sufficient moisture and vegetation to bind the dust and fine sand thus transported. This process continued during long periods has formed the mighty loess bed which throughout the Khotan oasis now overlies the coarse gravel of an earlier 'Sai'.

Subaerial and silt deposits.

Seeing the dust-laden atmosphere which envelops Khotan, like other oases of the Tārīm Basin, for the greatest part of the year, and the great frequency of its sand-storms, it is easy to realize that this subaerial deposit still continues at the present day and must constantly heighten the soil[7]. But there can be no doubt that, ever since systematic irrigation has been carried on within the oasis, this process must have been greatly aided by the deposit of river silt; for of this every cultivated piece of ground receives annually a considerable quantity in the muddy water which the irrigation canal brings to it, and which is allowed to remain until it evaporates or is absorbed in the soil. When discussing later the strata of fertile soil covering the remains of the ancient Khotan capital at Yōtkan, I shall have occasion to demonstrate in detail the remarkably rapid rise of the ground-level brought about by this twofold deposit[8].

It appears probable that the rivers of Khotan while thus creating as it were the soil of the oasis, have also produced that configuration of the ground which now greatly facilitates the distribution and full use of their waters.

Absence of 'Sai'.

A look at my map shows that, owing to the presence of fertile soil almost to the foot of the outer hills, cultivation begins at the very *débouchement* of the two rivers and thence spreads out fan-like over a steadily broadening area northward. Excepting the narrow strip of pebble-covered ground, probably nowhere more than three to four miles in width, which stretches along the southern edge of the oasis in the space left between the two rivers (some thirteen miles only), we do not find here the barren stony 'Sai' that elsewhere separates, like a forbidding glacis, the foot of the hills from the cultivable area. The advantages which this configuration of the surface assures must strike any observer who has paid attention to the time-honoured systems of irrigation prevailing throughout the whole region. Wherever, as in the case of all oases to the east of Khotan, a broad desert zone of stony detritus, gravel, or coarse sand, up to seventy miles in width, intervenes between the emergence of the rivers from the outer hills and the nearest large loess deposits, the utilization for irrigation purposes of the available supply of water offers considerable difficulties.

Owing to the uniformity of level which the glacis-like 'Sai' presents, the rivers and streams passing over it necessarily show a tendency to spread themselves in numerous shallow channels. The artificial control of the rivers in their passage through this sterile zone, when in summer flood, would be a task far beyond the engineering resources of the country, and also in many cases beyond the available labour supply. Hence, as we have seen above, much of the water is lost in side channels which cannot be made to feed irrigation canals with the needful regularity[9]. Much of it, too, evaporates before the cultivable loess area is reached, and probably still more sinks into the pervious upper stratum. It is true that part of the water lost through the last cause subsequently reappears in springs;[10] but as these are subject to periodical fluctuations in level and position, and besides lack the fertilizing alluvium brought

[7] The people of Khotan seem to be well aware of this process and to ascribe to it a fertilizing effect; see Johnson's remarks in *J. R. Geogr. Soc.*, 1867, p. 6; also Geikie, *Textbook of Geology* (4th ed.), i. p. 439.

[8] Compare chap. VIII. sec. ii.

[9] See above, pp. 96, 115.

[10] Compare below, chap. XIII, the remarks about the springs from which the small oases between Chīra and Keriya derive their irrigation, also the springs feeding the river below Keriya. See also Hedin, *Reisen in Z.-A.*, pp. 39 sq., 177.