

teristic of the great drainageless wastes of innermost Asia and of special interest to the geographical student of their present and past. The limits of areas of absolutely bare drift-sand, clay or gravel; of desert ground supporting vegetation of some kind; of irrigated and hence cultivable ground which in these regions, under the influence of peculiar factors, is subject to comparatively rapid changes, and similar features of importance, all claimed careful attention, only assured by prolonged observation and study and not ordinarily falling within the Indian surveyor's training.

The record of local names along our common routes was another task invariably effected by myself. For routes followed only by my assistants, I did my best to check and correct the record of local names brought back by them through the independent examination of natives acquainted with the ground. The methods used for a strictly phonetic record of all Turkistān local names and for their systematic transcription, as well as for the transliteration of Chinese names necessarily recorded on a different basis, will be fully explained below in the chapter dealing with the preparation of the present maps.

## SECTION II.—FIRST EXPEDITION, 1900-01

After these general observations I may now proceed to a summary record of the survey operations carried out on each successive journey. For those of 1900-01 Colonel St. George Gore, R. E., late Surveyor General of India, had kindly provided the help of Sub-Surveyor Babu (now Rai Sāhib) Rām Singh, previously employed on the last of Captain Deasy's expeditions, together with the necessary equipment of surveying instruments and a grant of Rs. 2000 to cover additional expenses. After reaching the westernmost border of Chinese Turkistān from Hunza over the Kilik pass, survey work was commenced at the head of the Tāghdum-bāsh Pāmīr by the close of June 1900.

Here as throughout our travels in the mountains I endeavoured to supplement it, as far as my limited time permitted, by photogrammetric work with a Bridges-Lee photo-theodolite kindly lent by the Indian Meteorological Department. A large selection of the mountain panoramas taken with it on the Pāmīrs and in the K'un-lun range south of Khotan has been published by the Royal Geographical Society;<sup>1</sup> and though the ground west of the Muz-tāgh-atā massif is the only area which has been actually mapped from them, these photographic records have subsequently proved more than once of great value in clearing up points of topographical interest, besides serving other geographical purposes.

From the Chinese-Afghān border on the Wakhjīr pass where it overlooks the glacier sources of the main Oxus headwaters, the survey extended through the whole length of the main Sarīkol valley to the great eastward bend of the Zarafshān river below Tāsh-kurghān.<sup>2</sup> Triangulation was started at the head of the Tāghdum-bāsh with the help of points supplied by the surveys of the Pāmīr Boundary Commission and Captain Deasy.<sup>3</sup> It was subsequently extended for a considerable distance to the north along the great meridional range which is crowned by the ice peaks of the Muz-tāgh-atā and Shiwakte (or Kongur) massifs.<sup>4</sup> A series of triangulation stations fixed around the Little Kara-kul lake permitted the determination of several of the most prominent peaks on that range.

<sup>1</sup> See *Mountain Panoramas from the Pamirs and Kwen Lun*. By Dr. M. Aurel Stein, London 1908 (29 views and map, folio).

<sup>2</sup> See Sheet No. 3; for a descriptive account, cf. *Ruins of Khotan*, pp. 56 sqq.

<sup>3</sup> This triangulation in a limited area has since

been superseded by the exact operations carried out here for the geodetic connection of the Indian and Russian triangulation systems; see Major K. Mason's Appendix A.

<sup>4</sup> Cf. Notes on Sheet No. 2; *Ruins of Khotan*, pp. 74 sqq.