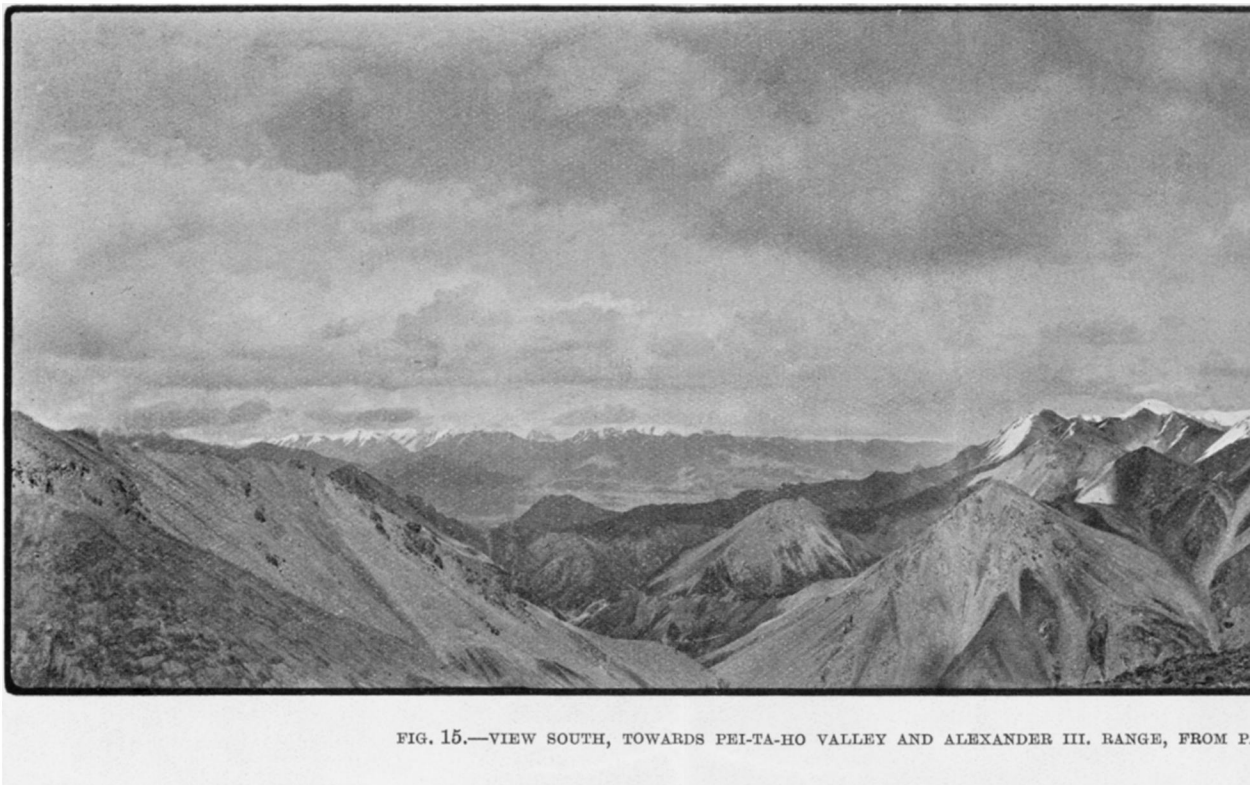
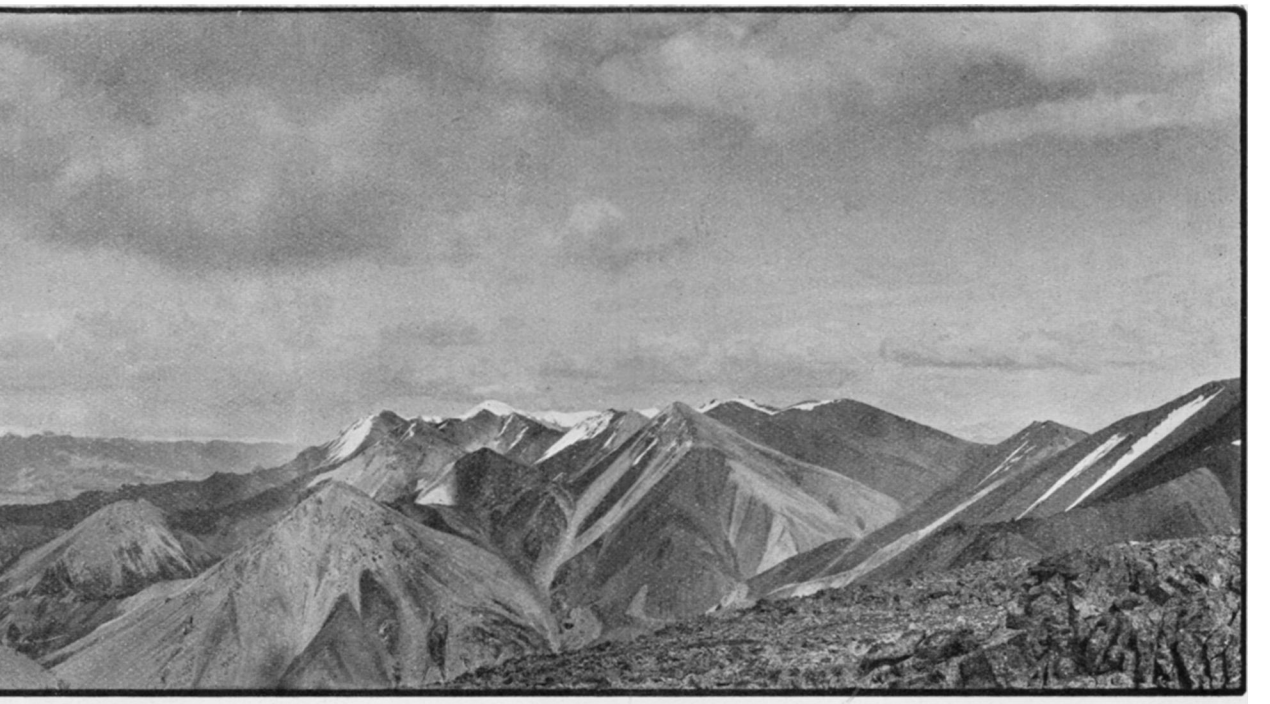


FIG. 15.—VIEW SOUTH, TOWARDS PEI-TA-HO VALLEY AND ALEXANDER III. RANGE, FROM P

FIG. 18.—GLACIERS ENCIRCLING BASIN OF EASTERNMOST YURUNG-KASH SOURCES, SEEN FROM SURVEY



ARDS PEI-TA-HO VALLEY AND ALEXANDER III. RANGE, FROM PASS ON TOLAI-SHAN RANGE.

OF EASTERNMOST YURUNG-KASH SOURCES, SEEN FROM SURVEY STATION, CIRC. 19,000 FEET ABOVE SEA.

Keriya river rises at the foot of a line of great glaciers. The range from which these descend proved identical with the easternmost part of the ice-clad range confining the Yurung-kash sources. Our passage up to the Keriya river headwaters, and for days after, was greatly impeded by very trying weather. Frequent snowstorms swept across the high plateaus and valleys, and the slush they deposited, slight as it was each time, soon converted the gentle slopes of detritus into veritable bogs, very difficult to cross for animals already suffering from the effects of great altitude, exposure, and an almost total absence of grazing.

I was heartily glad when at last we left behind the watershed of the Keriya river, and could commence our exploration of the ground westwards which in our atlases generally figures as a high plain with the name of Aksai-chin, but which the latest transfrontier map of the survey of India rightly showed as a blank. Instead of a plain we found there high snow-covered spurs with broad valleys between them descending from the great range which flanks the Yurung-kash sources. A series of large lakes and marshes mainly dry extends along the foot of those spurs, at an elevation of 15,000 to 16,000 feet; but the streams brought down by the valleys rarely reach them, losing themselves instead on vast alluvial fans of detritus. Depressions connecting those lakes, and running from east to west, greatly facilitated our progress. But their increasing barrenness told heavily on our ponies and donkeys, of which, in spite of all care, nearly one-third succumbed in the end. Vegetation, such as it is on these Tibetan uplands, disappeared almost completely after one march from the first lake, and soon fresh water, too, ceased to be obtainable except by digging in dry watercourses. Icy gales pursued us for most of the time, and made the bitterly cold nights doubly trying both for the men, who had difficulty in collecting enough fuel, and for our poor animals, which had neither shelter nor grazing.

But the most dismal ground was still before us when, after a week of long marches from where we had left the Polur-Lanak-la route, we reached a large salt lake which an Indian Survey party appears to have sighted more than forty years ago, but which has now been reduced to the state of a salt-marsh for the most part dry. Marching round it to the north-west, we entered a series of basins absolutely sterile, and showing in their centre a succession of salt-encrusted dry lagoons. Death-like torpor lay over the whole region; no living creature could be sighted nor even the track of one. There, to my grief, I lost my hardy Badakhshi pony, which had carried me ever since I entered Turkestan, except when I worked in the desert, and had never shown signs of distress, even when crossing the Taklamakan on the scantiest allowance of water. It was a great relief when, after three depressing marches, we struck traces of the old route, forgotten since more than forty years, by which Haji Habibullah, chief of Khotan at the

commencement of the last Muhammadan rebellion, tried to open up direct communication with Ladak and India, and over which Mr. Johnson, in 1865, had been taken on his adventurous visit to that ill-fated ruler. The survival almost intact of the cairns, the stacks of Burtse roots to be used as fuel, and of other relics left behind by those who followed this route during the few years it was open, was a characteristic proof of the dryness of the climate even on this high elevation. We had used up the last of our fodder store when, guided by those marks and crossing several side spurs from the main range, we emerged at last, on the evening of September 18, in the valley of an eastern feeder of the Kara-kash. Descending this, I was joined two days later by a party of Kirghiz with yaks from Shahidulla, whom I had ordered from Khotan to await my arrival here.

The only task now remaining was to trace Haji Habibullah's route up to the point where it crossed the main Kun-lun range towards Karanghu-tagh. A line of cairns running up a side valley showed where the pass would have to be looked for. But advancing masses of ice and snow had obliterated all trace of the old route at the head of the valley. As, however, it was important to fix our position accurately by linking it up with our former surveys from the north side of the main range, I ascended on September 22, with Lal Singh and some Kirghiz, a steep glacier which seemed to offer the nearest approach to the watershed. The ascent, over miles of much-crevassed ice and *névé*, deeply covered with fresh snow, taxed us severely, and it was late when at last we had gained the crest at an elevation of about 20,000 feet. The fine view before us northward showed that we stood at the head of one of the great glaciers descending from the main range towards the Nissa valley explored in 1906. Mapping and photographic work delayed our descent in spite of a temperature of 16° below freezing-point at 4 p.m. with the sun shining. No halt was possible *en route* from fear of getting altogether benighted, and when late in the evening camp was reached, I found that the toes of my feet had been severely injured by frost-bite. This was bad luck, indeed, but I was glad all the same to know that our exploratory tasks had been carried through to their end.

Realizing the serious results of this accident and the urgency of surgical help, I had myself carried down the Kara-kash valley as well as I could. There, at Portash, I had the satisfaction of seeing my heavy caravan of antiques safely arrived across the Sanju pass. I left this valuable convoy in charge of Rai Lal Singh, who had all through displayed zeal, energy and utter indifference to hardships such as I had never seen equalled by any Indian. I am glad his merits have since received due recognition by the award of the title of Rai Bahadur on the part of the Indian Government. I myself moved ahead towards Leh as rapidly as the conditions of the difficult

Karakoram route, leading over passes of more than 18,000 feet and the troublesome Sasser glacier, would permit. Without the timely help sent up by Captain D. G. Oliver, the British Joint Commissioner in Ladak, I could never have got myself carried across in my improvised litter. After nine long marches I arrived at the first Ladak village, where the Rev. S. Schmitt, in charge of the hospital of the Moravian Mission at Leh, kindly met me. Four days later I reached Leh, where he could perform the operation necessary on my right foot, all the toes of which had to be amputated, and where his kindness and that of his fellow-missionaries provided me with much-needed comforts. But nearly three weeks passed before I was considered strong enough to face the fatigues of the fortnight's continuous travel down to Kashmir, where another long halt was imposed by the medical advice of my old mountaineering friend, Dr. Neve; but this was made quite pleasant and refreshing by the kind hospitality and attention I enjoyed on the part of the Assistant Residents, Captains Oliver and Macpherson. At last, at the commencement of December, I could begin my first attempt at walking, and start on my way down to India. Urgent work of all sorts and a visit to Calcutta, where his Excellency the Viceroy, Lord Minto, gave fresh proof of the kind personal interest with which he had followed my travels throughout, and of his kind thought for my Indian assistants, detained me until the close of the year. Thus it was not until the close of January last that I could reach England, where all my cases with antiques, close on a hundred in number, had just then safely arrived.

The return from a long journey like mine cannot mean rest, but only a prelude to labours in some respects more arduous and important than the work in the field.

The results achieved by my expedition would for the greatest and most valuable part be thrown away, if all the exact observations bearing on the physical conditions, past and present, of the wide regions traversed; on the ruins unearthed and surveyed; on the antiquities and manuscript remains which have been brought to light by the thousands—were not to be carefully recorded by myself, and made thus available for further researches. To give some idea of the extent of these tasks, I may mention that our topographical surveys, which are at present being prepared for publication by the Trigonometrical Survey Office, will, on the scale of 4 miles to 1 inch, fill close on 100 map sheets of the standard size, every one needing careful revision in proofs; and that the mere unpacking and first arrangement of the thousands of archæological objects, a task on which I am now engaged, will, with such assistance as is available, probably not be completed before August. The decipherment of the manuscripts and individual documents, probably close on 8000 in number, and in about twelve different scripts and languages, will claim the attention of quite a

staff of Oriental experts, and their labours cannot be started in full earnest until all facts bearing on the origin, date, etc, of the finds, as observed by me on the spot, have been thoroughly sifted and published. So, with all these tasks and responsibilites before me, I can at present cherish no more eager wish than that my efforts to secure adequate leisure may be successful, and that I may thus be able to do to the end what I feel is my duty to science.

The PRESIDENT (before the paper): It is just about six years since Dr. Stein last visited us in order to describe his first journey in Chinese Turkestan, a journey which proved him to be an explorer of the very first rank. With such a record as his, very few words are needed to introduce him to this meeting. Dr. Stein, a Hungarian by birth, was very early in his career attracted to this country, on account of the facilities for linguistic study. He came here and worked for three years on Eastern languages. At the end of that time he went to India and joined the Punjab University, where he worked, if I remember rightly, for about eleven years. Then he was appointed to the Imperial Educational Service, and became a naturalized Englishman. After one year in that department, he was sent on his first journey, the one I have already alluded to. But before he went on that journey he had employed his leisure time in India in working hard at historical, geographical and archæological problems, and he produced a great deal of work, which was in itself of great value. He was, in fact, preparing himself in the best possible way for the work in connection with these two great explorations. It is not my intention to take up your time, but I did wish to say these few words, so that every one should know that in listening to Dr. Stein we are listening to one who speaks with greater authority on the historical, geographical, and archæological problems of the regions he visited than any other living man.

After the paper the following discussion took place:—

Mr. MACARTNEY: As one who has had the good fortune to spend many years in Chinese Turkestan, I am specially pleased to hear the allusions made by Dr. Stein to the courtesy shown him by the Chinese officials in that country, many of whom are my personal friends. If Dr. Stein's travels have been rewarded with such marvellous success, I venture to think that some thanks are due to the local Chinese authorities for the ever-ready assistance they rendered him both in his survey work in the mountains and in his excavations in the desert. Perhaps the following instance of Chinese courtesy may be of interest. In the absence of banking facilities in Eastern Turkestan, one of the difficulties which beset travellers in those regions is naturally connected with the carriage of funds. As we all know, the money of the country is Chinese silver, and silver in large quantities is extremely heavy, besides being a temptation to robbers. Now, although Dr. Stein had made, in a manner, Kashgar his starting-place, yet his travels extended at least to some 1500 miles east of that centre; and his journey lasted for pretty well two years. The question of funds was therefore a most important and difficult one for him. Both the Taotai of Kashgar and the Taotai of Aksu came to his assistance by the issue of orders to their subordinates, not only to help him generally, but also to allow him to draw funds at the local yamêns, against repayment by myself at Kashgar; and accordingly Dr. Stein was able to obtain money at Khotan, Keria, Karashahr, and at some other places. No doubt a financial operation of this kind could have been carried out very easily in a highly developed country; but I know, as a matter of fact, that in this particular instance, which entailed the adjustment of

accounts between treasuries normally having no inter-relation, considerable inconvenience was caused to the authorities. There is another instance of Chinese courtesy, in a small matter, it is true, which I should like to mention. Dr. Stein has given us an account of his journey through the desert from Shahyar to the Keria river. Perhaps he does not know that in the course of this journey, his caravan dropped a camp chair of his. Well, the Chinese amban at Shahyar not only recovered it, but also sent it through the post to me at Kashgar, for transmission to Dr. Stein.

Dr. STEIN: It is at Oxford at present.

Mr. MACARTNEY: On the other hand, if Dr. Stein has been so successful in obtaining the assistance of the Chinese, the reason for it is largely attributable to the consummate tact and *savoir-faire* which he displayed in his dealings with those whose assistance he claimed. When he left Kashgar at the end of his first expedition in 1901, he left behind him, perhaps unknown to himself, amongst the Chinese, a great reputation as a scholar—as one profoundly versed in Chinese Buddhism, and having a special interest in tracing the itinerary of one of its early propagators—Hsuan-tsang, whom he so often mentions in his lecture as his "patron saint." Now, if there is a character that appeals to the Chinese more than another, it is that of a quiet, unostentatious and cultured scholar. In that character, the Chinese at once recognized Dr. Stein, and they honoured him accordingly.

Dr. L. D. BARNETT: I feel it a great honour to be allowed to say a few words to-night as a personal tribute of appreciation to Dr. Stein. Like Odysseus, Dr. Stein has travelled wisely and well, and has seen the cities of many men, and learned their thoughts, and like Odysseus, he has also gone below the face of the Earth and questioned the mighty dead. Now I venture to think that this last achievement of Dr. Stein is one which appeals most strongly to the imagination. As a geographical explorer, he has contributed to science as much as any man in the present generation; as a Sanskritist and Oriental antiquarian, he is surpassed by none of the erudite gentlemen who are the pride of our Western academies. In all these and in several other departments he has contributed enough work for the lifetime of any ordinary man. But the most extraordinary and fascinating achievement of our many-sided Odysseus has been the combination of antiquarian learning and practical insight, a combination constituting genius, by which he has been enabled to bring to light a vast realm of buried and forgotten history. No exploit of equal magnitude, I think, has been made since Sir Henry Layard laid bare the ruins of Nineveh. I well remember the meeting of this Society on June 16, 1902, when Dr. Stein told us how it was that the call first came to him to visit Khotan. There were a few fragments of Buddhist manuscripts, a few mysterious block-prints and scrawls, which his own subsequent experience proved to be forgeries, and these were all the "archæological proceeds" that indicated Turkestan as a likely field for his explorations. Such a bait would have allured no ordinary man, but Dr. Stein, not being an ordinary man, went there, and returned with twelve cases full of treasure. Now he has been here again, and has come back with nearly a hundred boxes. Thanks to Dr. Stein in the first instance, and to the learned explorers who have followed in his track, we are now able to form some idea of the rich culture and eventful history of Turkestan in the first ten centuries of our era. Here was a wealthy kingdom with an Indian administration, carried on in an Indian language, a kingdom with an established Church which brought into its service the exquisite Hellenistic art to which ancient India owed the noblest of its monuments. Here, too, we see this Indo-Greek art gradually becoming modified, until we can almost trace the steps by which it was assimilated on the one hand into the classical art of China, and on the other hand passed away

into the exquisite inspiration of ancient Persia. Equally striking are the documents of another kind. In Turkestan have been found abundant remains, both in literature and art, of the great Manichæan Church, which by the fascinating power of its theology and the strength of its communal organization was able for centuries to wage a deadly war with Christianity. Very important, also, are the remains of Sanskrit works now lost, and likewise all the great masses of Tibetan and Chinese documents which reflect the political relations between the two powers. On all these subjects a surprising light has been shed by Dr. Stein, and great as is our gratitude for this light, it is to a large extent a lively expectation for more to come. Now we see Turkestan no longer as a blank in the vista of history, but as a great centre of military and religious force, which have thence radiated in every direction. Here passed the Mongol and the Turk, the Hindu and the Greek, the Chinaman and the Persian, the Buddhist and Manichæan, each playing their part in the great drama of world-history; and in the rich stores of documents of this culture which the desert has preserved we may hope to find answers to many of the deepest problems, which have hitherto faced the historical student. And as we proceed along this path of knowledge, we shall know with increasing clearness our debt to this scholar who first opened up that road.

After some remarks from Sir H. HOWORTH,

The PRESIDENT: I think the time has arrived to bring this meeting to a close. No doubt the lecture we have heard to-night does not represent one-hundredth part of the information which will be published when Dr. Stein has been able to work out all his results. It is only an explorer who has taken the immense trouble he has to prepare himself for a journey who can bring back such a mass of information. I should like to mention one little incident. I happened to be sitting between Dr. Stein and Dr. Hedin at a dinner, when Dr. Stein handed me a little tape-measure he had picked up north of Lop-nor. It had been lying there for six years in that desert land uninjured and unmolested, and Dr. Stein asked me to return it to its proper owner, Dr. Hedin, who was sitting on the other side. Dr. Hedin has kindly presented it to our Society, and we thus possess a pleasant memorial of these two great travellers, which illustrates both the extraordinary character of that climate, and also how solitary that desolate land is. The mention of the names of these two great explorers tempts me to make comparison, but I am glad to say that I am also reminded that comparisons are odious. Without incurring that epithet, I may remind you, perhaps, that Dr. Sven Hedin in this room spoke of his own explorations as being pioneer work, a description we can only accept that if by pioneer work is meant that his dominant ambition was to enter lands which had never before been traversed. With regard to Dr. Stein, the dominant idea was somewhat different. According to the terms with the Indian Government, he had to look mainly to archæological work and detailed topographical work, and this necessitated taking with him a considerable number of assistants wherever he went, making the passage of desert places very difficult. He did in certain instances travel with small numbers, but most of his expeditions necessitated considerable caravans. I think that his idea always has been that he should do the work he had to do as well as it was possible to do it at the time, and, if practicable, to leave nothing undone. That should be the ideal in the future for every explorer, because we must recognize the fact that pioneer work is becoming less and less necessary, and there are fewer and fewer blank places on which maps remain to be filled. The explorer who wishes to make a name for himself in the future cannot do better than study Dr. Stein's methods. No man should think it is waste of time to spend years and years preparing himself for his work, and all explorers should take with them trained surveyors, as Dr. Stein did to help in the work. I should like him, from us,

to send a message to those Indian surveyors, to tell them how greatly we appreciate their work. I should also like to place on record how wise and how wide-minded we think it is of the Indian Government to have subsidized an expedition of this sort, and also heartily to congratulate the British Museum for the great assistance that they are giving and have given to the exploration. Naturally, Dr. Stein himself is the central figure in this drama, and it is to him that we wish to give our heartiest congratulations and our warmest thanks. There may be some other opportunity of placing more definitely on record our appreciation of the work done, but I am sure I may to-night, in the name of every one here present, express our thanks to him for giving us one of the most interesting lectures we have ever listened to in this hall.

Dr. STEIN: I have been trespassing too largely upon your patience. At present I shall only ask for a minute to express my heartfelt thanks for the friendly interest with which you have listened to me, and the exceedingly kind remarks which Mr. Macartney, Dr. Barnett, and Sir Henry Howorth have made in regard to the results of my work. Naturally, after the appreciation which you have expressed, my hope of being able to finish my work properly has been raised, and for this, as well as for all the encouragement which I have received, I wish to be allowed to express here my deep sense of gratitude.

The following communications were received:—

Lord CURZON OF KEDLESTON: "I wish indeed that I could be present at the reading of Dr. Stein's paper this evening. Conditions of health alone prevent me from having that enjoyment. My interest in his explorations and discoveries is very great and natural, for I had the good fortune, when in India, to sanction his first journey, and to make the preliminary arrangements for the second, the brilliant record of which you will hear to-night.

"His paper will have shown you how speedily the archæologist and the scholar —for as such I shall perhaps not offend Dr. Stein by describing him—can acquire the aptitudes of the geographer and the skill of the descriptive writer; and his works will long remain models of the best type of scientific narrative.

"His remarkable journey suggests several reflections, to which I will briefly allude.

"His discovery of a new and advanced section of the great system of frontier defences with which the Chinese Empire guarded its Western marches against the nomadic hordes of the desert, as long ago as the beginning of the Christian era, is one of extraordinary interest. History preserves faint records of many of these ramparts erected by successive conquerors of different races in various parts of Central Asia; but nowhere did they attain the elevation, the solidity, or the military perfection of the walls erected by the Chinese. They are only comparable in height, though they were greatly superior in length, to the *limites* of the earlier Roman Empire.

"Secondly, the history of archæological discovery contains hardly anything more dramatic or more fruitful than the record of Dr. Stein's long chaffering with the Taoist priest in the caves of Tun-huang, the proceeds of which, I understand, are now in London, and will furnish yet another illustration of those curious meeting-points of the East and West with which Central Asia abounds.

"I should like, indeed, to call attention to the unique advantage of that mysterious region as a scene for the cultured explorer of modern times. No climate in the world is so favourable for the preservation of the relics of the past—where no rain falls, where no irrigation exists, where lakes form only to dry up and disappear, where the footfall of a man has ceased to resound for centuries, where

his last footprints, years and years ago, can still be traced in the sand, where no destructive agency but the wind exists, and where the wind preserves almost as much by its dryness as it destroys by its erosion. Can we conceive a locality better adapted by nature for antiquarian purposes?

"The unbroken silence and the untrodden desolation of these regions have another effect. Centuries shrivel up like a scroll, and travellers who are separated by hundreds of years—Hsuan-tsang, Marco Polo, the Russian explorers, Dr. Hedin, and Dr. Stein—seem to be marching in close file, one behind the other, instead of being sometimes separated by centuries. Indeed, in some places a greater physical change is caused by local conditions in a few years than is elsewhere produced by thousands. Note, too, from Dr. Stein's observations, how in some parts the tide is at length beginning to roll back, and cultivation for the first time for centuries is beginning to gain at the expense of the desert.

"Further, this vast expanse, which the courage and genius of our modern explorers is gradually filling on the map, is the meeting-ground not only of individual pioneers, but of ages and races. The Greeks, the Indo-Scythians, the Indians, the Huns, the Tibetans, the Chinese, all converge at this historical rendezvous, and the sand overlays the records of their marches and meetings with its kindly and protective mantle.

"Dr. Stein could not have accomplished this great journey without many advantages. The experience of his previous journey was invaluable to him; friendly governments sped him on his way; he was fortunate in his native servants, and in that admirable body of Indian surveyors, whose endurance and fortitude no monument could adequately commemorate. But he would have achieved little of what he did had it not been for his own indefatigable ardour, his high courage, his trained abilities, and his indomitable spirit. We read with unfeigned sorrow of his hardships and his sufferings. But even though he left some of his toes behind him, he has brought back a reputation greatly enhanced, and, in the cases which he is now unpacking in London, a treasure-store for our museums, which will, I am sure, compensate him for all that he has gone through, and convince even his inveterate modesty that he has added materially to the knowledge of mankind."

Colonel Sir Henry Trotter: "I regret extremely that I am prevented by illness from assisting at the delivery of Dr. Stein's lecture. I have had the advantage of reading it, and coming as it does so soon after Dr. Sven Hedin's most enthralling description of his three years' explorations in Trans-Himalaya, I think our Society is to be congratulated at having, within the short space of a few weeks, heard the accounts of their journeys by two of the foremost explorers of our time. I had the privilege, at the meeting at the Queen's Hall, of seconding the vote of thanks to Dr. Sven Hedin—a labour of love, I fear very inadequately performed—and nothing would have given me more pleasure than to have had a similar task assigned to me this evening in the case of Dr. Stein.

"Both explorers have shown the same admirable qualifications, both of body and mind, which have paved their way to success—a most invincible and untiring energy and determination to go on, looking at apparently insuperable difficulties ahead only as obstacles to be surmounted; they both possessed bodies seemingly impervious to cold, heat, and fatigue, and minds stored with all sorts of knowledge enabling them to reap a rich harvest wherever they went; and, above all, both appear to possess that magnetic sympathetic feeling which seems to have attracted all with whom they came in contact, leading them to great diplomatic triumphs.

"In the case of Dr. Stein, this magnetic influence seems to have fallen on two successive Governors-General of India, the British Museum trustees (by no means an easily influenced body), the R.G.S. and its officials, the Indian Survey Department

—all of whom helped Dr. Stein in his start; and when once off, he seems to have obtained the most devoted and faithful service from his native assistants, the two Ram Singhs, his Chinese secretary, his camel-man, muleteers, and servants; and even his own patron saint, Hsuan-tsang, came mysteriously to his aid in his very difficult negotiations with the Taoshi of the Hall of the Thousand Buddhas, which ended in the acquisition of archæological and historical treasures of untold value.

"I think that Dr. Stein's hearers this evening will feel that magnetic spell, and if time permits him to describe to you how towards the close of his work his faithful assistant, Naik Ram Singh, lost the sight of both eyes, and Dr. Stein himself, after ascending to a height of 20,000 feet under circumstances of the greatest difficulty, fell a victim to his own zeal, losing all the toes of one foot from frost-bite, the audience will feel as I have felt—a deep personal sense of loss, only partially compensated for by the invaluable results brought back in the shape of geographical, archæological, and other scientific results which will probably take many years before they are thoroughly worked out."

Colonel Sir T. H. Holdich: "I should be grateful to you if you would express to Dr. Stein the great disappointment which I feel at not being able to attend his lecture. Please offer him my warmest congratulations on the marvellous results of his two years' research. Looking back over the last few years' record of papers read before the Society, papers dealing with farthest north and farthest south, with Equatorial Africa and with highest Asia, I can recall nothing to rival the paper read to-night in the depth of its human interest. I feel certain that the geographical results of so wide a field of exploration will ever rank with the very best records of Indian geographical surveys, and it is with the greatest pleasure that I read Dr. Stein's generous recognition of the services of his native staff. But it is easy to see that the spirit which animated them was his own. He has the faculty of imparting his own indomitable energy and enthusiasm into those who follow his lead. His Asiatic colleagues, Indian and Chinese, did their duty nobly and bravely, but I venture to think that whenever the call to face difficulties and hardships in the cause of scientific research comes from a determined, yet wholly sympathetic, leader like Stein, there will never be lack of response."

Dr. Sven Hedin: "I have read Dr. Stein's paper with the greatest interest, and although it was impossible for me to be present at the lecture itself, I cannot help writing a few words expressing my sincere and deep admiration for the splendid work Dr. Stein has carried out on his second expedition in Central Asia, as well as on his first. The magnificent treasure of old records and documents he has brought home will form a most important addition to his first collection, and he and his collaborators will be able to spread new light over the ancient history of those immense countries where now nothing but deserts and moving sands prevail. We are in a most interesting and unexpected era of Central Asian exploration. The epoch of geographical discoveries is almost gone, although a lot of detailed work is still left to be done. The time of archæological investigation has set in. It began years ago with 'Bower's manuscript,' Petrovsky's, Macartney's, and Deutreuil de Rhins' collections, and with my discovery of Dendan-uilic, and Kara-dung, those sand-buried cities in Takla-makan which later on were visited and examined so carefully by Dr. Stein. The archæological investigation has now taken a great step forwards. From several different countries, England, Germany, France, Russia, America, expeditions have been sent out, but one can hardly talk of any competition—the deserts are big enough for as many parties as Europe, India, and America can afford to send out, and for some more still. From what we already know we have every right to draw the conclusion that there must still rest under the moving sands whole civilizations of different ages and races. The records now brought

home by Stein, Grünwedel, Lecocq, and the rest are so overwhelming as to keep a whole staff of experts busy for years to come, and in Paris I heard from Sénart and Chavanne that they could hardly see any end of the work before them. A quite new science, or anyhow a new branch of ancient history, is in this way steadily growing up from the deserts of Central Asia, and I congratulate my friend Stein most heartily on the splendid and glorious place he has conquered for himself in this fascinating branch of science.

"When in the beginning of 1906 I travelled down the Kerya-darya to its end, and thence through the desert to Shah-yar, I did not regard this journey as any particularly great risk, as the river and its underground continuation showed me the road. It was a much more, incomparably more, dangerous task Dr. Stein faced when he went the same way—in the opposite direction. Everybody will easily understand this from a single glance at the map. Wherever I went, keeping fairly straight north, I could not help reaching the Tarim river sooner or later, whereas Stein, coming from the north, had only one single point to keep on, namely, the point where Kerya-darya dies away in the sand. Everybody who has travelled in the Takla-makan will understand what it would have meant for Stein if he had not reached this very point—he would very likely have lost both his own and his followers' lives in the killing desert, situated to the east and west of the Kerya-darya. As nothing else existed from this part of Asia except my map, I should have had a terrible responsibility for his fate if he had not found the inland or desert delta of the river. So nobody can be more glad than I that this most dangerous journey of Stein's went off in such a happy way. The fact that the delta had changed its place some miles is only a new proof of the instability of the rivers in the desert—a phenomenon that both Stein and I have studied and described on so many different occasions.

"I am very glad, also, to hear from Dr. Stein's paper that he was able to find the old site of Lou-lan from my map. It is by no means easy to find the place. Everything is grey and yellow; the 'yardangs' are very like ruins, and the ruins like yardangs; old dry trees look like parts of houses, and *vice versâ*, and one can be quite near the place without seeing it. I, or rather one of my Russian cossacks, discovered the ruins only by chance, but one year later I visited it again, coming from the north, and of course following my own map. It was more difficult to find the place from the south as Stein did. I am not an archæologist, so I cannot take part in a discussion as to whether this place is Lou-lan or not. I have called it Lou-lan from a communication by Karl Himly in Wiesbaden, who undertook to work out and publish my records, almost all of them Chinese. Dr. Stein says in his paper that these ruins were not Lou-lan, this place being situated further south. After the death of Karl Himly, my collection had a rather long time of rest, until Prof. Conrady of Leipzig continued Himly's work, and is still busy with it. I asked Prof. Conrady the other day about Lou-lan, and he positively says that the site in question *is* Lou-lan and nothing else, and that there are absolutely sure proofs of the fact in the collection of manuscripts I brought home. But, as I said before, the discussion about the real situation of Lou-lan is a matter which I leave, without the slightest jealousy, to the experts.

"It is of very great interest to learn from Dr. Stein that those new lakes I found in the Lop desert had almost disappeared at the time of his visit. Does that mean that the lakes are in a period of shifting, or that in general the volume of water carried down by the Tarim has been diminishing during recent years? Dr. Stein's maps and measurements of the river will tell us about this question, and will give us all the material necessary for comparison and conclusions.

"There are several other things in Dr. Stein's paper which invite interesting

discussion, but I have no time now. This last journey has opened up magnificent prospectives, not only in the field of archæology, but also in the field of physical geography—formation of deserts and dunes, wind-erosion, desiccation, the wanderings of rivers and lakes, etc.—and it is not difficult to understand how closely the physical phenomena of Central Asia are connected with the archæology, the explanation and understanding of the possibilities of ancient culture, the causes of migrations of nations, the extinction of empires, the disappearance of roads and stations, etc. The one cannot be understood without the other. From a verbal communication of Dr. Stein, I am glad to hear that he quite agrees with my theory (vol. 2, 'Scientific Results') of the curious morphology of the Lop desert, and specially about the formation of 'yardangs' by the action of the wind-erosion. A detailed description of any part of the Earth is always extremely valuable, not only for its own sake, but also because it affords the next explorer the possibility of deciding in which direction the changes go, and this holds good specially for deserts like Takla-makan and Lop, where the changes are so very rapid. No doubt Dr. Stein will later on give us many important conclusions to which he has come by comparing his own observations with mine, which he had no time to mention in his lecture. He will be able to tell us the changes in the bed of Kerya-darya, which he visited ten years after me, and he will tell us a good many things about the desperate struggle between the water and the sand in the Lop desert."

THE WESTERN PACIFIC: ITS HISTORY AND PRESENT CONDITION.

By Sir EVERARD F. IM THURN, K.C.M.G., C.B.

AMONG the most picturesque even of Fijian words is the word *wailangi-lala*, literally "water-sky-emptiness" but as a whole meaning the horizon. The picture suggested by the word is of the glittering line where, as far away as a man can see, sky and sea seem to meet and blend, and where any object, it may be ship or island, is barely discerned. The word is in many ways peculiarly appropriate to much in the Pacific; and it seems to me still more appropriate to the conceptions formed on this side of the world of the conditions now existing in the great ocean on the other side of the globe. Even many Fellows of the Royal Geographical Society would be hard put to it to say offhand anything of the position, history, allegiance, or general condition of the Fiji, Cook, Society, Sandwich, Tonga, or any other of the innumerable islands of the Pacific, the very names of which are merely dimly recognizable to most of us until and unless our personal interest is evoked as to any of them. I remember telling one of our present legal luminaries that I was to be Governor of Fiji, and I remember his reply congratulating me on at last becoming King of the Cannibal islands, but asking where that kingdom might be. I have since spent some four years as Governor of Fiji and High Commissioner of the Western

* Read at the Royal Geographical Society, May 10, 1909. Map, p. 360.

station observations and the scientific exploration of the region, whilst the main force is landed in McMurdo sound.

In this case it is hoped that the geographical work of the main party will not be confined to the main southern effort. If, as is anticipated, a large quantity of provisions can be carried to the foot of the great glacier, a sufficient portion, together with the remaining ponies (which cannot be taken up the glacier), can be utilized by a small party to prosecute the further exploration of the mountainous land in a south-easterly direction, and determine finally whether it has connection with King Edward VII. Land, or whether it continues in the direction of Graham Land. Such work should be of great geographical importance, and, together with the exploration of King Edward VII. Land, should throw great light on the nature and extent of the Great Barrier. The general outline of the scientific work of such an expedition is too well known to need repetition, and the advantage of comparative observations in two stations needs no comment. It may be well, however, to lay stress on the advantages which such sciences as magnetism and meteorology will gain by the duplication of observations in known places as being the only means by which secular change and seasonal variation can be determined. Attention might be drawn also to another consideration of great importance. The collaboration between those who have made observations on recent expeditions, and those who have dealt with such observations, should lead to the solution of many elusive problems. For instance, the examination of geological results may point to the exploration of critical localities whence data of the highest importance may be gleaned. Again in meteorology, it seems not too much to expect that consultation will lead to devices whereby some accurate conception of the precipitation and evaporation in various regions may be ascertained. Yet again, the extent to which the study of ice-physics can be carried should now be more surely known, and suggestions as to the prosecution of such study should be more clearly defined. For the better elucidation of these and kindred matters, it is hoped that it will be possible to consult the best expert advice, and secure the formulation of the most detailed and practical instructions. In conclusion, it may be urged that such a programme as has been briefly outlined cannot fail to produce scientific results of high importance, as well as serve a patriotic end, if a proper attention is paid to the details of organization.

THE LOHIT-BRAHMAPUTRA BETWEEN ASSAM AND SOUTH-EASTERN TIBET, NOVEMBER, 1907, TO JANUARY, 1908.*

By NOËL WILLIAMSON.

THE river shown on the maps as the Brahmaputra enters the north-eastern corner of Assam through the Mishmi hills. To the Assamese it is known

* Map, p. 480.

as the Lohit; Tibetans call it the Zayul Chu, and the Mishmi name is Tellu. It is the eastern branch of the Tsangpo or Brahmaputra, and after meeting the Dibong, another branch from the north, the two join the Tsangpo, here known as the Dihong, some 15 miles to the west of Sadiya.

Attempts to trace the Lohit have been made at various times—Wilcox and Griffith in the early part of last century; then Rowlatt, and, in 1869, Cooper. Of these Wilcox reached the farthest point, the Ghalum river. In 1854, the French missionaries Krick and Boury penetrated as far as the Zayul valley, in which Rima lies, but were murdered by Mishmis the same year. In 1882, the great traveller A-K carried his explorations down the Zayul Chu as far as Sama, a few miles below Rima, and prior to this certain influential Khamtis had on three different occasions traced the river from Assam up to Rima. In 1885 an attempt was made to prove that the Zayul eventually found its way, not into the Brahmaputra, but into the Irawadi. The following year the ground was cut from below this theory when Needham and Molesworth followed the river up to within a short distance of Rima. None of these travellers gave us a reliable map of the region, and it remained unvisited for the next twenty-one years.

The first two years after my arrival at Sadiya in 1905 were occupied in making myself acquainted with the frontier tribes generally. Anxious to see something of the Mishmis and make myself acquainted with their country, it was my intention to penetrate into the hills as far as possible with local transport, and, if opportunity occurred, to map in the course of the Lohit as far as the limits of British territory. That I should have been in a position to carry on survey work was due to the great interest taken in the matter by Sir Lancelot Hare, K.C.S.I., Lieutenant-Governor of Eastern Bengal and Assam, and to the valuable assistance given me by Mr. John Eccles, M.A., of the Survey of India.

The names of the tribes inhabiting the hills surrounding the Assam valley as shown on our maps are those by which they were known to the Assamese when we occupied the country. These names are still in general use, but they are neither recognized nor understood by the races to whom they refer. Thus the term "Mishmi" is used for the tribes living in the hills between 95° 30′ and 97° longitudes along the north-eastern frontier of Assam, and the people through whose country the first part of the present journey was made are commonly known as Digaru Mishmis, presumably because they live somewhere near a river called the Digaru. They speak of themselves as Taroañ.* The latter half of the journey was amongst a tribe calling themselves Miju (M'ju).

I left Sadiya by boat on November 28, 1907; and on December 7 a Taroañ chief, with several men of his village, appeared at my camp at Samkha in reply to a message that I wanted him to help me with porters to take me as far as his village, Tashalun. He arrived with a large

* Pronounced Tâ-ro-añ, the *n* being nasal.

following, but it consisted mostly of small children. So it was late before we got away, since to readjust the loads to my diminutive porters' capacity took some time and not a little tact. On December 9, Tashalun was reached after a weary three days' trek up and down the dry stony beds of streams, the only paths in these parts. For the Mishmis, who come down to visit Sadiya only during the winter months, the beds of rocky streams, which are dry at that time of the year, form convenient paths. But for the white man wearing nailed shoes it is a tiring game. The country from 4 miles north of Sadiya and from Sunpura to the foot of the hills is covered with dense forest without a sign of human habitation. Here and there, buried in the growth of centuries, are to be found traces of a kingdom of prehistoric times. Gait, in his 'History of Assam,' gives legends of these ruins dating back to the time of Krishna, but tells us that nothing is really known about Sadiya prior to the beginning of the thirteenth century, when the Chutiya dynasty held sway. The Chutiyas sacrificed human beings as a part of their religion, and this method of propitiating the household spirit is still in vogue amongst the Rangpangs living in the hills between Assam and the Hukawng valley.

Tashalun was found to consist of one house surrounded by a number of granaries hidden in dense jungle. In these parts a few houses, or even one, make a village. The explanation is that quite a large community collects under the one roof and really represents the inhabitants of several houses of the ordinary hill type, a household consisting of wives, brothers, brothers' wives, sons, and their wives, etc., etc.

On the 10th I was ready for a forward move, but the elders of the place arrived to say that the porters were all crying and unable to carry loads that day owing to the terrible hardships they had suffered on the road from Samkha! Of course this report was nonsense, and only a prelude to a suggestion of higher wages. Having satisfied them on this point with a promise of one rupee per porter as far as the Tidding river, we arranged to start the next day without fail. The rest of the 10th was occupied in climbing to the crest of the range overlooking the plains, and from a height of 4700 feet a magnificent view was obtained of the Lohit where it debouches on the plains and divides up into a multitude of channels. The water looked a deep blue, and distance rounded off the edges of the numerous islands, giving the whole the appearance of a toy archipelago. Turning in the opposite direction, I got my first peep into the country of the Taroañ—a rugged mass of hills, the nearer peaks here and there covered with snow, and at the back of all a great wall of snow-clad ranges. On my return to Tashalun that evening, the village elders came to tea and stayed until it was time for rum.

On December 11 we got off safely. About half my porters consisted of women, who are more used to heavy loads than the men. They all carried a fair 40-lb. load, but I found them very slow. They were a

cheery, merry crew, however, and I had not the heart to be very angry when only a portion of my tent arrived in camp that night.

My party consisted of my cook—a Buddhist Magh from Chittagong —and a chaprasi, an Angami Naga. I had to confine myself to these two owing to difficulties in obtaining more porters. The cook, however, was not long before he had enlisted one of the local gentry to assist him in the "kitchen." Chowna Gohain, a Khamti chief with great influence in these parts, and a son of Chowsam Gohain, who assisted Cooper in '69, accompanied me, and with him came two of his Khamtis. In addition to the transport difficulty, there was that of food. Rice, I was told, was not available in large quantities, and the fewer mouths to fill the better. Our march on the 11th took us over the first range facing the plains at an altitude of 4600 feet, and we camped that night at the Aharo stream (4200 feet), looking down into the valley of the Tidding. Next day we descended to a village called Salumgum (2300 feet), where I was told I must stop the night, as fresh porters would have to be arranged for for the next stage, though I had hoped to have got as far as the Tidding river that day. However, there was nothing else for it, and as it commenced to rain later in the day, it was perhaps just as well. The people evinced the greatest curiosity as to the object and direction of my journey, and were firmly convinced that I was making for Rima. As news of any event out of the common travels fast in these hills, the authorities at Rima must have heard about my approach to their border long before I reached it, and had they intended to offer objections to my crossing into their territory, I should have seen or heard something to that effect when at my farthest camp—Sati. But the Tibetans made no sign, and I am pretty sure my journey might have extended to Rima without difficulty or objection. This may not be the case again (unless we find China in possession), as possibly in another few years the effects of the Lhasa expedition will have worn off. But as the orders against British subjects entering Tibet are strict, I had to turn back short of Tibetan territory. The 13th found me scrambling down the remainder of the range to the Tidding river, which was crossed (altitude 1200 feet) a mile above its junction with the Lohit. The crossing was made by a bamboo trestle-bridge, which also served as a fish-trap. The streams running into the Lohit are of no depth in the dry winter months, but the current is too strong to admit of their being forded. So a temporary bridge is run across on bamboo supports, held in place by boulders, the footway consisting of a single bamboo with a very shaky rail on one side. Below the footway, in the stream at the point where the current is strongest, several cone-shaped baskets are fixed to the supports, and all fish swept in are very soon drowned. In addition to this temporary bridge every village has its rope bridge, many of them 300 feet in length for use when the rivers are swollen. They are of the single-rope type, and all goes well as far as the bottom of the sag, but from there onwards

hard work with hands and feet is required to haul one's self up the other side. One variety consists of several canes laid together, with a hoop of cane as a runner, through which the traveller passes his shoulders, and, with his legs crossed over the canes, shoots off head first. The other is constructed of a fibrous creeper twisted into a cable, which is both soft and smooth. On this is a wooden runner rounded to fit the cable, and to it several ropes are attached. The passenger ties himself with these

FIRST VIEW OF UPPER LOHIT.

ropes below the runner in a sitting position, and away he goes down to the centre, from where he pulls himself up the other incline.

On December 14 we climbed a small spur and got into the valley of the upper Lohit, at which I got my first peep from a height of several hundred feet. From here on we practically had no climbing. Occasionally we had a slight rise of a couple of hundred feet or so to get over a spur, but beyond that I was surprised to find how easy the country was. In places we came on long flat shelves along and above the river, which only wanted the undergrowth cleared away to become

an excellent level road. But oh! that undergrowth! It was a mass of thick reed, with a tunnel through it which the people called a path. On December 14 I reached the Tellua river, and on the 15th the path took us close to the edge of the Lohit and past a charming sandy bay called Narra. A rope bridge over the Lohit was near at hand, and the offer of a rupee soon obtained a volunteer to give an exhibition of how a crossing was made. This took him three and a quarter minutes. We then turned up the left bank of the Um, and after a short climb came out on a level piece of country surrounded by hills, where was Kupa (2000 feet), a village of three houses. The headman Kumnu on first acquaintance seemed a bit sulky, but we soon became excellent friends, and next morning he had arranged for porters to take me on to Sameling.

From Kupa the path returned to the Lohit, and we crossed the Delli river at its junction with the Lohit by the ordinary type of rickety trestle bridge. A short distance brought us to a flat piece of ground below Sameling (1650 feet), where we decided to camp. That night we found that we had selected the spot to which the village *methan* were accustomed to return of an evening to sleep, or rather where they did *not* sleep! I wish they had, instead of wandering round during the night poking their noses into everything. Here Vichy, my chaprasi, who had started fever, became much worse; and on the 17th, as no porters had appeared by 9.30, we halted to give him a chance of recovery. This halt gave an opportunity of climbing out of the valley to look at the surrounding country, of which no view was obtainable near the river, except of an occasional peak, the hills on each side being so steep that they shut out everything. A friendly Taroañ took me up a hill called Birakhu, on which had stood Kaisha's village, destroyed by Eden in 1855 for the murders the previous year of the French missionaries, Krick and Boury. The site has never been reoccupied. Birakhu, having lately been cultivated, was fairly clear of trees, and a glorious view was obtained. As one plodded up the steep path the headwaters of the Delli first came into view, and then snow and more snow and more snow. I looked forward to a grand panorama at the top, but at an altitude of 5200 feet the mist swept up from the valleys and all was blotted out. After a time it cleared sufficiently to show me the hills and give me a view of the country in the neighbourhood, but nothing of the great ranges stretching from the north-west round to the north-east. On return to camp that evening I found Vichy worse. The local nobleman who had consented to help the cook in return for his food plus pay had com plained in the morning of a stomach ache, the result, probably, of a too liberal diet at my expense. I had dosed him with strong ginger, but evening found him still in pain, and he refused to take more. He expected one dose to effect a magic cure, and if it did not he considered the medicine was not worth taking a second time. An evil spirit had

got hold of him, he confided to me, and the only sure remedy was to propitiate it by sacrificing a white fowl. To do so with full ceremonial three whole days apart from the world were necessary, and therefore he had to tender his resignation. He came to see me a few weeks ago in Sadiya, and was much hurt at my mildly suggesting that "the evil one" had been a surfeit of pork. The custom of shutting one's self off from contact with one's fellows is common all along this frontier, on such occasions as a birth, a death, sickness, or some other unusual occurrence. It is called doing "genna," and takes place whenever the slightest ground can be found for it. There is a story of a certain well-known frontier officer being refused admittance to a house where usually he was an honoured guest. On asking the reason, he was told that the household was doing "genna," as the family bitch had just produced pups. On the 18th I again halted for Vichy. The next day, as he was no better, I left him behind with money and medicine in the house of a headman, who promised to look after him, and so lost one of my only two servants. On the 19th, porters having arrived, we marched to Pangum, crossing the Du river, which is smaller than the Delli, but too broad to be forded in comfort. The Du is the boundary between the Taroañ and Miju tribes, and Pangum is the first of the Miju villages. It consisted of some seven houses, the ruler being Dagresson, a headman of great influence in these parts, a sturdy old gentleman with a pleasant face. On the road between Sameling and Pangum I passed a cane bridge over the Lohit, where I found a large party of Mijus waiting to cross, as all the cane hoops had been taken to the other side by previous travellers. On the 20th and 21st I remained at Pangum, while Dagresson made arrangements to get me porters who would go through to the end of my journey and return here with me. I arranged to give each man Rs.10 for the trip. Through porters are a great advantage, as the delay in collecting others daily at each stage is thus avoided.

HALLI RIVER FROM SOUTH BANK OF LOHIT.

One day at Pangum was occupied in climbing a hill near the village, from which I was able to fix my position. No view, however, was obtained, as the forest was thick and the hills round me too high. The altitude of the village was found by B.P. to be 2131 feet, and that of the winter level of Lohit below the village, 1756 feet.

At Pangum I found a couple of Tibetans, traders from Rima, bartering Chinese opium for Mishmi teeta (Coptis teeta), from the roots of which a decoction is made valued in Tibet and India as a tonic and febrifuge. The opium is soft stuff from which the moisture had not been properly extracted, unlike the hard Indian article, which is much preferred by these tribes. All villages I passed through had patches of poppy, but only in very small areas. The cultivation of the poppy gives the owner much trouble. The field has to be fenced in and constantly watched to guard against the depredations of deer and village cattle, who are particularly partial to the plant. The drug is commonly used by the hill people, Dagresson being an exception to the rule. He was a great trader, and he told me one day, "No, I don't take opium, because it is an article with which I trade. Were I to eat opium, I should be eating up my profits."

The want of small coin gave me some trouble during my journey, as I had not brought enough change. A porter for an ordinary march received 8 annas pay, and when one had to give a rupee between two of them it caused a lot of explanation and worry, not only to one's self, but also to the porters. There is little money in these hills, and a Mishmi remarked to me one day that the only way to divide a rupee between two people was to cut it in half.

Dagresson, shortly after my arrival at his village, produced a couple of letters addressed to "Mr. Nicholl, Rima." Mr. Nicholl was a traveller who was expected to arrive at Sadiya from Rima in 1904, and these letters had been sent up by my predecessor at Sadiya through Dagresson for delivery. Mr. Nicholl had never got as far as Rima, and the letters had been carefully preserved for three years. While at Pangum, Dagresson was particularly anxious that I should go as far as Rima, but on my telling him that it was impossible, we agreed that I should make my way to Walung, a village he described as belonging to himself, though inhabited by Tibetans and close to the Rima border. Tibetans, he told me, resorted in large numbers to the headwaters of the Du river to trade, and owing to the isolated position of the Rima province, I am inclined to think that that portion of Tibet relies to a great extent on Assam for imports through the hill people, who are never likely to give us trouble, lest we close our marts to them.

We left Pangum on the 22nd, and reached Tila (2600 feet), following the Lohit. As Dagresson had not been able to get the full number of porters, it was a question of leaving behind the theodolite and plane-table or my tent. In the end the tent was left with one of the many

Mrs. Dagressons, who was selected custodian as she was the proud possessor of a padlock on one of her granaries. The mention of the theodolite reminds me that on first entering the hills I explained that it was utilized for keeping my watch correct to time. Some of these people had a glimmering what a watch was, one of them describing it to his fellows as a device which told noon-time even in the height of the rains when the sun could not be seen for days. This explanation allayed any superstitious fear which may have existed in their minds, and after that I was frequently asked to set up the "time maker."

At Tila I took up my quarters for the night in a Miju house. Things

MIJUS AND TIBETAN TRADER AT SATI.

were not made pleasanter by the cook having to use the fireplace alongside my bed as a kitchen. Culinary operations always cause great interest amongst savages, and consequently the smell of Miju combined with the smoke from the kitchen fire was a little overpowering.

The Halli river (2075 feet) was crossed on the 23rd near its junction with the Lohit, and we then suddenly entered a country covered with pines. From here onwards the rapids of the Lohit became more frequent and resembled small falls. The upper Lohit is nowhere navigable. In fact, it is possible only with great difficulty to get small "dug-outs" as far as the Brahmakund. The night of the 23rd we spent in the forest near the Sa stream (2580 feet), and again out in the open on the 24th at the Ma Ti (stream), as there were no villages at

hand (2580 feet). At the Ma Ti a crowd of people came from Chang-gu, on the other side of the Lohit, to see me, bringing presents of fowls and eggs. Chang-gu is the village from which Cooper turned back to Assam in 1870. As it was Christmas Eve and cleanliness is next to godliness, I had to cast conventionality to the winds and bathe in front of my bonfire surrounded by an admiring circle. After leaving the Halli river no large streams like the Delli and the Du are met with on the right bank. From here the large streams which feed the Lohit flow in from the left bank.

On Christmas Day we reached Wanung (2850 feet), a village with one house, which was found empty on arrival except for an idiot child. The owners were considerably surprised when they came in later to find us in occupation and making ourselves quite at home. The road ran in many places over the boulders in the Lohit bed, and the going was extremely bad. The boulders were enormous, and a slip down between them would have meant a broken leg. Halfway to Wanung we got a view up-stream of a long stretch of the Lohit, with the Ghalum flowing into it in nearly the same line. From a distance they looked one river; a closer view, however, showed the Ghalum to be less than half the size of the Lohit. At the junction of the two rivers, which we passed just before reaching Wanung, the Lohit makes a bend of close on a right angle and narrows from 100 to 60 yards. The river is then a constant succession of rapids and small falls. December 26 found us making for Sati, the path as usual running over level tiers well above the river, varied by occasional drops to those awful boulders. The scenery was very grand and wild—great steep spurs studded with pines falling to the Lohit on either bank, and a foaming roaring mass of water cutting through the centre of the picture. Sati was not reached as expected on the 26th, as a halt for the night was made at Dagresson's suggestion in the forest near the Klang Ti (3020 feet). Sati could have been reached that day, but as an influential Miju lived there, etiquette demanded that my arrival should be announced with due ceremony; a sudden appearance might have clouded the political horizon! So Dagresson went on, and I followed him next morning, arriving at Sati in half an hour. After all he need not have been so particular, as we found the local king, Maiyuonson, away on a trading trip; one of his wives, however, welcomed me and took me in. Chowna, my Khamti friend, shared with me the front room, in which as usual there were two fireplaces. He used to light his fire and have a cheerful blaze; I didn't! The result was that his warm side of the room was always crowded, and my cold end left severely alone, for which I was very thankful at times.

On arrival at Sati, Dagresson again urged my going on to Rima, saying there was nothing to prevent my doing so. Much as I should have liked to, it was under the present orders impossible. Besides,

except for purely sentimental reasons, there was not much to be gained. I had learnt what I wanted to—the attitude of the hill people and the nature of their country—and so had to refuse the tempter Dagresson. It had been my intention to go as far as Walung, but Dagresson had to admit that though he had great influence there, still the people paid revenue to Tibet; so that village was also barred to me. I could see the old gentleman was very disappointed at my decision. However, he packed off his son Tungno to Walung shortly after our arrival at Sati, with orders to kill a cow of his there, and come back sharp with beef and rice with which he wished to feast the party. Tungno returned next day, and the beef was excellent; not that I had anything to complain of in the way of scarcity of meat, as these people go in largely for capons, and a fine bird can be easily got for one or two rupees. Walung is one march from Sati, and it is two more marches on to Rima —the last being a short one. With Tungno came three Tibetans from Walung, who presented me with some eggs and a fowl. They were wild-looking men and very dirty, more so than the Mijus. The authoritative manner in which Dagresson talked to them struck me particularly, and I fancy the Rima people look with a certain amount of awe on the inhabitants of these hills. I remained at Sati during December 28 and 29, and fixed my position with theodolite and plane-table. Dagresson, who was doing the honours of his country, seemed to think a return journey to Pangum by the same route a waste of time. "If you won't go to Rima, and have only come to see the Miju country, see as much of it as you can. Cross the Lohit here and travel back to Pangum along the other bank," was his suggestion, which suited me in every way.

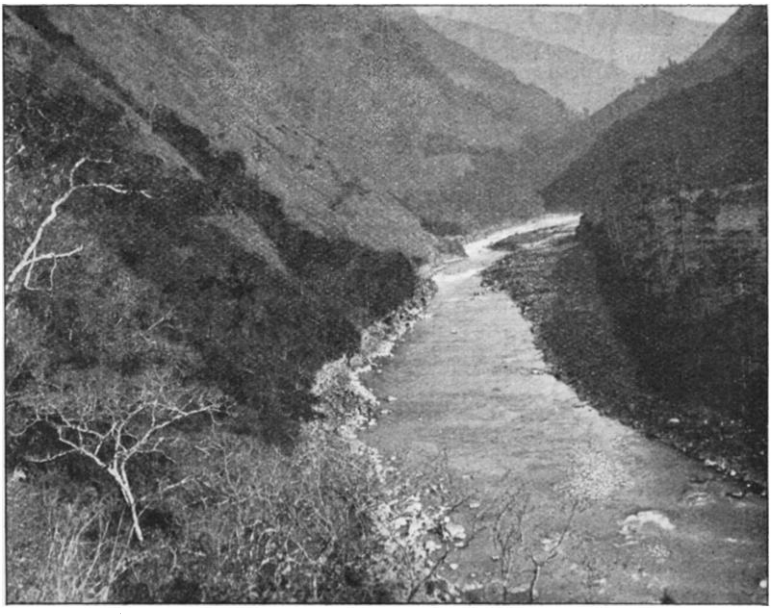
While at Sati I climbed a peak to the west of the village, and at an elevation of 6000 feet had a fine view to the north-east and east, only spoiled by a haze through which one could see no great distance. The great snowy range to the east, commencing north of the Khamti Long, stretches away in about long. 97° to the north, and curves round towards the Lohit and Rima, being in places 15 to 20 miles distant, and forming the divide between the Lohit and the Irawadi. A Miju of Sati, who came up the hill with me, explained that due east on the other side of this range the Kunung river took its rise, and, running south, entered a country "where Sahibs live." By this he meant Burma, and was referring to the N'Mai Kha. "Kunung" is the name by which a tribe occupying the hills to the north-east of the Khamti Long is known. Another tribe, known to the Khamtis as Kinung, has its habitat between the Kunung country and China. The Khamtis report the Kunungs to be decent, quiet folk, but speak of the Kinungs as a warlike, turbulent people who dress like Tibetans. At Sati I met another Tibetan trader from Rima. He seemed to think I was on my way there, but appeared quite indifferent. The position of Sati was found to be lat. 28° 1′ 3″ and long. 96° 54′ 2″.

On December 29 I commenced my return journey, crossing on a bamboo raft a deep pool of the Lohit where there was little current. The river here was about 60 yards wide. At my crossing-point at low-water level a B.P. observation for the height of the Lohit gave 3186 feet. A-K gives the elevation of the Lohit at Rima as 4650 feet, a drop to Sati of about 1500 feet. This is a good deal for the distance, but, as I have already said, the Lohit here descends very rapidly. Another B.P. observation taken at Shirong gave 2688 feet, a fall of 500 feet in 9 miles. The difference between flood and low-water level is 35 to 40 feet; on the Dihong (Tsanpo) the difference is 55 feet some 10 miles before it enters Assam.

Our camp on the 30th was amongst charming surroundings. A flat piece of ground covered with dry bracken in a pine forest about 80 feet above the Lohit, and a clear hill stream alongside; a clean smell in the air, a great bonfire of pine logs—one sighed at the thought of a return to civilization and all its worries—and round me a crowd of Mijus, very savage and very dirty, but withal merry and willing, watching me eat my dinner with the greatest interest. The Miju and other so-called Mishmi tribes compare in manners most favourably with the Abors. It would be impossible with the Abor to allow him near one at meals. Out would go his paw to seize anything new to him, and he would be annoyed if one objected. On the 30th, after leaving Sati, I asked Dagresson to join Chowna and myself at lunch by the wayside, the *pièce de résistance* being a capon presented me by my late hostess, Maiyuonson's wife. Dagresson declined the capon, but asked for some bread, as he was hungry. It appeared that Maiyuonson was his father-in-law, in whose house he could touch no meat; nor could he after he had left the house eat any meat which had come from it. My bread had no connection with Maiyuonson, and so he could eat that. A curious custom, and calculated, I should imagine, to discourage a prolonged visit by a Miju to his father-in-law!

On December 31 we passed through Kraw, a village belonging to the Lamat clan of Mijus. The Lamats live on the left bank and up the Ghalum, which was crossed by a fishing-weir near its mouth. We halted close by on a level plain of short grass under the Miju village of Shirong. This is about the farthest point reached by Wilcox in 1826, owing to the refusal of the Lamats to let him proceed past the Ghalum. After dark I took observations for latitude with the help of Chowna, who held the lamp. It was bitterly cold, and poor Chowna must have been glad when it was over. He was not very enthusiastic on star-gazing in a wintry wind. The Shirong men were all away at Sadiya buying cattle, but soon after our arrival the ladies of the place appeared with presents of fowls and eggs. It is here that the Lohit makes its great bend from north to west, the latitude being 27° 53′ 5″ and longitude 96° 53′ 7″, the altitude, as I have already said, being 2688 feet. On

New Year's Day we passed along above the Lohit, over a very fair path to the La Ti (2400 feet), a river about 30 yards broad. Crossing it, we struck up a steep hillside, and, after rising 1300 feet, found ourselves on a big open plateau between the hills and the Lohit, about three-quarters of a mile broad and 4 miles long, covered with short grass. On it were dotted here and there a number of houses, each surrounded by their own granaries and bamboo clumps. All was so different from what one had been accustomed to. Instead of being close to the Lohit surrounded by dense forest, we were up high on rolling downs well away from the river. The plateau generally, as well as the village, is



THE LOHIT AFTER IT MAKES ITS GREAT TURN FROM SOUTH TO WEST.

called Chang-gu, the headquarters of the clan called Malu by the Taroañ and Peri by the Mijus. It was from here Cooper turned back in the seventies. The story told me at Chang-gu was that the Tibetans, hearing of Cooper's intended visit to Rima, sent word to the Lamats and Malus not to let him through. The Tibetans gave out that if anything happened to Cooper, these clans would be held responsible. This frightened the Malus in case of any misfortune befalling Cooper, and they objected to his going forward. So he had to turn back. It is quite possible the Tibetans did honestly think that harm might come to him amongst the Mijus, and that they themselves might be held to blame. There is little doubt, I think, that the Rima people did have,

and probably have to this day, a dread of the wild Miju. Take the case of A-K. The Tibetans had no idea who he was, and appear to have acted solely with a friendly object when they warned him about the perils of the route between Rima and Assam. The head Tibetan responsible for Cooper's return sent him a present, I was told, of a Tibetan mastiff and a sword, with the message that as he had now seen Tibetan specimens of both, there was no necessity for him to proceed as far as Rima itself. Chang-gu (3700 feet) is marked on maps as Prun, which name nobody recognized. It may have been a mistake for Peri, the Miju name of the clan.

At Chang-gu I saw an animal much like a highland bull. It had been purchased at Rima, and had a thick, shaggy black coat, long slender horns curving forward, then turning back, with sharp points, a tail thick and short, with tail-hairs about 18 inches long; height at the withers (which were not high) 12.1 hands. The Mijus called the animal *chula*, the Tibetan name being *dzu*. It is a different species from the ordinary Tibetan cattle called *man-tsu* by the Mijus, and *lor* by the Tibetans. The price paid for the animal had been three Assam silk cloths, or about 30 rupees. These cloths and musk-pods are the articles principally taken by the Mijus to Rima for barter, 10 rupees a tolah being calculated as the value of the latter.

In Chang-gu I came across a couple of Tibetan traders. They came one day to the house I was putting up in, solemnly sat down close to where I was writing, and after gazing on me for half an hour, got up and walked away without a word. I trust I met with their approval! I remained at Chang-gu on January 2 and 3, 1908, and climbed a hill (5300 feet) to the south-east. The Chang-gu plateau lay at my feet to the north-west, and to the south I looked down a sheer drop of nearly 4000 feet into the La Ti. The haze was very thick that day, and I could only get occasional glimpses of the great snow-barrier between the Lohit valley and the Khamti Long to the south and south-east.

The Mijus bury their dead in a suitable spot near the house. A child is buried at once, but the corpse of an adult is kept in the house from two to four days. The length of time intervening between death and burial depends on the wealth of the deceased—the wealthier the man, the longer the period. The reason given me was, "A rich man has a bigger house and more property in it than one poorer. It is a greater wrench for the spirit of the rich man to part for ever from all his belongings, and consequently we let his body remain in the house as long as possible to please the dead." A month or so after burial, when the deceased's relations have had time to prepare for it, a feast is given to the village. The grave is then opened, and the remains are burnt, the ashes being left untouched.

My stay at Chang-gu came to an end on the 4th, when I continued my homeward journey, reaching the Gam stream that day. *En route*

we met a party of Mijus, carrying great loads of pork. They proved to be a bridegroom and his friends off to Chang-gu to fetch the bride, and were taking the wherewithal to feast her relations. Dagresson failed to arrive that night in camp, and his son Tungno reported that papa was sleeping peacefully on the road, having been overcome by the many stirrup-cups he had drunk with the local kings of the Chang-gu plateau. He arrived next morning, looking bedraggled and bleary-eyed, but a drink of hot tea made him look more himself. Tea I found very much appreciated by all these people, and I am not sure that they do not prefer it to rum. The tea, however, they get from the shops on the

TAROAÑ.

frontier is vile stuff and expensive. On my showing the Tibetans at Pangum some of my tea, I was told that only the wealthy classes at Rima drank it in that form.

The cold at our camp of the 4th was very bitter Next morning at dawn the thermometer registered 29° Fahr., and it must have been a good deal lower during the night. The whole of this valley in the winter has a damp cold temperature, and this is especially the case on the left bank, where, owing to its low declination in December and January, the sun is shut out from many places by the height of the hills to the south. All along the banks pine trees lie rotting. My suggestion

to float down logs to Sadiya, where there was a market for them, met with all sorts of objections as to its impossibility. The hill savage is very wanting in initiative, and the idea will not catch on until some outsider leads the way. On January 6 I recrossed the Lohit to Pangum, the bamboo raft being worked by one of the Tibetans whom I had seen there in December.

The spectators at meals solved a matter one day which had been puzzling them for some time. "What is that brown stuff the sahib breaks up and drinks with hot water?" One brilliant mind at last declared it to be *kaning* (opium).* Cadbury's chocolate accused of being a narcotic!

While at Pangum I measured Dagresson's house, which was 252 feet long and 18 feet broad. It contained twelve rooms, three having two fireplaces, the rest only one. In addition, there was the front common room with the usual two fires. Numerous doors down one side of the house, and on the other a narrow verandah with exits on to it from each room. The house is raised off the ground about 3 feet, and is made of bamboo with timber supports and a thatched roof. This house is of the ordinary type, but of course few are as large. On my asking Dagresson how many people lived with him, he replied that he really did not know, but would count them up for my benefit. So a long piece of stick was selected, a place on the ground in front of me swept clean; down squatted Dagresson, and after many false starts the census began. The sons living with him headed the list, and after he had muttered each one's name a piece was broken off the stick and laid on the ground: these totalled fourteen. The same process for his daughters, a row of nine representing them, and six more for his wives. He had had many others, he explained quite cheerily, but six only remained to him then. A row of thirteen pieces gave the number of his male slaves, and ten the female ones. Here the stick gave out, and a fresh one had to be called for. His sons' wives came to thirteen—a total with himself of sixty-six. But nothing had been said about his grandchildren, and on my mentioning them the old man groaned with weariness. However, more space was swept clean, and he proceeded to tackle the sum. He made out there were thirteen living with him, but thought there were more whom he could not remember. We had to stop here, as the unaccustomed mental exertion was telling on the old gentleman. However, he had accounted for seventy-nine persons in his own house. Leaving out the twenty-three slaves, and fifteen for his wives and daughters-in-law, there were forty people under his own roof directly descended from himself. Also he had other sons with their offspring living in separate houses. Of course this case is an exceptional one, but generally tribes on this frontier are very prolific; even among those who

* A corruption of *kani*, the Assamese word for opium.

are monogamous it is quite common for a woman to bear her husband ten children. The infant mortality from exposure, however, is very great—70 per cent. at the least; and it is an example of the survival of the fittest, from the survivors springing a hardy race of mountaineers.

On January 9 I left Pangum, after an affectionate farewell from Dagresson, Tungno his son, and all their wives. He came in to see me at Sadiya in March, 1908, bringing with him a Tibetan from Rima, but, I regret to say, died shortly after his return home. His influence rendered the portion of my journey east of his village nearly free of all transport worries, usually one's greatest difficulty, and his place will be hard to fill. Tungno his son has succeeded, but unfortunately he has taken to opium, and can never be the man his father was. This reminds me that a report has come down in the last month that the sale at Rima of Chinese opium to the Mijus has lately been put a stop to. I hope this is true, as the habit is doing untold harm in this little corner of the globe.

On January 12 we reached the Tidding river. Instead of crossing we followed it up as far as Pariling. From here we moved to Teronlung (1970 feet), a village on the right bank, and on the 14th crossed the outer range at an elevation of 5922 feet (B.P.), following the path by which the hill people bring up cattle from Assam. A well-graded bridle-path could be constructed over this range without difficulty. That night we camped at the Tiju river (1550 feet) amongst the low foothills, and next day our party was back in the plains.

In appearance and dress there is nothing to distinguish the Miju from the Taroañ. Each speak a dialect which is understood by the other. They intermarry, and both tribes are polygamous, the only limit to the number of wives being the length of the purse. Each tribe is divided into clans, which are exogamous, and marriage is between adults. Though living on the borders of Tibet, no trace of Buddhism is found among them. Their religion is animistic, and consists in the propitiation of the various spirits to whom sickness, failure of crops, and suchlike calamities are attributed. The propitiation takes the form usually of the sacrifice of a fowl or a pig, a small portion being set aside for the spirit, the rest going down the throats of the offerer and his family.

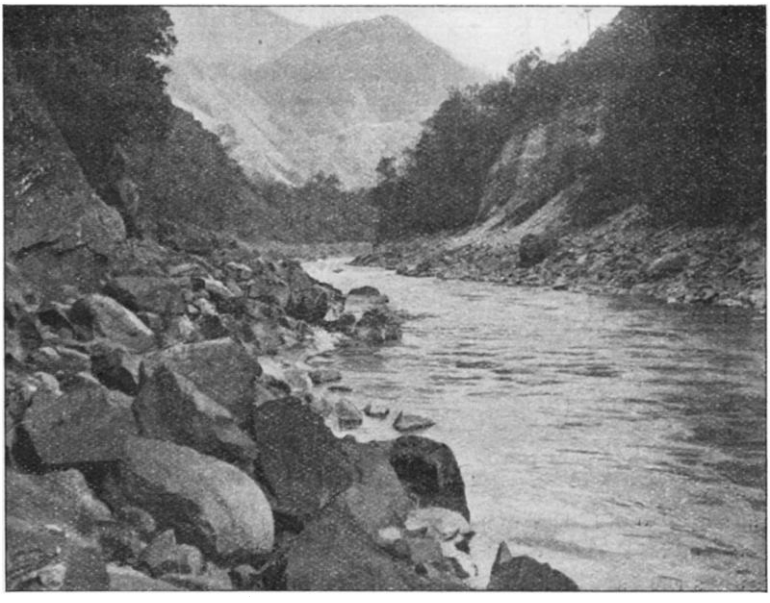
Travelling amongst the numerous tribes which occupy the hills to the east and north of Assam, one is struck by the strange similarity which is sometimes met with between people divided from one another by great distances, and between whom there never can have been any communication in their present locations. The Miju and Taroañ tie their hair on the top of their heads like some of the Lushei clans. Among the "crop-haired" Mishmis we find the men and women cutting their hair very much like the Angami men, and, more curious still, the women wearing the same broad black cane garter below the knee which one meets with amongst the Angami men. The earring of the Taroañ

and Miju women is identical with the large ring of thin brass wire which the Eastern Angami women pass through their ears. But strangest of all is the likeness between the Abors and the Ao, Lhota, Sema, and Trans-Dikhu tribes of Nagas, separated from one another by the whole breadth of the Assam valley and the Brahmaputra. The Abors male and female cut their hair in the round fashion peculiar to these Nagas, and the curious tattoo-markings on the legs and faces of the Abor, Ao, and Trans-Dikhu women are extraordinarily similar, though we find no trace of such marking amongst the tribes occupying the 200 miles of intervening hills. I doubt if many corners of the globe can compare with the region between the Brahmaputra and Irawadi systems in respect of the number of tribes speaking dialects so totally different that no two tribes can understand one another, and yet they spring (except the Khasis and Khamtis) from the same stock. Their languages are classified by Grierson as Tibeto-Burman, and a comparison of common words, as *fire*, *wood*, etc., and of the numerals of such widely separated people as Abors, Aos, Lusheis, and Eastern Tibetans, shows a marked resemblance between the various languages.

As already said, in appearance, dress, etc., there is practically no difference between the Taroañ and Miju tribes, and, unless otherwise specified, any description applies to the two tribes equally. The men let their hair grow long, and tie it in a knot on the top of the head. They wear a small apron in front, a sleeveless coat of a very dark blue, usually ornamented with red thread, open in front, and reaching well down the thigh; a cloth 3 feet wide and 5 feet in length, worn during the day like a Highlander's plaid, at night serving the purpose of a blanket; slung over one shoulder, a large bag, usually of bearskin, hangs in front to the waist, and over the shoulder a strap supports a long knife. Sometimes a piece of coloured cloth twisted round the hair knot completes the attire. Ornaments consist of long cylindrical silver earrings with bell-mouthed ends; some quarter-rupee pieces sewn on a leather strap as a necklace, and a silver charm box of Tibetan manufacture, studded with turquoise, on the chest. The women wear a short little sleeveless jacket covering the breasts, of the same colour as the men's coats; a short under-cloth as a petticoat, and a longer one reaching to below the knee, which is used as a covering at night. They tie their hair behind, and above the forehead wear a thin band of silver fastened under the hair at the back. They wear earrings like those of the men, and some in addition pass a large ring of thin brass or silver through the top of the ear, which is held up in place by a cord across the head. Long strings of glass beads, amber in colour, depend from the shoulders; a number of thin silver rings hang round the neck with a silver charm box like that of the men. All of them, men, women, and children, are great smokers, using home-grown sun-dried tobacco in pipes. The pipes, about 10 to 12 inches long, are of various

kinds, some with silver bowls and mouthpieces, others plain bamboo roots.

These people usually build their villages low down close to the rivers. The want of water prevents their occupying the cooler heights, and as they live at peace with one another, there is no necessity for a strategical site on the top of a hill. They may occasionally have a fight, but they are not raiders or head hunters like the Naga tribes on this frontier. Even in war heads are not taken. All that the victor does, I am told, is to cut off the hair of the slain, which is buried in front of the victor's house. Living at peace as they do, they are constantly on the move, trading between Tibet and Assam. Agriculture and hunting are their other means of livelihood. They are well to do,



BOULDERS ON THE LOHIT RIVER.

and their villages are plentifully stocked with fowls and pigs. Of cattle I saw few, though they buy quite a number from Tibet and Assam, but quickly slaughter them at festivals. There is no permanent cultivation, but a fresh patch of the hillside is cleared and utilized for a couple of years, after which it is allowed to rest for eight or nine years, when it is again cleared, all growth being burnt and worked into the ground. Rice is not largely grown. The staple crop is maize, which they grind into a coarse flour or boil whole. They make from fermented grain a liquor of which they drink large quantities, but I saw little drunkenness.

Their weapons consist of a single-edged knife about 18 inches long,

and a spear. They own crossbows, but the ordinary bow with which they move about is a light one of the usual pattern.

Wandering in the wilds, one is apt to wonder what will be the future of the country—whether in another twenty years it will be in the same uncivilized state as it now is, or whether sufficient reason will arise for opening it up. These hills, it must be remembered, are peculiarly situated. They separate two countries, Assam and Tibet, from one another; the distance from the plains of Assam to the border of Tibet is less than 50 miles in a straight line and 110 by road, the whole route lying through a country occupied by a quiet, peaceable people, who at present look to us as the paramount power, and from whom we may expect nothing but obedience; a people amongst whom no trace of Tibetan influence is found. With the awakening of China, how long these conditions will continue is a subject that I cannot touch on here. An effort to take advantage of the present situation should, I think, be worthy of consideration from a commercial point of view. To connect India with the borders of south-east Tibet by a good mule-track as a beginning would be easy, could be carried out at no great cost, and should attract trade. The attention of the Calcutta Chamber of Commerce was drawn to a trade route from Assam to Tibet over forty years ago by Cooper, who went up to investigate. He met with failure, but in those days the hill tribes were unfriendly, which made all the difference. The country itself presents no difficulties; it is, in fact, a strikingly easy one for a mountainous tract. The highest altitude is met with when crossing the outer (or first) range, and even here we have to face only an actual rise of 4600 feet, after which no high altitudes obstruct the way. The banks of the river would appear specially formed for a road; large flat tiers running parallel to the Lohit, with easily surmounted spurs extending to the river itself, rising gradually from 1200 feet at the Tidding, to 3100 at Sati, an ascent of 1900 feet in 70 miles. It is a natural highway into Tibet, and only requires the hand of man to render it easy and expeditious.

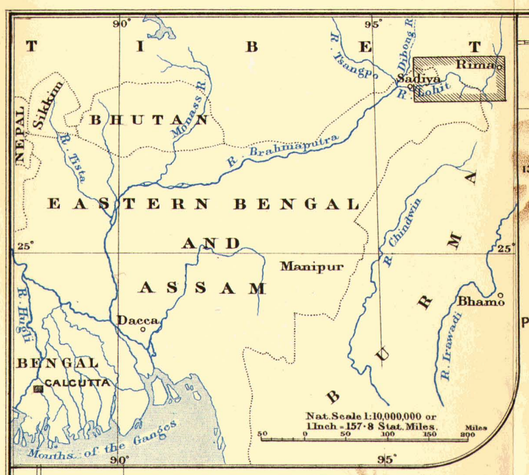
At present trade is infinitesimal. The imports which pass up to Tibet from Assam through Miju traders amount to little, and of Tibetan exports there are none. But would these conditions continue if an easy and fairly expeditious route existed? I very much doubt it. At present south-eastern Tibet, or the Rong, as the country is known, has no industries, because she has no incentive for the development of her resources. She is cut off from convenient marts on all sides. Thousands of maunds of wool are wasted annually simply because there is no market, and that not only wool of the ordinary quality, but also of the costly variety called bashm from which shawls are made. Were communications improved along the natural outlet and the line of least resistance, viz. the Lohit valley, facilities for export would be brought within the reach of all. Once the Tibetan learned that every pound of

wool had a marketable value in Assam, and that Assam could be reached quickly, comfortably, and safely, and that there he could purchase tea, clothing, etc., in return for his wool, commercial interchanges would be assured, and both countries would benefit to a considerable extent. Trade intercourse just now is impossible, as Tibet is a forbidden land to the trader. But a good bridle path from the limit of British territory to Sadiya, a place in close proximity to the terminus of the Dibru-Sadiya railway, would attract the Tibetan to trade with us.

Events have been taking place of late which are likely to increase interest in this section of the Lohit valley. I refer to the Sinification of Tibet, and if reports in the public press be true, it is only a matter of months, not years, before the Rong, instead of forming a part of Tibet, will become a Chinese province. Assam will then be separated from China by only 50 miles (in an air line) of mountainous country, which can be traversed with ease.

How this is likely to affect affairs it is difficult to say. The Chinese colonist may under orders prevent all intercourse between the "foreign devils" and the Tibetans. Or if left to his own devices, we may find him keenly alive to the advantages accruing from easy communications with Assam. Sir Thomas Holdich, in 'Tibet, the Mysterious,' draws a picture of the Tsangpo valley with a railway and Gyala Sindong with a hotel. Why not, then, a railway running up the Lohit towards Sechuan? A railroad as far as Rima is practicable, but from there the country is difficult. The Tila La and two other high passes have to be surmounted, and the Salween, Mekong, and Yangtse to be crossed—at first sight a formidable array. But then we must remember that the altitudes of these passes do not represent their heights above the surrounding country. The altitude of the country itself is 5000 feet or more, which substantially reduces the height to be encountered. Again, the rivers are not the enormous rivers we know them to be further south, but at the points crossed are confined within narrow limits with a rock formation suitable for bridge foundations. But however costly, were there facilities for quick communication between India and Western China, the possibilities of commercial expansion would appear to be boundless. Given a railway, every ton of our exports for Sechuan would be captured for this route instead of being carried a long sea voyage from Calcutta, only then to commence the difficult journey up the Yangtse. With such improved communications, the resources of Sechuan, one of the wealthiest provinces of China, would develop enormously; with an easy and expeditious route, there is no reason why the Chinese coolie should not seek for employment on the tea gardens of Assam, and so possibly solve some of the present labour difficulties. The prospect of forging the link connecting India with China may be visionary, but, again to quote Sir Thomas Holdich, "it is not more visionary than twenty-five years ago was that of a modern hotel at the Victoria falls of the Zambezi."

THE GEOGRAPHICAL JOURNAL 1909.



THE LOHIT BRAHMAPUTRA

From a Survey by

NOEL WILLIAMSON

Note

This map is based on a plane-table survey checked by astronomical observations for latitude made with a 6 inch theodolite.
The heights of the peaks are from the survey of India, and those along Mr. Williamson's route from boiling point readings.

Nat. Scale 1: 250,000 or 1 Inch = 3·94 Stat. Miles.

10 5 0 5 10 Stat. Miles.

Route -------- Heights in feet

Published by the Royal Geographical Society

T I B E T
NEPAL
Sikkim
BHUTAN
R. Tista
Monass R.
R. Brahmaputra
R. Tsangpo
Dibong R.
Sadiya
R. Lohit
Rima
EASTERN BENGAL
AND
ASSAM
Manipur
Dacca
BENGAL
CALCUTTA
R. Hugli
Mouths of the Ganges
R. Chindwin
R. Irawadi
Bhamo
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1 Inch = 157·8 Stat. Miles.
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Tiju R.
Dora R.
Temei R.
A
S
Digaru R.
Camp
Suttar
Samkha
LOHIT BRAHMAPUTRA
Digaru Mukh
Kamlung Mukh
Lai Pani
Karem R.

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peaks are from the survey of India,


97°
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Nang R.
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Ghatum R.


Sangpo
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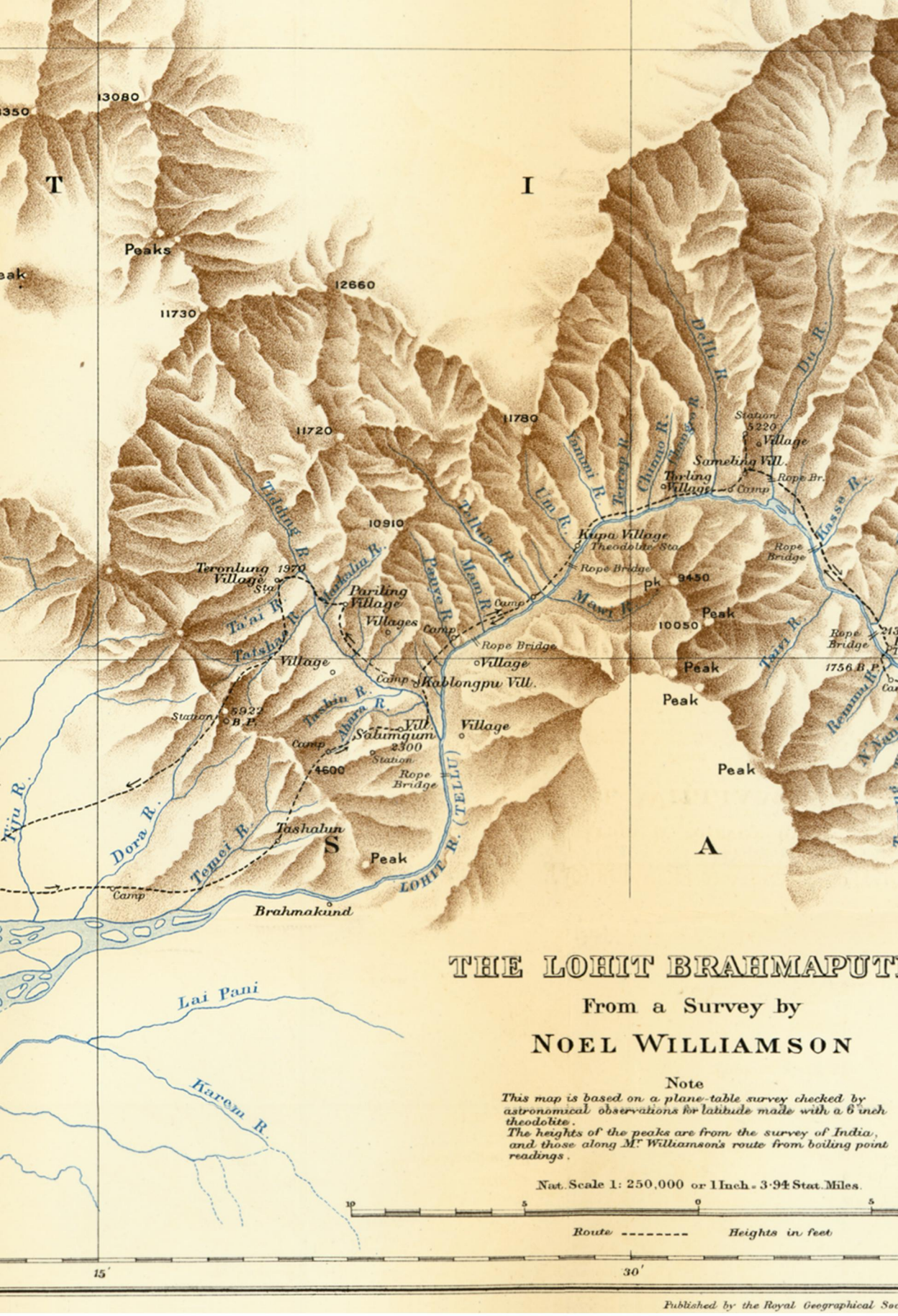
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Teronlung Village
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5922
B. P.
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2300
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LOHIT R. (TELU)
Tidding R.
Ta'ai R.
Tafsha R.
Mandala R.
Tashin R.
Abara R.
Pauya R.
Mam R.
Tellwa R.
Lim R.
Yamni R.
Tereng R.
Chunno R.
Tamlow R.
Delli R.
Du R.
Kupa Village
Theodolite Sta.
Rope Bridge
Mauri R.
Pk. 9450
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10050
Peak
Peak
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Station
5220
Village
Sameling Vill.
Tarling Village
Camp
Rope Br.
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Rope Bridge
Rope Bridge
1756 B. P.
Tauri R.
Remmu R.
A
Lai Pani
Kareem R.
THE LOHIT BRAHMAPUTR
From a Survey by
NOEL WILLIAMSON
Note
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Nat. Scale 1: 250,000 or 1 Inch = 3·94 Stat. Miles.
10 5 0 5
Route -------- Heights in feet
15′
30′
Published by the Royal Geographical Soc

T BRAHMAPUTRA

n a Survey by

WILLIAMSON

Note

on a plane-table survey checked by
rvations for latitude made with a 6 inch

peaks are from the survey of India,
Lt. Williamson's route from boiling point

250,000 or 1 Inch = 3·94 Stat. Miles.

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Heights in feet

0' 45'

Published by the Royal Geographical Society

15'
Shikha
E
T
Rima
Zayul Chu
15220
Sama
Sa Ti
3186 B.P.
5970
Station
Rope Bridge
Hlang Ti
Village
Sate Village
Camp
Camp
Tsik R.
28°
Nang R.
Tulong
Village
Kam Ti
Kaimung R.
Rope
Bridge
Village
Phing
Rope Bridge
Ma Kung R.
Kraw Ti
Camp
Kram Ti
Thiral R.
Wanung
Village
2850
Rope
Bridge
2688 B.P.
Shurong
Village
Kraon Ti
Kai Ti
Ghalum R.
97°

THE MONGOLIA-SZE-CHUAN EXPEDITION OF THE IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

By Captain P. K. KOZLOFF.

In the summer of 1907, the Imperial Russian Geographical Society, with the approval and assistance of His Majesty the Czar, organized an expedition to Central Asia, entrusting it to me from its commencement. My companions were the geologist A. A. Chernof, the topographer Staff-Captain Napalkof, and S. S. Chetyrkin, botanist and entomologist, besides ten men to prepare specimens, take meteorological observations, etc., and to act as a guard.

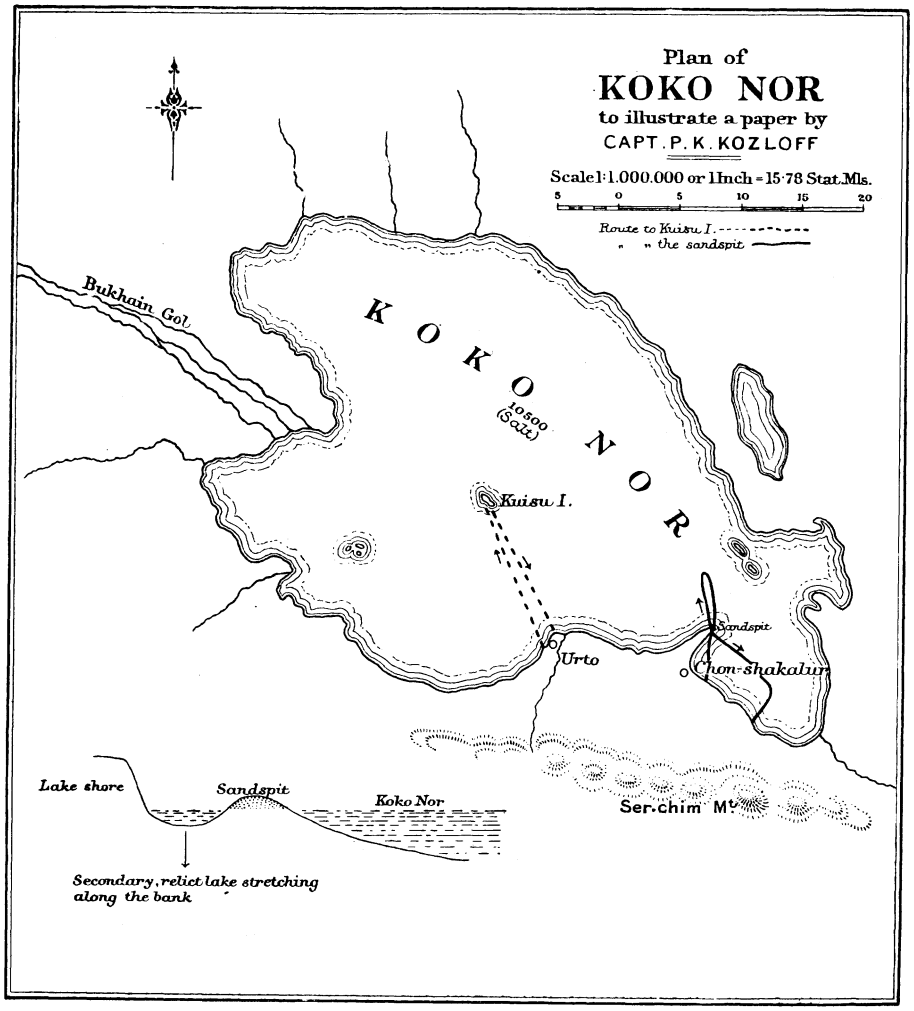
The object of the expedition was to explore parts of Mongolia not yet visited by Europeans, to take soundings of the alpine lake Koko-nor, and to investigate the region of the upper course of the Huang-ho, where it winds among the mountains.

The expedition started excellently equipped from St. Petersburg, and on November 22 left Moscow. Though the year was drawing to a close, my compatriots flocked to the station to see me off—relations, friends, acquaintances, comrades of the Ekaterinoslav Guards, and our journey commenced to the strains of the Ekaterinoslav March. The railway journey of ten days and a couple of days' ride in a Siberian carriage soon passed, and we found ourselves on the borders of the empire at Kiakhta-Dvazhda, and were kindly welcomed by old acquaintances.

Beyond Kiakhta begins Mongolia, at first a steppe country, but mountainous beyond, with ranges more or less massive, rich in animal and vegetable life. Then comes Urga, the Mongolian Lhasa, beyond which the character of the country rapidly changes, the surface becomes more even, the vegetation is poor, the population scanty, especially south of the mountains constituting the eastern prolongation of the Mongolian, or Gobi, Altai. There is the actual desert of Gobi, here taking the form of even slopes of sand and stone, there moulded into smooth or rocky hills, on the top of which at even the setting sun casts picturesque gleams. In fine, southern Mongolian presents almost everywhere a sea of arid sand, but in many parts occur meridional sand-dunes, not infrequently rising to a height of 100 feet or more.

The native inhabitants of Mongolia, the Mongols, also vary with the physical conditions and the predominance of their own chiefs or of the Chinese. In Northern Mongolia the traveller meets with nomads still priding themselves on their traditional boldness and courage, their many-coloured garments, their lively hacks, their ornaments, their dexterous horsemanship, their cunning; these Mongols carry one's thoughts back to the time long gone by, when they had a history of their own. The maintenance of the independent condition of the

Mongols is promoted to a great degree by the Bogdo-gegen of Urga and the ruling authorities of the tribes, the Mongolian princes, whom the Chinese treat courteously, striving to attach them to the court of the Bogdykhan (Emperor of China). The Mongols of the central parts of the country are markedly inferior to their northern neighbours,



but, on the other hand, are often superior to the inhabitants of the south, who are becoming ever more and more assimilated to the Chinese, both outwardly and inwardly. Among these people the national life is forgotten, the racial feeling is disappearing. On the whole, judged from our standpoint, the Mongol passes his life in a miserable, unenviable environment, and his mental horizon is limited, though he is

distinguished from his nomadic neighbours by having attained a comparatively higher intellectual development; has his own literature and printed laws, learns to read and write Tibetan, studies religious questions—has, in fact, some slight conception of culture; but, after all, the nomad, according to European ideas, represents a low, effete stage of social development.

In crossing Mongolia in various directions, and observing and studying different sides of its simple but original character, I was far from expecting to find a dead, forgotten city, such as the expedition actually came across in the lower basin of the river Etsin-gol, which rises on the northern slopes of the mighty Nan-shan. The lost, deserted city Khara-khoto, or Baishen-khoto,* now stands 8 to 10 miles east of the most easterly branch of the Etsin-gol. The "Black City," or rather its ruins, were well known to the Etsin-gol Torguts, who migrated thither from Kobuk-saire-Dzungaria about four centuries ago, when the banks of the Etsin-gol were still clothed with virgin forest, impenetrable in parts, which the Torguts burned down during the first three years to make room for their encampments and pasture. According to the present Torguts, their ancestors found the ruins just as they are now—that is, a town of the Chinese type, with high clay walls facing the cardinal points, placed on a rather high abrupt terrace, which was at one time washed by the Etsin-gol flowing past to the north-east. The remains of the channel can be traced the whole distance from its head at Botok-deerek to the salt sandy basin Khodon-khoshu, lying in a line with the existing basins Gashun-nor and Sogo-nor. At some distance before reaching Khara-khoto we were much interested in the *suburgans*, or tombs, standing singly or in groups of two to five along the road which leads to this historical monument, and overwhelmed with sand from the neighbouring desert. Two miles further the city itself came into view, its principal *suburgan* rising above the north-western angle of the fortress, from among a number of smaller neighbours erected by the wall and in a line with the wall outside the fort. The explorer approaching Khara-khoto from the west notices a small building with a dome-shaped roof standing at some distance from the south-western corner of the fortress, and somewhat resembling a Mussulman house of prayer. The walls of the town are covered with sand, in some places so deeply that it is possible to walk up the slope and enter the fortress. A few minutes more, and we passed into the dead city by the western gate, placed directly opposite the other remaining gateway in the eastern wall. Here we found a quadrangular space,† whereon were scattered high and low, broad and narrow, ruins of buildings with

* Khara-khoto and Baishen-khoto are the Mongolian names signifying Black City and Fortress City.

† A side of the square measures about a quarter of a mile.

rubbish of all kinds at their feet, including a heap of fragments of clay and china pottery. Here and there stood tombs. We at once divined the interest with which our labours would be rewarded in the investigation and excavation of all that now lay around us.

Our camp was pitched in the middle of the fortress beside the ruins of a large two-storied building, to which adjoined, on the south side, a temple ruined to its foundations. Owing to the absence of water on the spot, we were obliged to carry with us all our vessels filled with water, that we might remain as long as possible at the ruins. Before an hour had passed, the interior of the fortress had come to life again. Men moved about, tools were at work, dust rose into the air. About the bivouac was the desert bird, the chough-thrush (*Pedoces Hendersoni*), chattering loudly as it perched on the twigs of the saxaul; it was answered softly by the sweet singer of the desert, the whinchat (*Saxicola*). Interesting occupation made the time pass quickly and imperceptibly. The dull grey and generally windy day soon gave place to a calm clear night, in which the ruins seemed stern and gloomy. Being tired we soon fell asleep, but some of us were disturbed by the unpleasant voice of the owl (*Athene*) screeching ominously from the top of the principal *suburgan*.

During the few days spent at the ruins of Khara-khoto, the expedition gathered all kinds of articles—books, letters, documents, coins and paper money (assignats of the Min dynasty), female ornaments, some household utensils, ordinary articles of trade, objects of the Buddhist cult, etc. The quantity collected was enough to fill ten chests of 36 lbs. each, which have been forwarded to the Geographical Society and the Academy of Sciences. On the return home of the expedition we shall be able to learn positively when the "Dead City" existed and who were its inhabitants.* From the slight legendary lore handed down from generation to generation, the Torguts of Etsin-gol who accompanied us to the ruins communicated to us information of no little interest. The native tradition runs as follows: The last ruler of Khara-khoto, the *batyr* † Khara-tsian-tsiun, relying on his invincible army, designed to take possession of the throne of China, and consequently the Chinese authorities were obliged to send a considerable force against him. A series of battles took place between the imperial forces and those of Khara-tsian-tsiun to the east of Khara-khoto, about the present northern boundary of Ala-shan in the Shar-tsa mountains, and were unfavourable to the latter. Having got the upper hand, the imperial army forced its

* Captain Kozloff has, since writing the above, received a letter from A. V. Gregorief, vice-President of the Russian Geographical Society, informing him that the manuscripts and other articles forwarded to St. Petersburg show that Khara-khoto must be identical with Hsi-hsia, the capital of a Tangut kingdom which flourished from the eleventh to the fourteenth century.—Ed.

† A Mongol word meaning a valiant man, a hero.

enemy to retire, and finally to shut himself up in his last refuge, Khara-baishen, which was blockaded on all sides. Whether the siege was prolonged is not known, but, at any rate, the fortress was not taken at once. The imperial army, being unable to take Khara-khoto by assault, determined to deprive the beleaguered city of water, with which object they diverted the river Etsin-gol, which, as mentioned above, at that time washed the wall of the town, to the left, that is westwards, blocking up the original channel with bags of sand. And to this day there are to be seen remains of this dam, in which the Torguts not long ago found remnants of bags.

The besieged then began to dig a well in the north-west corner of the fortress, and sank it down to 80 *chokan*—a *chokan* is more than 11½ feet—and still did not find water. Then the *batyr* resolved to meet his enemy in a last general engagement, but, in case of defeat, he buried in the well, before it was filled in, all his treasures, which, it is said, filled no fewer than eighty wagons or carts, each holding 600 to 900 lbs. weight; and this consisted of silver only, and did not include other valuables. He then killed his two wives, and son and daughter, that the enemy might not abuse them. These preparations completed, he ordered a breach * to be made in the northern wall, near the place where his wealth was hidden, and through it rushed on the enemy at the head of his troops. In this decisive action he perished, and also his army, hitherto considered invincible. The imperial army, as usual, destroyed the captured city utterly, but did not discover the hidden treasure, which, it is said, lies there still, though the Chinese of the nearest towns and the local Mongols have tried more than once to get possession of it. They attribute their failure wholly to a spell worked by Khara-tsian-tsiun himself. The natives are more convinced of the efficacy of this potent spell since the last time they searched, when instead of treasure they found two large snakes brightly glistening with red and green scales.

After its work at the ruins of Khara-khoto, the expedition followed the historic road to the residence of the Alasha-tsin-van, the town Dyn-iuan-in, and then made somewhat extended excursions into the Ala-shan range and the adjoining valley of the Hoang-ho before proceeding to the Nan-shan and further south. In Dyn-iuan-in we established a depôt and a meteorological station of the second class, which was in working order from the beginning of May, 1908.

Here ended the first period of the expedition's activity, and the second lay before it—the Koko-nor period.

On October 15, 1908, the expedition came to the Hui-dui oasis, where it was accommodated in the Chinese temple, Viu-tsy-miao, beautifully

* This can still be seen.

situated on the heights bounding the oasis on the south. Three months had passed since we left Alasha-yamyn, and in this interval we had visited the burning desert of south Ala-shan, the eastern Nan-shan, and the high alpine lake Koko-nor—had, in fact, accomplished the second part of our programme. We happened to be among the Ala-shan sands in the very hottest season, in the Nan-shan at the time of the development of vegetation and animal life, and at Koko-nor under the best weather conditions, comparatively speaking.

The heart of Koko-nor, its mysterious island Kuisu, was visited. This event made a great impression, not only on the Koko-nor natives, but also on the Chinese of Sinin—so great that both conceived it possible that we had subdued the dragon of the lake; that the water retired before us, and we marched along the bottom, caught a golden fish, etc.

LANDSCAPE IN CENTRAL MONGOLIA: MONGOL ENCAMPMENT.

At any rate, it is certain that both Chinese and Tanguts began to treat us with greater respect and attention.

Uninterrupted rain for the space of a week delayed the departure of the main caravan from Dyn-iuan-in till July 18.* The noise and bustle of the town gave place to the deep silence of the desert. The air, purified by the rain, had become clear, and it was possible to trace on the one side the outline of the Ala-shan range, on the other a sandy plain stretching far away to the western horizon. The route of the expedition crossed the desert at its narrowest part, from Dyn-iuan-in to Sa-yan-tsin, in a south-westerly direction, leaving on the east a wedge of sandy waste that extends to the undulating heights on the left bank of the Yellow river. Our caravan consisted exclusively of camels, to the number of thirty, which travelled easily over the cracked sandy ground. At our feet lizards scurried about, beetles crawled everywhere, flies swarmed, buzzing as usual; butterflies were less

* The eastern detachment, under Captain Napalkof, left the town on July 11; the western, under the geologist M. Chernof, on July 14.

common. A great scarcity of birds was remarked, and still scarcer were the mammals of the desert; occasionally the profile of a swift-footed antelope appeared for a moment on the summit of a hilly ridge or sandy mound. Oppressively monotonous and wearisome is the desert in summer. At night, indeed, one feels pretty comfortable, but as soon as the rays of the summer sun appear the heat becomes unbearable, crushing all one's energy. Even the famous ships of the desert become heavy and stupid in the very hottest season. Again and again you look at your watch, straining your eyes to catch sight in the distance of the green spot that is to afford a resting-place for the caravan beside its well. In order to cross the desert with greater ease, especially where there were long stretches without water, we usually left the wells after dinner at two or three o'clock, and travelled till dusk, then unloaded the caravan beside the road, and, after taking some refreshment, immediately lay down to sleep. As soon as the morning dawned the caravan was ready to start, and tried to reach as soon as possible another halting-place with water.

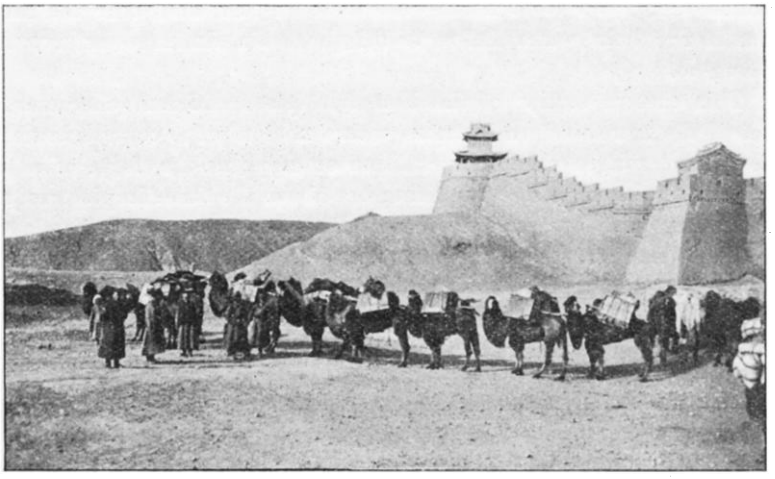
The first half of the sands we traversed under a burning sun, far from feeling the full "charm" of the desert. The sand was heated almost up to 158° Fahr., and burned our feet through the thin soles of our shoes. The poor dogs suffered more severely than ourselves, in spite of the great care and precautions of Sergeant-Major Ivanof, who every half-hour took down a trough from the baggage, and sparingly watered them. The dogs knew all about it, and at the proper time ran, without being summoned, to the front and fawned upon Ivanof.

The sand-dunes (*barkhans*) were piled one on the other, higher and higher. The camels strain at the leading-reins, and breathe heavily as they ascend to the top of a dune and then descend to its base. The broad hoof of the camel falls softly on the sandy surface; the curious sound it emits is hardly heard, being overpowered by the breathings of the troop. On ascending a high sand-dune we have always the same view—sand, sand, sand. Our mouths are parched; the dryness of the desert air is extreme. The expedition rested quite twenty-four hours at Shirigin-gol, where in one of the small lakes, or rather pools, we bathed several times, vainly seeking coolness.

We were fortunate in crossing the second half of the desert, the Tengeri sands, when the sky was overcast. Dark storm-clouds swept up from the north, rain fell, and the air became fresh and pleasant. In such weather the sands were no difficulty. The camels left barkhan after barkhan behind, and at length passed the sacred *obo*, erected, according to tradition, by the Buddhist prelate Bangen-bogdo, who opened this road. In memory of the great pilgrim and his opening up of the road, the appropriate name of Tengeri, *i.e.* Celestial, was given to this sandy waste. Beyond the sands the road soon passes through hills of argillaceous stone, and then comes to a mountain ridge, a northern

offshoot of the eastern Nan-shan, crossing the scarcely perceptible remains of the Great Wall at the small decayed town, Sa-yan-tsin, the residence of the Chinese custom-officer. There, for the first time after leaving Dyn-iuan-in, we found good water. A dense agricultural population extends thence right up to the little town Shara-khoto, near the pass of the same name, where the basin of the Koko-nor begins—a country well suited for nomadic life.

Every day we advanced along the eastern Nan-shan the air became more transparent, the sky bluer, the vegetation more luxuriant and greener. Behind us, to the north, clouds of dust rising above the plain reminded us of the desert. From the Chagryn steppe, from the town



DYN-IUAN-IN (NORTH-WEST ANGLE OF FORTRESS): CARAVAN ON THE MARCH.

Sun-shangen,* we could already admire mighty mountain chains, especially to the south-west, where the impetuous mountain stream, the Tetung, hides itself, which was visited more than once by my never-to-be-forgotten instructor, N. M. Prjevalsky. More to the east, along our road, beyond the town Pin-fan, rocky chains sloped down, dividing into secondary ridges, which were covered from top to bottom by the tilled fields of Chinese. Not long ago, comparatively, the land there was waste, a memento of the terrible Dungan insurrection; to-day it is almost all occupied; there is absolutely no free, uncultivated spot that is suitable for tillage.

* In this town we stayed in a small Buddhist monastery, presided over by the amiable *gegen* Nian-gokik, who had erected a very fine temple at his own expense. We soon became intimate with this priest, for he and I had many friends in common—senior lamas of Nan-shan monasteries. At parting we exchanged presents, the priest giving me an excellent metal figure of Tsagan-darkhe, the White goddess.

The first stream of importance on our route was the Churmyn-gol, the second the Tetung, and the third and last the Sinin-ho (with the little town Lo-vachen) with its tributaries. Along the valley of the last we turned sharply to the west, and, gradually ascending, passed beyond the region of cultivation. We crossed the Churmyn, which divides into arms, without much difficulty by a ford at the town Pin-fan, where we found good camping-ground close to the wall. On the larger and more impetuous Tetung there is a ferry-boat, unfortunately with a rather high deck, rendering it troublesome to get the animals on board and off again. The river Sinin-ho, along which runs a much-frequented trade route, Lan-chou-fu to Sinin, was spanned by some hunch-backed bridges. The valleys of all these three rivers, like the mountains that confine them, run from north-west to south-east, and bear the same character; their water helps to fill the main drainage artery, the Hoang-ho.

This eastern section of the Nan-shan has a different character to that of the more western districts, where not only the central, but also the lateral, ranges exhibit crystalline outcrops in the form of sharp summits, peaks or great cliffs rising one above the other in picturesque, enchanting grandeur. Here the traveller can, with comparative ease, reach the summits of the passes with a caravan of camels, or in a Chinese cart drawn by horses or mules, for loess predominates everywhere, overlying for the most part Han-hai deposits, Han-hai red sandstones, and limestones or siliceous schists occur only in small quantities. The carriage-road is deeply sunk in the layers of loess, and the surface is cut up by trenches very troublesome to travellers, and in some places impossible to avoid.

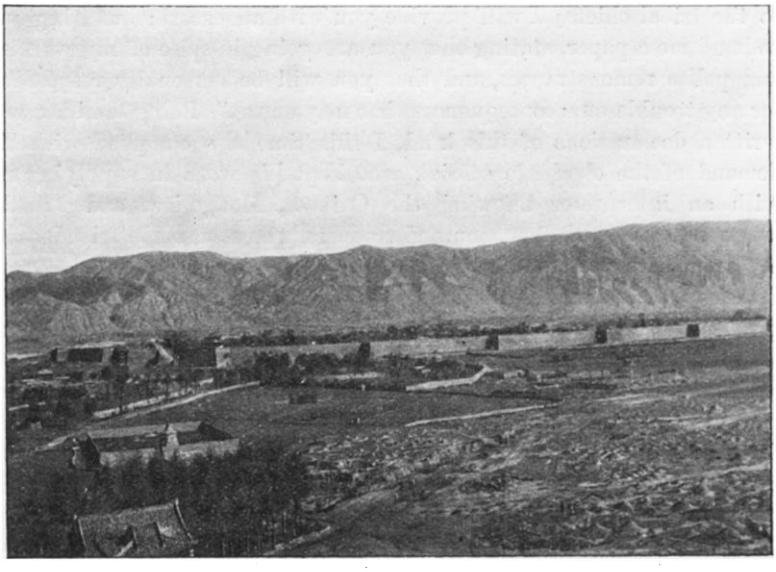
The towns and inhabitated places in general on the route of the main caravan do not differ essentially from other towns of Western China well known from the reports of former travellers. Here, too, the towns are enclosed in walls of stone or clay, and here are collected officials, traders, soldiers, artisans, etc. Here also the Government buildings and the bazaars are full of natives during the day. It may safely be asserted that Chinese towns have from times long past been constructed, and are still constructed, on one plan; having thoroughly examined one or two inhabited places, one can form a correct idea of the others. The only variations are the extent of the town quarters and the strength and solidity of the walls.

At the time of our journey in the Nan-shan, at the end of July, the grain harvest had commenced in the valleys and on the lower and middle belts of the adjacent mountain slopes. The fields were alive with natives, both men and women taking part in the work. Broad straw hats protected them from the scorching rays of the sun. The villages, as with us at home, were deserted by old and young.

Towards the middle of August the expedition came to Sinin, and

pitched its camp on the eastern side in the little hamlet Tsav-dia-tsai. The animals were hard up for pasturage; we had to put them on dry fodder and deprive them of their usual liberty of movement.

Sinin * is a large provincial capital with the residence of the Chinese dignitary who exercises authority, not only over the nomads of Koko-nor, but also over those of extreme north-eastern Tibet. To get all my business in Sinin done as satisfactorily and quickly as possible, I, with two interpreters, moved into the city, where I found lodging with the Chinese trading firm Tsian-tai-mao, known to me during my former Tibetan journey. In the course of the three days I spent in Sinin, I was able to settle all questions definitely. The Chinese officials received



TOWN OF SININ, TAKEN FROM THE TEMPLE, WHICH STANDS ON THE SOUTH-SOUTH-WEST OF THE TOWN.

me very pleasantly, and professed themselves ready to assist me in my projected visit to Koko-nor, though they all with one voice declared, "You know that the times are changed; that many Tanguts and Tibetans are armed with quick-firing rifles; that these savages collect more frequently than formerly into robber bands, attack caravans, and mercilessly pillage them. Pray do not go to Koko-nor. The Tanguts will not leave you in peace, and unpleasantness will arise which will give us all no end of trouble." The Tsin-tsai went still further. In the course of a long conversation, he heard from me that we intended

* Founded, according to Chinese annals, 2225 years ago, consequently in the year 317 B.C.

to navigate Koko-nor, and for this purpose were provided with a folding canvas boat. The Chinese official almost jumped off his chair, and, raising his voice, declared that this was folly, for the water of Koko-nor was peculiar, not only stones, but even wood sinking in it. "Try it yourself, and you will see. Besides," continued the Tsin-tsai, "at the present time there is no one on the island Khaisin-shan;* the pilgrims flock to it only in winter." For my part, I thanked the honourable official for his kind attention, but could not refrain from telling him that I was now more determined than ever to visit Koko-nor, to convince myself of the truth of this singular property of the water of drawing dry wood to the bottom. Thereupon the Tsin-tsai said, "Very well, I will do everything to facilitate your journey to Koko-nor. I will write to the tribal chiefs; I will provide you with an escort; but I beg you to hand me a paper, stating that you are going in spite of my warning and polite remonstrances, and that you will be personally responsible for any troublesome consequences that may ensue." Being familiar with written declarations of this kind, I this time also complied with the demand of the obstinate official, who kept his word in supplying me with an interpreter knowing the Chinese, Mongolian, and Tibetan languages, and with four mounted troopers, who soon made friends with my grenadiers and cossacks.

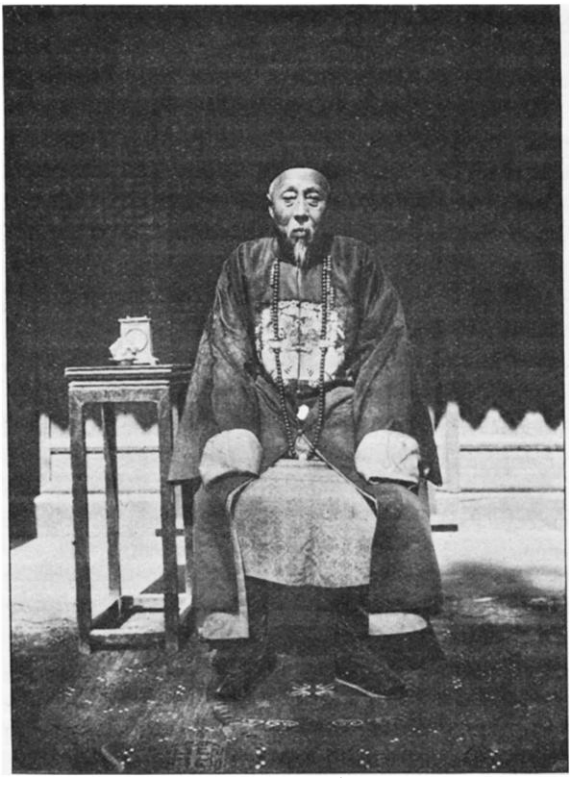
As regards the information given by the Sinin officials about the greater audacity and activity of the Koko-nor and other Tibetan robbers, and of their possessing quick-firing rifles, this we ourselves had opportunities of learning, having noticed large or small parties of Nan-shan Tanguts bearing across their shoulders German, more frequently Japanese, and occasionally Russian, rifles. Seeing the wild energetic nomads sweeping past on their mettlesome horses, we reflected that in no distant future these free sons of the steppes of Koko-nor and Tibet would become formidable to the Chinese Empire. This the Chinese of Sinin recognize, and they recognize their own present helplessness and the absolute necessity of training and arming their troops before long after the European model.

My affairs in Sinin being settled, I sent off the caravan by the direct road to Donger, turning myself, with the Cossack Badmazhanof, southwards, with the object of visiting the great Amdos monastery, a day's journey from Sinin. Gumbum is hidden among high hills of clay and loess, immediately adjoining a very lofty alpine range, the southern foot of which is washed by the rapid waters of the Yellow river. The Gumbum monastery was founded five hundred years ago by Bogdo-gegen, who afterwards made a pilgrimage in Tibet, to Lhasa, where he fixed his permanent residence. The monastery he founded came

* That is, "New mountain of the sea;" so the Chinese name the island Kuisu. The latter word is Mongolian, and signifies "navel."

under the control of the Acha-gegen, supposed to be now in his fifth regeneration.

In the twelve temples are said to reside sixty-three *gegens*, presiding over a confraternity of fully two thousand men. There are four principal temples, which were saved from destruction by the Dungans by the forces of the monastery—young fanatical lamas, who fought splendidly, gun in hand, against the daring foe. The solid ancient temples glitter outwardly with gorgeous gilded roofs, and within are abundantly



THE TSIN-TSAI OF SININ.

decorated with historical images of the best Mongolian, Tibetan, and even Indian workmanship. Especially magnificent and revered is the temple called the Golden Tomb. Before this temple, the worshippers, prostrating themselves and moving their hands and feet from time to time, have worn in the boarded floor of the porch large holes, in which they can easily place the toes and hands when prostrating themselves at full length. The large cathedral temple is also preserved in good condition, and is capable of holding five thousand worshippers. On

entering the porch I caught sight of seven stout whips hung on the wall. These whips, as I was informed by the local inhabitants and the older lamas, only keep up the long-established rule of the monastery for novices. Rich and beautiful also is the temple, standing beside eight white tombs,* according to tradition on the spot where is concealed in the earth the placenta of the child which afterwards became the famous reformer of Buddhism, Tson-khava.

In Gumbum are carefully preserved relics, such as the raiment of a Dalai-lama, Bangen-ergen, Tson-kava; also the carts of the Dalai-lama and Bangen-ergen, the hat of the reformer, and the saddle of a Bogdykhan with the dragon quivering on the bow.

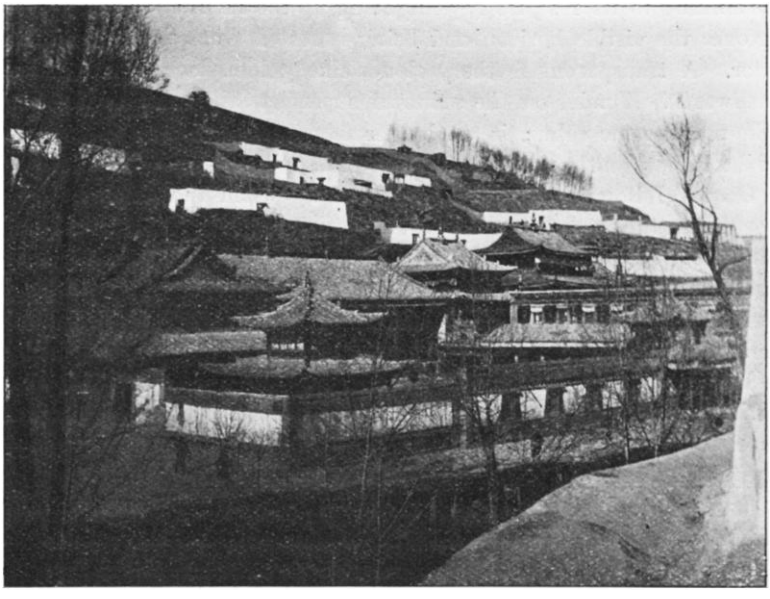
All the time I was in Gumbum, the head of this monastery, the Acha-gegen, was absent on an extended tour to the East—Peking and Japan. According to information obtained from the inhabitants of the neighbourhood, the Acha-gegen sides with the Japanese. The latter call at this monastery from time to time, and on particular occasions, as, for instance, during the presence of the Dalai-lama, stay there for a long time—a year or more—under the pretence of learning the Tibetan language.

I left Gumbum early in the morning of August 18, and in the evening of the same day reached Donger, where an island between the arms of the river on the southern side of the town was whitened by the tents of the expedition. The caravan had arrived only the day before my return from Gumbum. As the governor of the town had received timely notice of our expedition, we received nothing but kindness and attention from him. The members of the expedition could wander freely through the town, enter at will the stores and shops, and felt themselves generally at home. In this market town the streets were crowded with Koko-nor Tanguts. The young ones compelled notice by their bright dress and the singular decoration of their backs, consisting of ribbons in twos or threes richly trimmed with coins, shells, turquoise, etc. Still more animation was lent to the streets by the Tangut horsemen careering along fully armed. The proud and haughty steppe-dwellers fear nothing and no one, but rather, on the contrary, inspire the Chinese inhabitants with fear and humiliation.

Rain again delayed our departure for some days till August 24, when at length we continued our march. On the third day, from the summit of the Shara-khoto pass, we joyfully greeted the soft blue surface

* The tombs of eight *gegens*, put to death here by order of a Chinese prince notorious for his cruelty and severity in the exercise of judicial functions. This prince was despatched to Gumbum by the Bogdykhan to reduce the rebellious Tanguts. The prince charged the eight *gegens* with being the instigators of the revolt, and said to them: "You that are boru again know all things, not only the past and the present, but also the future. Tell me when you will die." "To-morrow," they replied. "No, you are wrong; it will be to-day;" and he ordered their heads to be cut off at once.

of the Koko-nor, stretching away to the west. To the south mountains were crowded together, among which the rocky summit of Ser-chim was conspicuous, silvered over with fresh-fallen snow. This stands near Koko-nor, and farther off, in the same southerly direction, a still grander range lifts itself proudly to the sky, reflecting a dull whiteness from its thick mantle of snow. A solemn calm reigned in the marvellously transparent atmosphere; the sun made its heat perceptible; in the clear blue vault of heaven the feathered denizens of the kingdom of the air hovered here and there—the Himalayan griffon, the black vulture, and the bearded lammergeier; the last seldom approached near enough for



GUMBUM MONASTERY FROM THE SOUTH-EAST.

us to admire his stately flight, particularly grand when, without moving his wings, he soars or glides along the mountain.

The next day, August 27, the expedition reached the shore of the alpine basin, and Koko-nor smiled on us with still greater charm. Before us spread its azure surface slightly agitated by gentle undulations, which from the first day lulled us to sleep with their monotonous murmur. In calm clear weather Koko-nor was simply enchanting. This imposing sheet of water seemed to us all more like a sea than a lake. Its really grand dimensions,* its surface stretching beyond the horizon, the colour and saltness of the water, the depth, the high waves,

* Koko-nor has a circuit of about 230 miles.

and at times the heavy surf, conveyed the idea of a sea rather than a lake. We from the first to the last day of our stay there spoke of it as such. The bathing in Koko-nor was excellent; we bathed several times a day. Floating easily on the water, we could swim to a considerable distance, and then giving ourselves up to the power of the waves, reach the shore again. The transparency of the water was so great that the sandy bottom and the fishes swimming over it could be plainly seen at a great depth.

But if Koko-nor was beautiful by day, at eve, especially in fine weather, it was truly bewitching, as it was on the day of the arrival of the expedition on its bank. The sun, having finished its daily journey, was sinking to its rest, its rays lighting up the mountains and spreading over the visible horizon and being reflected from the bosom of the water. A transparent feathery cloud, like golden lace, moved slowly southwards. Yonder on the mountains perfect stillness prevailed, and Koko-nor became calm; it no longer blustered and beat heavily on the bank, but gently whispered to it.

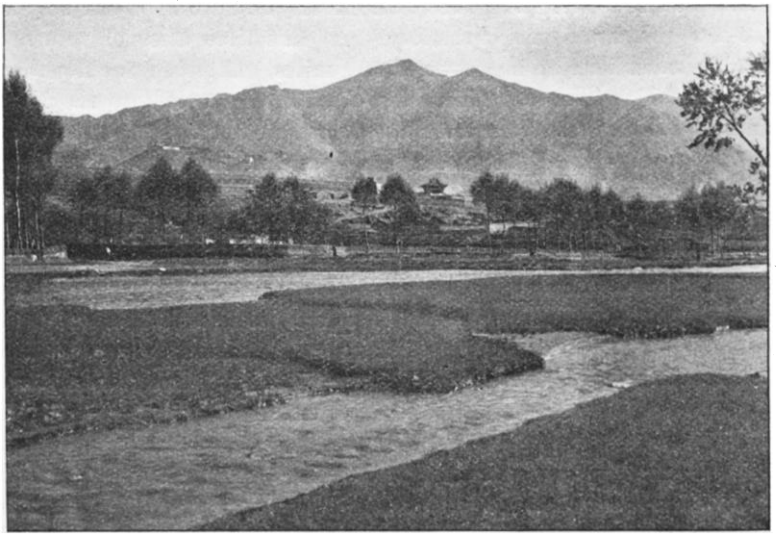
On the following day our camp woke up when the dawn had just appeared in the east. Ser-chim still slept veiled in cumulo-stratus clouds that reached down to the shore. From the lake geese cackled, snipe screamed and whistled in various tones, and the white-tailed fish-eagle uttered its call; in the meadows the lark awoke and began to rise aloft, singing as it went. The caravan was in motion along a soft beaten track. The rays of the orb of day played on Ser-chim; the clouds, wanderers of the sky, rose upwards and melted away. After an hour the first sharp gust of wind rushed upon us, quickly followed by a second and third. Koko-nor knit its brows.

We followed the southern shore, meeting occasionally Tangut caravans of yaks. The nomads were moving from one side of the valley to the other, from the western to the eastern, where lay rich pastures still untouched. Finally, the island Kuisu, the centre of attraction to us, showed itself. From the meadowland sloping to the shore, where our caravan was now travelling, we could see a still greater expanse of blue and azure water than before. Kuisu, like a gigantic war-ship, rose from the dark-blue waves and allured us by its mysteriousness.

It may be remarked that Koko-nor is drying up year by year, its level is sinking, and the line of its banks is shrinking. Native observers, especially former inhabitants of the district—Mongols—assert that Kuisu is increasing in size; that long ago, as the old men say, this island was scarcely noticeable, whereas now it appears quite as a mound.

On August 29 the expedition pitched its camp at Urto, the nearest point to Kuisu on the southern shore, where it remained about three weeks, enjoying the full and unrestrained life of the nomads 3 miles

away from us. To the north, half a mile distant, lay Koko-nor; to the south, 4 miles off, stretched the mountains, the western prolongation of Ser-chim. From the mountains flowed a stream, traversing a valley slightly sloping to the lake and entering a secondary or partially enclosed basin along the shore, $1\frac{1}{4}$ mile in circumference. On a third raised beach by the same stream, continuous with the mainland plain, we had our camp, whence we enjoyed an extensive view on all sides. The swift clear brook enlivened our bivouac, winding round it on three sides. About the brook, and still more on the neighbouring lake, geese, ducks, and widgeons were constantly flying. On the sandy shore



THE TOWN OF DONGER FROM THE SOUTH-WEST.

of the lake itself sat cormorants and gulls in small and large flocks and solitary fish-eagles.

On arriving at Koko-nor we took out our folding boat, and, having put it carefully together, commenced making trial trips to a distance of 2 miles and more from the shore.* We boated in all kinds of weather, when Koko-nor was stormy and calm. On the whole, the result of these trials was satisfactory. The boat swam on the water like a cork, obeyed the helm, and was fairly easily steered in any direction. It had, however, its bad qualities. On the first day the rudder and the fastenings began to get loose, the fastenings parted,

* The depth of Koko-nor is almost a fathom at the shore, and it gradually increases with the distance: at two-thirds of a mile it sinks to 50 feet, and at 3 or 4 miles to 65 to 80 feet.

and, the sides of the boat opening, high waves fell constantly into it. Thorough repairs were necessary before we could have sufficient confidence in our craft to attempt the sail to Kuisu. A wooden strip laid along the sides strengthened the whole boat and kept the fastenings firmly in place.

Having tested the boat, we had to think of provisions, adjust sounding and other instruments, and decide who were to take part in the navigation. As a starting-point, a place was chosen about 4 miles to the west of our camp and 2½ miles from the *obo* on the bank, which serves as a landmark for the pilgrims who cross to Kuisu in winter on the ice.

Amidst these interesting occupations the first week of our stay at Koko-nor glided past imperceptibly. At this time Chernof returned from his excursion, having covered 560 miles. Crossing the Ala-shan desert from Dyn-iuan-in to Lian-chou-fu, he penetrated into the Nan-shan in the direction of the town Datunga, a region hitherto unvisited, and discovered some glaciers occupying ravines on the northern slope of the highest chain. Then he descended to the valley of the Donger-ho, and travelled by the caravan road to rejoin the expedition. The first days after his return he was engaged in setting in order his observations and collections. We, as before, were occupied with Koko-nor, daily observing the condition of the water, which was not the same at all times and parts. Thus, for instance, the south-eastern bay, calm and quiet, reflected the lovely azure shades of the sky when the northern part of the lake was agitated with waves of astonishing height, while dark high rollers tipped with foam swept up from the north-west. Koko-nor quickly changes from calm to rough, but takes a long time to settle down after a violent storm. Calm or agitated, Koko-nor is always exceedingly beautiful. I sat for hours on its shore, or walked at a distance up and down from our encampment, never tired of gazing at the boundless expanse of water, nor wearied of the monotonous splash of its breakers, which reminded me of the southern shore of the Crimea.

I decided to take the first turn in the voyage to Kuisu. All was ready, and in the evening of September 9, I and the orderly Poliutof moved to the landing-place. Koko-nor was peaceful; the sun set in a clear transparent sky; the barometer was high. Scarcely had the red of sunset vanished from the west when the moon rose from the east, illuminating all the visible surface of the lake. I was vexed that I had not made ready to sail for Kuisu a day sooner, that I might have taken advantage of the good weather. What would the morrow be?

Having had enough of wandering on the shore and enjoying the beauties of Nature, I turned to the tent to sleep. The sea also slumbered, and not a sound disturbed the absolute stillness; but at two o'clock in the morning I was roused by heavy waves beating violently against the shore. At dawn, when we had intended to start, the storm was

still more furious. At midday it began to abate, and we made several attempts to get away from the bank, but the tenth or twelfth wave forced us back again.

Returning to the camp, I proposed to my comrades Chernof and Chetyrkin, that they should go to the starting-point and patiently wait for smoother water. They were more fortunate than I. Going to the starting-place on September 11, they put off from the shore the next day at one o'clock, with the intention of proceeding perhaps halfway, if the lake did not settle down. However, as they advanced the weather improved; the wind dropped, and the waves became lower. Rejoicing in this circumstance, my companions put forth greater strength, with

SOUTHERN FLANK OF THE ALPINE CREST LYING BETWEEN SININ AND HUI-DUI: CHINESE TEMPLE NEAR VILLAGE OF CHAN-HU.

more hope of accomplishing their purpose. Five hours of heavy toil at the oars passed, and half the distance between the shore and the island lay behind, though the island still appeared of no great size. Another tedious hour passed, and the island seemed as far off as ever. The desire to reach Kuisu at all costs inspired them with fresh energy. Meanwhile twilight spread over the water quite unnoticed, and the wind rose, bringing with it a heavy swell. Every minute it became darker and darker, and the island vanished from sight. The high waves threw jets of cold water into the boat. The travellers had only their own strength to depend on, but their reserve of strength was being gradually exhausted. Working at the oars, they encouraged one

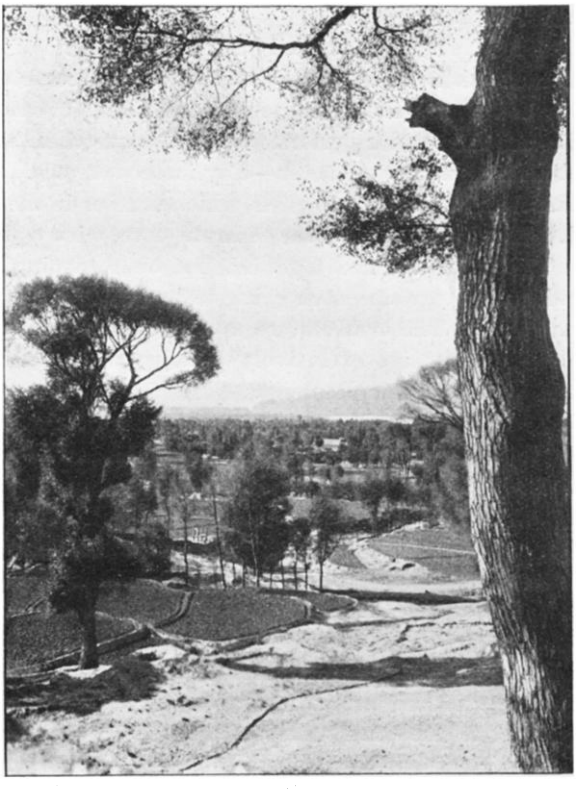
another with the idea that the island was near. Four trying hours passed, and suddenly, like a dark monster, Kuisu rose before them. Our travellers fortunately chanced on a smooth beach, where the boat could be put in; rocks stood to right and left. One can imagine with what delight my comrades landed at Kuisu. At the same time the clouds became thinner, the moon showed itself, and Kuisu stood revealed in all its beauty. Weariness, hunger, and cold (from wet clothes) were for the time forgotten.

My companions were on the water seven and a quarter hours altogether, never leaving the oars, during which they rowed 18 miles. The boat, being a third full of water, was too heavy for the travellers to drag ashore till the ordinary lading was taken out. Then they drew it on to the beach, and, turning it over, made a shelter for themselves. Having refreshed themselves with brandy, eggs, and tea, they tried to sleep, but their wet clothes made them too uncomfortable. They felt great chilliness, a premonition of fever, so they set off to wander over the island in the direction of the *obo* and shrine, the situation of which was very well known to them from numerous observations from the shore with a field-glass or in astronomical work. On the way to the *obo* they fell in with a horse, which, neighing with alarm, quickly cantered away. This discovery was a welcome indication of the presence of people on the island. After seeing the *obo* and temple, they returned to the boat, but soon started off again, this time in the opposite direction, along the bank, where they came across a human habitation—a cave, surrounded by an enclosure, from which a flock of goats and sheep gazed with curiosity at the travellers. Fearing lest they should frighten some one, the two companions went on, and soon found a small empty cave, with a store of fuel (dung). There they made a fire, warmed and dried themselves, and at two o'clock in the morning fell asleep.

On leaving the cave in the morning, September 13, Chernof and Chetyrkin saw a thin whiff of smoke rising from a cave-dwelling about one hundred and fifty paces off. They went to the boat, and having got the kodak and presents which had been brought in case they were wanted, they set off to visit the unseen hermit. On approaching the cave, they heard the voice of the monk offering up his morning prayer, "Ommani padme-hum," *i.e.* O Treasure of the Lotus.* To give notice of their presence, Chetyrkin coughed loudly, when the invisible anchorite began to pray more fervently with raised voice, trembled, and began to break down. When the travellers entered the cave he was terrified, made a long face, shook, opened wide his eyes, and putting his fingers to his throat, repeated volubly, "Ter-zanda? ter-zanda?" *i.e.* What is to be done? what is to be done? The travellers tried as much as possible

* The lotus, according to Indian mythology, is the throne of the Creator, and is also a symbol of the world.

to pacify the anchorite; but he was a long time in recovering, and probably would not have come to his senses if the boat had not been pointed out to him, at sight of which he smiled, brightened up, and concluded that he had to do with ordinary men, and not such beings as his imagination had conjured up. The meeting with the other two anchorites dwelling on the island, Tangut lamas * like the first, passed off quietly, as they were already informed of the presence of Russians on Kuisu, and their companion was present.



OASIS OF HUI-DUI, TAKEN FROM THE TEMPLE VIN-TSY-MIAO, LOOKING NORTH-WEST: THE HOANG-HO IN THE BACKGROUND.

My colleagues spent four days on the island, exploring it and making acquaintance with the life of the monks. Kuisu lies almost in the centre of Koko-nor, a little nearer the southern shore, and stretches from west-north-west to east-south-east. It is composed of granite and gneiss containing biotite, exposed along the coast and the higher parts

* One of the lamas came from Labran, another from Gumbum; of the third we have no information.

of the island, but in other places covered with soil of sand and clay, which supports herbaceous vegetation. The relative height of the crest of Kuisu is 200 feet; the shore-line scarcely exceeds $3\frac{1}{4}$ miles, the length of its axis is about $1\frac{1}{4}$ mile, and its maximum breadth, about the middle, is a third of a mile. The island is especially rocky along the southern and western shores; elsewhere it descends to the lake in long gentle slopes. The vegetation is identical with that of the land along the southern shore of the lake. There are no springs or streams; the anchorites and their cattle satisfy their needs with rain-water collected in hollows made for the purpose.

Besides the temple and *obo*, erected on the highest part of the island, Kuisu is adorned with tombs, cave oratories, minor *obos*, etc. In the temple and caves are some interesting old idols. The chief occupations of the anchorites are the regular performance of religious rites, copying out prayers, and making numerous *tsatsa*—clay images of gods. They also attend to their flocks of sheep and goats, which number in the aggregate ninety head. Each monk lives in a separate cave, with a fold for his own flock. The animals graze together, but on returning from the pasture part into three groups, each going to its own home. The horse is common property. The monks store up abundant supplies of curds, butter, and fuel. They live exclusively on dairy products, with which they kindly regaled my comrades daily.

Eight foxes live on the island in the company of the monks and their flocks; there are probably also alpine hares and other smaller rodents. As for birds, the chief species were swimmers and waders—geese, ducks, widgeons, cormorants, and gulls, usually sitting on the rocky coasts or on the sandflats. There were always fish * near the shore basking in the sun. When the cormorants came down to the water these shoals made off, and the birds pursued them for a long distance. There, too, fish-eagles fished, perched here and there on the cliffs; a solitary specimen of the black-eared kite (*Milvus melanotis*), probably a passing visitor, was noticed circling above the caves or flying from one end of the island to the other. Repeated inquiries from the natives about the existence of fur-bearing animals in Koko-nor, as well as personal observations, led to no positive results beyond the information obtained from the Tao-tai (Governor) of Sinin that he had seen skins of animals caught in the Koko-nor waters answering to the description first given by V. A. Obruchef.

In winter there is a change in the monotonous existence of the anchorites, for then the pilgrims cross to the island on the ice. However, the ice cannot be traversed every year, being not compact enough, and intersected by numerous cracks. From the summit of Kuisu a fine

* It is interesting to notice that there are no large fish in Koko-nor; the finest specimens were not more than 28 inches in length, or five or six pounds in weight.

view is obtained on all sides. A small rocky islet towards the south-west looked very pretty, and a cape or peninsula on the west stood out clearly. My comrades could not see the northern shore at all, whereas the southern shore was quite distinct.

On September 17, after hourly barometrical and other meteorological observations, my colleagues left Kuisu and its hospitable anchorites, who invited their "first summer guests" and "first foreign visitors" to wait till winter and return to the shore over the ice more safely than in "that cockleshell," they said, pointing at the boat and shaking their heads.

On the return voyage four soundings were taken. The first, close to Kuisu, showed the maximum depth of the southern part of the basin,* namely, 120 feet; the second and third, about halfway across, showed the same depth of 115 feet; and the last, 3 or 4 miles from the shore of Koko-nor, agreed with the soundings taken while the boat was being tested, marking 80 feet, or a little more. The surface temperature of the water was 58° Fahr. The bottom, over a belt extending from 3 to 5 miles from the shore, was sandy, and further out muddy.

While Chernof and Chetyrkin were rowing to Kuisu, I made an excursion of 60 miles in the southern Koko-nor mountains. On my return to camp, Ivanoff† joyfully greeted me with the news, "Yesterday (September 13) a rocket went up from Kuisu." This informed me that our "cockleshell" (9 feet long, 2 to 3 broad, and weighing 72 lbs.) had reached the island with its crew. My comrades and I had arranged that from the time they left the shore a watch should be kept at the head camp, at nine o'clock in the evening, for the appearance of two rockets. The first rocket was to be fired on the day of their landing at Kuisu or the following day (as, indeed, happened); the second on the eve of their departure from the island. "The rocket flashed like a small snake of fire," repeated my constant attendant Ivanof. "Thank God!" I said; "now we must watch for our friends' second signal." On September 14, 15, and 16 I stood at the astronomical pillar, surrounded by my fellow-travellers, the Sinin Chinamen and the Mongol drivers of Ala-shan. On the last evening, punctually at nine o'clock, a streak of light flashed for a moment across the darkness of the night. Immediately the silence was broken by joyous voices, and the Chinamen and Mongols, who had not seen the first rocket, were especially noisy. Next day, about nine o'clock in the evening, when Koko-nor was beginning to lash the shore, and our hopes were getting faint, I heard the voice of my comrades as they neared the tent. Our delight was

* That is, supposing Kuisu to lie on the line separating the northern and southern parts of the basin.

† Sergeant-major of the escort of the expedition, who has shared with me many hardships and privations since the fourth and last journey of my regretted master, N. M. Prjevalsky.

unbounded. Questions and cross-questions followed, narrative and repetition, which formed the base of the description given above of the voyage to Kuisu.

On the return of my colleagues, the camp was moved 13 miles to the east, to the base of a peninsula or cape called Chon-shakalur (great penfold), which ends in a sandbank jutting out into the lake. From this sandspit Chetyrkin and the orderly Poliutof made two boat excursions, one $4\frac{1}{2}$ miles to the north, and the other south-eastwards, returning by the shore, a distance of 10 miles. The former was in the open water of the lake, the latter in the south-eastern bay partly shut off by the promontory.* On the second excursion, about midway, an accident happened. The iron cross-ties of the boat broke, in consequence of which the edges parted, the fastenings came undone, and the boat suddenly rolled to one side. Struggling with a considerable swell, the boatmen could scarcely manage the boat, and hastened to run ashore.

With this our work at Koko-nor came to an end. I considered the second task of the expedition to be accomplished as far as lay in our power, and made preparations for our return to Sinin, which we reached by the former route on September 28. In Sinin we had the pleasure of meeting our companion N. Y. Napalkof, who had safely returned from an excursion in the eastern part of the Kan-su province. The route of Captain Napalkof's detachment included Dyn-iuan, Tsin-an, and Sinin, forming a triangle the sides of which were connected with places explored by our predecessors. My colleague visited a corner of Kan-su hitherto quite unknown, and put down for the first time on the map the names of nine new towns.

This time the Sinin authorities assigned to the expedition an excellent house specially reserved for distinguished visitors, standing in the centre

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* Two soundings between the camp and the sandspit ($1\frac{1}{4}$ mile) gave a depth of 36 feet; bottom muddy.

September 21, soundings to the north. Temperature at 11.45 a.m., of the air, 44°·6 Fahr.; of the water, 49°·1 :—

Depth at	1 verst (two-thirds of a mile)	from the spit,	$23\frac{1}{2}$	feet;	bottom sand.
„	2 versts	„	$47\frac{1}{2}$	„	sand and mud.
„	3 „	„	$57\frac{1}{2}$	„	mud.
„	4 „	„	$56\frac{1}{2}$	„	mud and weeds.
„	5 „	„	67	„	mud.
„	6 „	„	$82\frac{1}{2}$	„	„
„	7 „	„	85	„	„

September 22, soundings to the south-east of the spit. Temperature at 9.30 a.m., of the air, 43°·7; of the water, 45°·5 :—

Depth at	2 versts	from the spit,	74	feet;	bottom mud.
„	4 „	„	89	„	„
„	6 „	„	$95\frac{1}{2}$	„	„
„	8 „	„	$96\frac{1}{2}$	„	„
„	10 „	„	90	„	„
„	12 „	„	80	„	„

of the town. They met us, as we say, with outstretched arms. They were already informed by the interpreter and troopers, who reached Sinin the day before us, of all that we had done at Koko-nor, and how well the Koko-nor natives behaved to us; and, more than all, that we were all safe and sound, and none of us lost. The Tsin-tsai and other Sinin officials, when they saw us, could talk of nothing else but our navigation of Koko-nor and visit to the island, and all examined our boat with great interest, both when put together and taken to pieces, and also my colleagues, whose hands still bore thick callosities. At last the Tsin-tsai remarked, "You Russians have navigated Koko-nor for the first time, are the first to give me information about its depth, and are the first foreigners who have visited Kuisu or Khaisin-shan. I shall certainly report all this to Pekin." Not to endanger our excellent relations and weaken the good impression produced by every interview with the Sinin authorities, I thought it better not to refer to the former conviction of the Tsin-tsai, that not only stones, but also wood, sank in Koko-nor. The truth was self-evident.

In Sinin the members of the expedition had the pleasure of making acquaintance with the English family of H. French Ridley, who had lived there as a missionary for more than fifteen years. In the company of these amiable people we passed many pleasant leisure hours, reminded of the culture of Europe. French Ridley was also interested in our navigation of Koko-nor, and whenever an opportunity occurred led the conversation to this subject. Being an old inhabitant of Sinin, the friendly missionary gave me much valuable information about the district, and effectively assisted in the enlargement of our ethnographical collection by obtaining articles from the inhabitants of the place.

In Sinin, too, thanks to the general improvement of postal management in China, we received our letters fairly regularly, and could also dispatch our correspondence to our distant home. One always receives pleasant news and another unpleasant. So it was now. Chernof heard sad news from home, and was compelled to make an early start for Russia. On his way across Ala-shan, Central and Northern Mongolia, he would make geological and geographical investigations.

Taking advantage of Chernof's departure, I sent off to the *depôt* of the expedition at Alasha-yamyn seven baggage animals, chiefly laden with collections. For our further journey we exchanged camels for mules, which have a particular facility for travelling in mountains, but, on the other hand, require careful attention and plenty of grain fodder. A good mule carries, without much difficulty, a load of 220 to 250 lbs. equally balanced on both sides of the animal. As we did not try to curtail our baggage, the number of animals remained the same, namely, twenty-three, which, with eleven riding-mules, formed the caravan, and extended along a considerable stretch of road. The expedition left Sinin in two sections, starting at different times. The camel caravan,

under Chernof, left on October 9. The main caravan set out on October 12, and arrived on the 15th at the oasis Hui-dui, having crossed on the way a lofty alpine chain by the pass La-chi-lin, more than 13,000 feet above sea-level. This journey was enlivened by the passing of natives, travelling in one direction or the other. At this time, besides trading caravans and caravans laden with pears from Hui-dui to be sold at Sinin, the whole road was full of smart Tanguts repairing in motley companies to the monastery of Gumbum for a festival.

The oasis Hui-dui, which the expedition is to leave one day in the early part of January of the present year, is spread out over a wide part of the valley, on the right bank of the Hoang-ho. Two tributaries, which supply the agriculturists of Hui-dui with water and are fed by the southern mountains, divide the oasis into three parts—a western, central, and eastern. In the middle part, near the main river, is situated the town; on the southern border, the Chinese temple Viu-tsy-miao. On the borders of the other parts stand Buddhist monasteries, of which the most noteworthy is the monastery Gomba-sy, hidden among the woods of the south-eastern outskirts of Hui-dui. The native population of Hui-dui, numbering about 7000 to 8000 souls, consists of Chinese collected in groups in the interior of the oasis; Tanguts, only a fifth or sixth as numerous as the principal inhabitants, dwell on the outskirts near the mountains. Both peoples live on friendly terms, and often intermarry.

In autumn and winter the oasis is bare, and is of a dirty, dark, dull colour. It is very different in spring and summer, when a rich vegetation displays itself, and Hui-dui presents a harmonious emerald carpet, strikingly contrasting with the general yellow monotony of loess landscapes.

In conclusion, I wish to say a few words on the results obtained by the expedition during the second (Koko-nor) period. The chief caravan and two detachments traversed and surveyed 1600 miles of country, connecting its observations with three new astronomically fixed points, besides old ones. On all journeys meteorological readings were systematically taken, prominent points were determined hypsometrically, and collections were made—geological, zoological, and botanical, the last, however, only with the main caravan. These collections, the zoological in all its sections, constitute a full record of forms. In the ethnographical collection objects of the Buddhist cult are conspicuous, such as idols of metal or painted, *gau* or amulets, articles indispensable in the performance of religious rites, Tibetan books. This collection owes much to the valuable information and advice kindly given me at starting by our graduate S. O. Oldenburg. The expedition has also acquired a fair number of specimens of Chinese painting and photographic plates of views and types of the country passed through.

moving deserts of sand, and strange stone-figures rising from the black and glistening lava-flows, could not fail to be invested with many curious stories, and be, to the Maori, places which should be approached with the utmost caution or altogether shunned."

DR. LONGSTAFF'S HIMALAYAN EXPEDITION.

THE *Times of India* of September 2 contains a long and detailed account of the first portion of Dr. Longstaff's latest expedition by Dr. Arthur Neve, one of the members of the expedition. Dr. Neve points out that up to this year no expedition had crossed the main axis of elevation of the Mustagh and Karakoram range between the Mustagh pass on the west and the bridle path over the Karakoram range on the east, a distance of 90 miles, within which not a single pass was known. Sir Francis Younghusband, while exploring the upper valley of the Yarkand river, had discovered the western Aghil range, between which and the Mustagh lay the Oprang valley, with its great glaciers from the northern slopes of Gasherbrum and K_2; but though he had penetrated to the head of the valley, and found a saddle-shaped depression, he had been obliged to turn back without elucidating the problem of the passes leading into Kashmir. On Dr. Longstaff's arrival at Srinagar this year Sir Francis Younghusband placed at his disposal the detailed notes of the survey of the Oprang valley. An examination of these, Dr. Neve says, showed that the cartographers had taken considerable liberties with the observations in order to fit them in with the preconceived ideas of the Survey department. An interesting clue for the fixing of the peaks sighted by Sir Francis Younghusband was furnished by the Duke of the Abruzzi, who in conversation with Sir Francis pointed out the extraordinary similarity in outline between a sketch of Gasherbrum drawn by A. D. McCormick from the south and the sketch of a peak drawn by Sir Francis Younghusband from the north. On the assumption that this suggested identification is correct, the saddle and pass seen by Sir Francis Younghusband lie to the north-west of the position hitherto assigned to them, and there is—or was before Dr. Longstaff's expedition—left on the map a blank space representing a considerable area north of lat. 35° 30′ N., in the neighbourhood of long. 77° E.

The expedition left Srinagar at the end of May. It included, besides Dr. Longstaff and Dr. Neve, Lieut. A. M. Slingsby of the Frontier Force. Khapalu was reached by way of the Zogi and Gantse passes, though locally the latter pass was not supposed to be open until much later in the season. From Khapalu the expedition crossed the Shayok river into the Hushe valley, whence a low pass led into the Saltoro valley. The scenery shows upon the grandest scale, says Dr. Neve, the typical conditions of Baltistan. The river-bed is wide and sandy, shut in by cliffs, and at the opening of each side ravine there is a fan-shaped talus richly cultivated and terraced, well irrigated, and bearing crops of wheat and barley almost hidden by dense masses of apricot trees, with here and there walnuts or poplars. The huts are of stone, clustered thickly on any stony knoll or old moraine. Some of the huts have a light upper story of lath and plaster for summer use. Towering about the huts rise gigantic walls of granite to peaks 21,000 feet high, presenting the steepest and smoothest precipice-faces Dr. Neve has ever seen.

The final arrangements for the exploration of the Saltoro or Bilaphond glacier were made at Guma, in the upper Saltoro valley. Starting up the Bilaphond valley, the explorers soon came in sight of the great main glacier, and established a base camp in a lovely grassy glade, among willow trees and rose bushes, with some

big rocks and caves in which the porters found ample accommodation. The Balti porters knew the place well, as it is a favourite grazing-ground, and they informed the explorers that during the last twenty years or so the glacier had advanced about a quarter of a mile. During a reconnoitring expedition on the following day a view was obtained of a lofty snow-peak, almost due east, which was identified as K_{12}; but there was considerable doubt about the identification of this and all other peaks, as the explorers had reached a point where the maps were quite unreliable. Ascending the glacier, the expedition encamped at a height of about 17,000 feet, near to some ancient stone-shelters, of which even the Baltis were without knowledge. The shelters were roofless, and in their best days could not have been more than about 4 feet high, but they indicated that the pass was known and used in former days. Early next morning the explorers continued up the easy snow-slopes which led due north to a wide saddle some 1500 feet above the camp. They reached the top in three hours, and there they found themselves on a snow-plateau of great extent, sloping up west to the outlying peaks of K_{10}, and east up a shallow valley to the snow-ridge going north from K_{12}. In front, perhaps 15 miles to the north, was a lofty, dazzling snowy range, evidently the Aghils. Progress across the plateau was delayed by the soft condition of the snow, and Dr. Neve says that great credit is due to the porters, who neither grumbled nor despaired. After a night on the snow-field, the journey was continued to the very large glacier in front. Dr. Neve says that he has seen the Hispar glacier and the Chogo Lungma, but none which has made on him such an impression of size as the one that then lay before them. According to the Baltis, the country to the north is called Terim, and that name was therefore given to the glacier. It appeared to originate near Gasherbrum peak, which could be seen some 25 miles to the north-west; and in the same direction, only a little more to the right, was a depression which appeared to correspond with the saddle seen by Sir Francis Younghusband; over it a pass could probably be made to the Oprang valley.

Dr. Neve reports that the Terim valley is evidently tectonic, with granite to the south and limestone and slate to the north. Its upper part averages 4 miles in width between the spurs. In its size and stratigraphical relations it is analogous to the valley of the Baltoro glacier on the Indian side of the watershed. Lessening supplies and the fear that the pass would become blocked with snow obliged the explorers to retrace their steps without following the glacier to its termination, and when, after the return to the expedition's base, Dr. Longstaff came to work out his map, it was realized that further exploration would be necessary to settle the question of the connections of the Terim glacier. Does the Terim, asks Dr. Neve, belong to Chinese Turkestan or to British India? When on the glacier, the explorers had assumed that it must flow to join the Yarkand river, of which it would undoubtedly be the longest and largest tributary. But when the map was worked out, the question arose whether the glacier might not turn south and flow down to the upper Nubra.

It was to find the answer to this question that Dr. Longstaff afterwards proceeded to Nubra. A telegram has been received from Dr. Longstaff from Leh, stating that he has connected the Terim* with the Saichar glacier, at the head of the Nubra valley, making it 50 miles long. It would seem, therefore, that the Terim lies on the Indian side of the watershed.

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* In view of Dr. Neve's article, it is obvious that Dr. Longstaff's telegram has no reference to the Tarim, or lower Yarkand, river of Chinese Turkestan.

a brief account of the lives and works of those two historians. The translation has evidently been made with great care, and, supplemented as it is by abundant and valuable notes, it cannot fail to be of much service to English readers desirous of studying these standard authorities for the connection of the Portuguese with Ceylon.

The Himalayas.

'A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet.' By Colonel S. G. Burrard, R.E., F.R.S., and H. H. Hayden, B.E., F G.S. Part IV. 'The Geology of the Himalaya.' *Price Rs.*2.

This paper forms the fourth and concluding part of the work on the geography and geology of the Himalayan area, of which the first three parts were noticed in the *Journal* for October, 1908. The geology of the region has been dealt with by Mr. H. H. Hayden, of the Geological Survey of India. Mr. Hayden is particularly qualified to write on this subject. He possesses unrivalled knowledge of the area under discussion, and is, perhaps, the most experienced trans-frontier geologist living. Not only has he worked extensively in Kashmir, Spiti, Ladakh, and the high regions north of Kashmir, and in Western Tibet, but he accompanied, in the capacity of geologist, the Tirah expedition of 1897–98, and the Tibet Mission in 1903–04. Added to this, he spent some two years attached to the Court of Kabul, where he had opportunities for travelling in Afghanistan which have been accorded to few others. With all this accumulated experience, no better officer could have been selected for the difficult task of writing a summary of all that is known of the geology of the Himalaya. The value of his work is further enhanced by the clear and lucid style in which he writes; indeed, this feature is characteristic of the whole series of papers.

The author divides the Himalayan system, for geological treatment, into three zones. The sub-Himalayan Zone, on the south side (embracing the comparatively low foothills), which occupies a belt extending throughout the whole length of the Himalaya. It is composed, for the most part, of rocks belonging to the Tertiary age. Inside this, and more or less parallel to it, lies the Himalayan Zone, comprising the Lesser Himalaya and the high central peaks "composed of granite and other crystalline rocks, and a great group of unfossiliferous sediments of unknown age." Lastly, the Tibetan Zone, lying north of the line of the high peaks, constituting "a series of highly fossiliferous sediments ranging in age from the Cambrian to the Tertiary periods." This system of division forms a basis on which to build the details of the geological structure, into which it would be impossible to enter here.

There is always a certain fascination connected with speculation as to the past, just as there is when we attempt to dip "into the future far as human eye can see." In this work Mr. Hayden endeavours, from geological evidence, to reconstruct the ancient topography of the Indian area, and to indicate the relative distribution of land and sea at the various stages of past history. On p. 257 we find an admirable summary of the conditions which prevailed during the various periods. In the Purana era—the earliest that can be traced from geological records, and of pre-Cambrian age—the Indian Peninsula and the Himalayan area were sunk beneath a great sea, which may have extended to China. At the close of this era there is evidence of volcanic activity, and a glacial epoch. In the Dravidian era occurred the "emergence, and conversion into dry land, of Peninsular India and the southern part of the Himalayan area." In the last, or Aryan era, there was an extension of continental conditions in the Himalayan area. What are now the northern slopes of the Himalaya became the southern shores of the Tethys sea,

which covered much of Central Asia. In the Tertiary epoch of this era began the period of mountain-building, the "final emergence of the Himalaya and Tibet, and the disappearance of the Tethys." The author, in a most interesting sketch, traces these various stages in some detail.

A section is devoted to the age of the Himalaya. That this mountain system, like the Alps, is geologically young is now accepted. It is not older than the Tertiary epoch. The fact that many of the rivers are re-excavating their channels tends to show that the process of elevation is still in progress; and the frequent occurrence of earthquakes indicate that a state of stability has been by no means reached. The origin of the deep-cut river gorges of the Himalaya has given rise to some speculation. We do not know whether it has been pointed out before, but there seems to be a curious resemblance, on a small scale, between the behaviour of the Rhine and the Rhône, and of the Indus and Brahmaputra, at least in their upper reaches. In both cases the pair of rivers rise near each other, and behind a great mountain range flow in opposite directions for some distance along what appear to be original tectonic valleys; then they turn at right angles and cut through the main axis of elevation. We wonder if a close study of the two European rivers, a comparatively easy matter, would help to elucidate problems connected with their two great Indian counterparts?

The last section of the paper is devoted to the economic geology of the Himalaya. Though the list of minerals which occur in the area is large, their economic value is small, and only three industries can be said to be established on a commercial basis; these are salt and slate quarries in Kangra district, and the sapphire mines of Kashmir.

A set of admirably reproduced maps and sections accompany the paper. Scenery is so intimately connected with geological structure that there might have been included, with advantage, typical views combined, where possible, with geological sections, such as have recently been employed by Dr. Carl Schmidt, of Basle, to illustrate his writings on Swiss geology. For the general reader these add considerably to the interest and attraction of works of this nature.

We suggest, for a future edition, that the plates might be bound with blank spaces the size of a page, so that they could be completely unfolded beside the volume, thus greatly facilitating reference to them.

There is one point the geological map of the Himalaya brings out prominently, namely, how much still remains to be done. Nepal, for instance, is almost a complete blank. This is, however, due to circumstances over which the geologist has no control. H. L. CROSTHWAIT.

'Asie-Mineure et Syrie (Sites et Monuments).' By Eugène Gallois. (Paris: Guilmoto. *n. d.* Pp. 246.) This is a simply written little book, which would be useful as a work of reference if it had an index or even a detailed table of contents. As it stands, it would be very hard to find the succinct account of any given town, which, however, is there to be found.

'The City of Jerusalem.' By Colonel C. R. Conder. (London: Murray. 1909. Pp. viii., 334. *Maps and Illustrations.* 12*s.*) This volume contains a *résumé* of the history of Jerusalem as it has been pieced together from the results of research and exploration. It is clearly written, has numerous textual references and a bibliography, some good maps of the city at early periods, and an indifferent modern map, so heavily shaded as to be in large part illegible.