

journey in 1907-08 along the Chinese high road from Kāshgar to Kan-chou; ¹ the latitudes observed by Dr. Sven Hedin along the Tārīm river and in the Lop depression; ² Captain H. H. P. Deasy's extensive triangulation work on the Chinese Pāmīrs and in the K'un-lun range east of Khotan; ³ the triangulation done on the Kara-koram range in connection with Sir F. De Filippi's expedition. ⁴

Apart from the use of certain latitude and longitude determinations just referred to, the topography of the maps now published is based solely on the results of our surveys. Special care has been taken throughout correctly to coordinate these results where the same or closely adjoining areas were surveyed on successive journeys. In order to assure greater accuracy in details reference was also made throughout to the original plane-table sheets in the case of ground already represented in the maps illustrating the first two expeditions. This has proved of particular advantage for the delineation of mountainous ground surveyed on the second journey, since the hachuring on the previous maps did but inadequate justice to the horizontal 'form lines' shown on the original plane-tables.

Where the same route was followed on more than one journey preference was given to the representation of the ground by the later survey, if done under my direct supervision or on a larger scale. When revising the 'fair drawings' of the map sheets I endeavoured to check, and, if necessary, to supplement topographical details by reference to the descriptive records I had kept of all routes personally followed. This task was greatly facilitated wherever the preceding preparation of my Detailed Reports had obliged me to make a thorough study of these diary records. Reference to them proved particularly useful in respect of minor features which the original plane-tables of the first and second journeys did not sufficiently differentiate, *e.g.*, as regards the various types of desert vegetation (tamarisk-cones, reed beds, etc., living or dead), and the permanence of water in stream beds, etc. ⁵

Apart from those determined by triangulation, height records were obtained on all three journeys by aneroid barometer and hypsometer observations. On the second and third journeys the aneroid barometers were controlled by simultaneous readings of a mountain mercurial barometer whenever time and conditions permitted. Height records obtained by mercurial barometer were given preference for entry in the maps and intermediate aneroid readings adjusted to those of the mercurial barometer readings. The methods used for the computation of barometric heights have been indicated in Appendix B, supplied by the kindness of Dr. J. de Graaff Hunter, in charge of the Computing Office. Comparison with the mercurial barometer records proved that the aneroids preserved a very uniform rate of accuracy throughout the third journey. As their readings were also found to agree more closely with the heights deduced from vertical observations with the theodolite in the course of triangulation they were adopted in preference to the hypsometrical heights. The latter were, however, used where no barometrical records were available.

On the second and third journeys extensive use was made of the clinometer to fix the approximate elevation of points intersected from positions of which the heights were barometrically determined. The help derived from these additional data as well as from the 'form lines' of the plane-tables and from photographic records, such as the numerous photo-theodolite panoramas I secured on the first journey, led to the hill-shading of the new maps being given the form of regular contouring, with approximate contour intervals of 250 feet. Where trigonometrically determined heights were available, these have been used as the basis for levels, barometric and clinometric heights serving the same purpose elsewhere.

¹ See *Summary of Geographical Observations taken during a journey from Kashgar to Kowlun, 1907-09*, by Cecil Clementi, M. A., Assistant Colonial Secretary, Hongkong, 1911; also *Geographical Journal*, 1912, pp. 624 sqq.

² See Hedin, *Central Asia*, Vol. V., Part Ia.

³ See 'Map of portions of Western China and

Tibet explored by Capt. H. H. P. Deasy in 1897-99' (Dehra Dun, 1906), Sheets Nos. 1, 4, 5.

⁴ See the map of *Regions between Leh and Kar-ghalik mapped by Cav. F. De Filippi's expedition in 1913-14*, Survey of India, Dehra Dūn, 1916.

⁵ Cf. below pp. 57, 59.