

was reached in which that great branch of the Khotan river has carved its way through the northernmost main range of the K'un-lun.<sup>13</sup> The extensive panoramic view obtained from Tōpe station above the last of those spurs (13,949 ft. as determined by subsequent triangulation) first showed serious and very puzzling discrepancies between the actual orography of these mountains and the sketch-map of the route by which Mr. W. H. Johnson had made his way from Leh down to Khotan.<sup>14</sup> It also made it quite certain that the head-waters of the Yurung-kāsh were much further to the east than shown on that map, as Colonel H. Trotter had already rightly conjectured in 1875.<sup>15</sup>

At Karanghu-tāgh, the last inhabited place to the south and a colony of exiled malefactors, reached after crossing the Yurung-kāsh, it proved impossible to obtain any guidance or other local help for the exploration of the very difficult route by which Mr. Johnson had crossed the glacier-covered main range from the south. We succeeded, however, in penetrating for two marches along the extremely confined bed of the Yurung-kāsh until stopped by narrow impassable gorges.<sup>16</sup> Thus it was ascertained that the upper course of the river lies in a succession of very deep defiles passing to the south and west of Pk. 1/61A (E.61 or K.5 of the old survey records), locally known as *Muz-tāgh*, 'the ice mountain'. This is the culminating massif of the northernmost K'un-lun range and the only point on it previously fixed by the G. T. Survey from the Ladāk side.

Any attempt at progress towards the high waterparting in the south was barred by local obstruction and the lateness of the season. Fortunately information was secured about another route leading across the mountains to the north-west, and this enabled us to map the glacier-fed head-waters of the streams draining the portion of the main K'un-lun range south and south-west of Karanghu-tāgh.<sup>17</sup> A succession of troublesome passes, practicable only for yak transport, led across the precipitous spurs dividing the valleys of Kāsh, Nissa and Chash and offered excellent stations for plane-table and photo-theodolite work. They also revealed the extraordinarily difficult nature of the ground to the south, rising with great glacier-clad heights to an ice-covered crest-line nowhere much under 20,000 feet and filled elsewhere with a maze of steep serrated ridges with deeply eroded gorges between them.<sup>18</sup> Further north on the Yagan-dawān we reached the watershed between the Yurung-kāsh and Kara-kāsh rivers. For the remarkable character of the region here entered, with its closely packed lines of bare rocky spurs and its deep arid gorges shut in by unscalable rock slopes, a reference to my photo-theodolite panoramas and Personal Narrative will suffice here.<sup>19</sup>

The hope of connecting our surveys by triangulation with peaks fixed by the G. T. Survey from the south on the main K'un-lun range was again and again disappointed until we reached the Ulūghat-dawān (9,890 feet),<sup>20</sup> the last pass above the Kara-kāsh river. Here a grand panorama permitted us to recognize with certainty at least two previously fixed peaks in the south, besides the ever conspicuous pyramid of 'Muz-tāgh' (Pk.1/61A)<sup>21</sup>. With our 'hill station' thus fixed in a position commanding extensive views in all directions, except in the north where the ever-present dust haze hid the Khotan oasis and the desert plain, it became possible to use the favourable atmospheric conditions fortunately prevailing on November 7th for triangulating a considerable number of prominent points from the mountains above the Kara-

<sup>13</sup> See *ibid.* pp. 190 sqq.; Sheet No. 9.

<sup>14</sup> For an explanation of these discrepancies and other questions connected with Mr. Johnson's route and with the representation his record has found in that sketch-map, see the Notes by Major K. Mason, R. E., and myself in *Alpine Journal*, November, 1921, xxxiv. pp. 54 and 62.

<sup>15</sup> Cf. his *Account of Pandit Kishen Singh's explorations in Western Tibet in Records of the Survey of India*, vol. VIII, part i, p. 151.

<sup>16</sup> Cf. *Ruins of Khotan*, pp. 200 sqq.

<sup>17</sup> See *ibid.*, pp. 208 sqq.

<sup>18</sup> See Panor. III-IV in *Mountain Panoramas from the Pamirs and Kwen Lun*.

<sup>19</sup> See *loc. cit.* Panor. v. and *Ruins of Khotan*, pp. 215 sqq.

<sup>20</sup> This is the local pronunciation of the name, evidently meant to be *Ulūgh-art*, "the high ridge".

<sup>21</sup> For an account of the triangulation effected from the Ulūghat-dawān and Kauruk-kuz hill stations, cf. *Ruins of Khotan*, pp. 219 sqq. See also Panor. VI of *Mountain Panoramas*, and the notes on the computation of triangulation results from these hill stations in Appendix A below.