

With regard to the traffic and communication, I fully agree with Colonel Church in what he has said about the impracticability of carrying out any important communication over the Andes from the Pacific. Nobody who has not crossed the Andes can realize the difficulties of traversing those mountains. They are widest in about lat. 20°, and to the northward the ranges are exceedingly steep, and there are no roads. In crossing the Cordillera you have to dodge the two wet seasons, and these do not coincide. The object is to cross the western range at the time the rains are nearly over, and then reach the second range before the rains commence there. Then of course comes the question of getting down the rivers, which is always a very difficult one. I am glad to hear that steamers have actually reached the foot of the Pongo de Manseriche in Peru, because that is the place to which I directed my attention a good many years ago, being anxious to find out whether that obstacle to navigation could be blown up, and if so, how far navigation could be carried beyond it. I quite satisfied myself that on the Marañon, above that fall, there were so many more rapids that, even if the main Pongo were blown up, very little advantage would follow. There is little more to say, except to express my great esteem for Colonel Church's paper.

Colonel CHURCH: In view of Mr. Saunders' remarks will you excuse me if I take up one more minute of your time? [Here Colonel Church gave an outline of the Amazonas lake, the Mojos lake, and Pampean sea as described in his paper, pp. 385 and 387.]

The CHAIRMAN: More than ever do I echo the sentiments expressed by Mr. Payne of regret at the absence of our President to-night, and deplore my own ignorance of the geography of South America; but I must, however, acknowledge the efforts that have been made by Dr. Moreno on the part of Argentina, and Señor Bertrand on the part of Chile, to correct those deficiencies. I hope to know something more about it in time. There is, however, one point on which I can challenge Colonel Church's conclusions. He has spoken of Lake Titicaca as the highest lake in the world. Now, as the self-constituted champion of Asia, I know of one lake which bears the name of our late beloved Queen which is at least a thousand feet higher than Titicaca, and I think I know others that may be higher; but they all bow their heads to Lake Victoria. These, however, are matters of detail, and I think we can all agree to join in a cordial vote of thanks to Colonel Church for the lecture which he has delivered, not only in an interesting, but in a most attractive, manner. I trust that hereafter we shall hear something more of South America from him.

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## NOTE ON TOPOGRAPHICAL WORK IN CHINESE TURKISTAN.

By Dr. M. A. STEIN.

IN June last I was able to start, with the assistance of the Indian Government, on a tour of archaeological exploration in Chinese Turkistan. The necessity of fixing accurately the position of ancient sites and of collecting fuller materials than hitherto available for the study of the historical topography of this region brought surveying operations into close connection with my immediate task. But from the first I was anxious also to utilize whatever opportunity the journey might offer for topographical work of a more general character. In

order to assist me in this direction Colonel St. G. Gore, R.E., Surveyor-General of India, very kindly agreed to depute with me one of the native sub-surveyors of his department, and to provide all necessary instruments. M. Ram Singh, the sub-surveyor selected, had accompanied Captain Deasy during his recent explorations in Chinese Turkestan, and was thus specially qualified to render useful services. In the present note I wish to give a brief preliminary account of the topographical work so far effected in connection with my tour.

The Government of India having allowed me to use the Gilgit-Hunza route for the journey to Kashgar, I reached, at the close of June, Chinese territory on the Taghdumbash Pamir by the Kilik pass. A plane-table survey, on the scale of 8 miles to the inch, was there commenced and carried down to Tashkurghan, and hence to the Sarikol valleys west of the Mustagh-ata chain. It was supplemented by triangulation, based on the points supplied by the Pamir Boundary Commission's and Captain Deasy's surveys, and further by photogrammetric work, for which I was able to utilize a Bridges-Lee photo-theodolite, kindly lent to me by the Indian Meteorological Department. Special attention was paid here, as well as along the routes subsequently followed, to the local nomenclature. In Sarikol frequent doublets of local names were noted, which curiously reflect the mixture of Iranian and Turki elements in the population, and also account for the variations in earlier traveller's records. In the matter of historical topography, it may be of some interest to note that the localities visited by Hiuen Tsiang, the famous Chinese pilgrim of the seventh century, on his passage through these mountains could be traced with certainty. The evidence thus obtained distinctly supports the identification of Tashkurghan with the *λίδιος πύργος* of Ptolemy.

From the spurs of Mustagh-ata the triangulation was extended to the great glacier-crowned ranges to the north and north-east overlooking the "Little Karakul" lake and the valley which drains it. The slopes of the "Father of ice-mountains" itself supplied a series of splendid survey stations, the maximum elevation reached being over 20,000 feet on the ridge that flanks the Yambulak glacier from the north. This ridge in the summer of 1894, when Dr. Sven Hedin made his ascents, was almost bare of snow. In July last it was found to be covered from *circ.* 15,500 feet upwards with heavy masses of snow, which greatly impeded the ascent. They seem to have been accumulating for the last two or three years, and may gradually transform themselves into an ice-mantle such as lies over the other elevated slopes of the great mountain. The weather was by no means favourable, else the attempt might have been made to reach the col that divides the heads of the Yambulak and Kampar-Kishlak glaciers at a height of about 23,000 feet below the northern summit.

The route from the Mustagh-ata region down to the plains of

Kashgar lay through the Gez defile. As its lower portion was rendered impassable by the summer floods, it was necessary to take to the track across the series of transverse spurs known as "Tokuz-Dawan" ("the nine passes"). These marches were trying to man and beast, but afforded opportunities for mapping also the little-known eastern slopes of the great snowy range north of Mustagh-ata.

The excursions which I made during a longer stay at Kashgar to various ancient sites in the vicinity, were utilized also for survey work. A couple of clear days, such as rarely fall to the surveyor's lot in the dust-laden atmosphere of Eastern Turkestan, made it possible to sight again the series of great snowy peaks previously triangulated from the neighbourhood of Mustagh-ata. It may be hoped that these observations will be useful for the final determination of the exact longitude of Kashgar.

In September I marched to Yarkand by the route which crosses the tract of moving sands around the shrine of Ordam Padshah. Our plane-table survey checked by astronomical observations indicates for this curious locality a position differing not inconsiderably from that in earlier maps. From Yarkand to Khotan I followed the great caravan route leading along the edge of the desert. In view of the historical importance attaching to it as the great thoroughfare by which, in earlier times, the trade from China to the Oxus region and the far West mainly passed, it may be noted that I was able to trace a number of ancient sites along it, and in particular to identify those named by Hiuen Tsiang in connection with his return journey from India. In regard to these and to the various localities in the Khotan district which the pilgrim visited and described in his 'Records of the Western World,' his guidance has proved quite as accurate as we are accustomed to find it on Indian soil.

The Khotan oasis and the desert region near it have in recent years furnished so many finds of great interest to the student of Indian antiquities and of Buddhism that it was necessarily from the first singled out as the special field for my archaeological work. The longer stay implied hereby, and in particular a delay necessitated by preliminary arrangements for the exploration of certain desert sites, have permitted me to devote also some weeks to a geographical task of special interest. Our knowledge of that portion of the Kuen-luen range which contains the headwaters of the Yurung-Kash or Khotan river, has so far been very scanty, having been practically restricted to the sketch-map illustrating the route by which Mr. Johnson, in 1865, had made his way down to Khotan. Colonel Trotter, of the Survey of India, in his report on the topographical work of the Yarkand Mission of 1873, had already expressed the belief that the headwaters of the Yurung-kash were much further to the east than shown on that map, and probably identical with a stream rising on the high plateau south of Polu. Captain

Deasy, working from the side of Polu in 1898, succeeded in reaching this stream at an elevation of close on 16,000 feet, but was prevented from following it downwards. Thus the true course of the main feeder of the Yurungkash, where it cuts through the Kuen Luen range, together with most of the orography of the surrounding region, still remained to be ascertained.

In view of the close approach of winter, I set out for this task as soon as possible after my arrival in Khotan. Fortunately, no objections were raised by the Chinese administration to exploration in that direction, though at one time it had looked as if there were reason to apprehend them. On the contrary, Pan Darin, the Amban of Khotan, did all in his power to facilitate the arrangements for transport and supplies, and subsequent experience has shown me that without this ready assistance the tour through these mountains would probably have proved impracticable. I owe this and other valuable help rendered by Chinese officials undoubtedly to the kind offices and the influence of Mr. G. Macartney, C.I.E., the representative of the Indian Government at Kashgar.

The valley of the Yurung-kash becomes impassable within a day's march from its debouchure into the plains. Hence the route from Khotan to Karanghu-tagh, the southernmost inhabited place, leads over a series of ranges that separate side valleys draining from the east. On the first range crossed by the Ulugh-dawan at an elevation of *circ.* 11,300 feet, the effects of the dust haze rising from the desert plains were still too marked to permit of any distant view. But already from the next range, above Buya, a very extensive panorama was obtained. In a grand glacier-girt mountain, rising in solitary splendour to the south-east, it was impossible to mistake the "Kuen-luen Peak No. 5," already triangulated from the Ladak side, and marked in the tables supplied by the Survey Department with the height of 23,840 feet. The few Taghliks in the neighbouring valleys know no other name for it than Mustagh, "the ice-mountain." South of it there stretches a magnificent range of snowy mountains, forming the watershed towards the westernmost portion of Aksai-chin plateau. Its crest-line seemed nowhere to fall below 19,000 feet, but none of its peaks can rival the grand cone of "Kuen-luen No. 5." It soon became clear that the main Yurung-kash stream has cut its way between this great peak and the range that is flanked by it on the east.

On the last of the outer ranges, above the Pisha valley, an excellent station was found, at a height of *circ.* 13,400 feet, for surveying the valleys of the numerous glacier-fed streams which join the main Yurung-kash river from the south. Their courses, as well as that of the main river, lie in deep rock-bound gorges flanked by spurs of remarkable steepness. Owing to the rugged nature of the ground, the descent to the Yurung-kash was exceptionally trying, and almost impracticable

for the baggage. Fortunately it was possible to replace the ponies by yaks at Karanghu-tagh, a small settlement of Taghlik herdsmen, which also serves as a penal station for select malefactors from Khotan. It would be difficult to find a bleaker place of banishment. The Kash river, on which Karanghu-tagh lies, comes from a series of magnificent glaciers below peaks that reach close to 22,000 feet, and carries a considerable volume of water to the main Yurung-kash, which it joins a few miles below the hamlet.

From Karanghu-tagh I endeavoured to follow up the gorge of the Yurung-kash as far as possible towards the east. The hillmen knew of no track leading to the head of the river; and, indeed, after a two days' climb over very difficult ground, a point was reached, *circ.*  $79^{\circ} 59' 30''$  long.,  $36^{\circ} 2'$  lat., where the river gorge, winding round the mighty southern buttresses of "Kuen-luen No. 5," becomes quite impassable for yaks and men alike. The spot is known as Issik-bulak, from some hot springs that issue from the rocks above the river-bed. Beyond this point, which is *circ.* 9000 feet above the sea, the river, unfordable even at this late season, fills completely the narrow passage it has cut through the rocks. No practicable track could be found along the extremely precipitous slopes that descend to the river from the high snowy ridges on either side. For an attempt at further exploration of the gorge, it would have been necessary to await the complete freezing of the river. But, though the temperature at night went down on October 27 to  $16^{\circ}$  Fabr., this eventuality could not be expected for another month. Even then I doubt whether a practicable passage could be found, considering the climatic conditions and the masses of fallen rock likely to be encountered. The uppermost portion of the river-course will, therefore, have to be explored from the south-east, where Captain Deasy appears to have found comparatively open ground near the source.

From the Karanghu-tagh valley I proceeded, on October 30, to the west, following the path just practicable for laden yaks, which forms its only connection with the outer world besides the route *via* Pisha. Two main transverse ranges are crossed by this track; they separate the Nissa and Chash valleys, both draining towards the Yurung-kash, and equally inaccessible in their lower portions. By camping near the passes it became possible to climb to excellent survey stations, particularly on the Brinjak ridge (*circ.* 15,300 feet elevation).

Beyond Chash the Yagan-dawan pass brought us to the drainage area of the lower Karakash river. Extreme disintegration of the rocks, aided apparently by peculiar climatic conditions, has produced here a perfect maze of deep-cut arid gorges, amidst which mapping was very difficult. Want of water also proved a serious obstacle. Fortunately, it was possible to arrange for the transport of ice from the Mitaz valley. The last pass to be crossed to the plains was the Ulughat-dawan, *circ.*

10,100 feet above sea, south of Popuna on the Karakash. Though much lower than the previously crossed ranges, it offered a more extensive view, which fulfilled a hope I had almost despaired of. It showed not only the whole of the ranges previously surveyed, but beyond them, towards the upper Karakash valley, many high snowy peaks previously hidden. Among them two peaks, already fixed by triangulation from the Ladak side, could be identified with certainty. These points, in conjunction with the "Kuen-luen Peak No. 5," made it possible to determine the position of the Ulughat-dawan station by theodolite, and to measure angles to all the prominent heights of the ranges within view.

Subsequently we succeeded in finding another high ridge to the east, which offered an equally extensive view, and where a second triangulation station could be established. We had climbed it just in time. While still engaged on November 10 at the height of Kaurukuz, we saw a heavy storm from the desert northward pass over the plains. The dust-haze it carried along gradually enveloped the mountains, and further work became impossible. This fog-like haze, effacing all distant views, has since then continued to lie over the plains. But the prominent peaks in the outer range of hills immediately south of the town of Khotan, which have now been triangulated, are sure to be seen again in the course of the winter. This will complete the long-sought-for connection of Khotan with the trigonometrical system of the Indian surveys, and render the exact determination of its position possible.

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## CAN HAWKINS'S "MAIDEN LAND" BE IDENTIFIED AS THE FALKLAND ISLANDS ?

By Commander B. M. CHAMBERS, R.N.

QUESTIONS connected with the discovery of the Falkland islands are, no doubt, of less general interest now than they were when Junius raised such a storm by his indiotment of the Government of the day and their treatment of the Spanish claims. Still, to those who love the sea-lore of the past, and who care to follow the footsteps of the early voyagers—so in some measure sharing those delights of discovery and adventure denied to us, living at a period when all the world is but a tourist's highway—to these such a question as that heading this article is of perennial interest. In this paper I propose first to show that the evidence of Hawkins having ever visited the Falkland islands is entirely insufficient, and then I shall endeavour to substitute a theory to elucidate the seemingly inexplicable account of that generally accurate chronicler.

Let me first take the earliest available authorities as to the discovery