

the gravels of branch streams. Kizil-Art pass lies on the middle of a sagging ridge between two diametrically opposite back-to-back cirques. The northern one heads the Kizil-Art Valley, which assumes, below the cirque, the twice-troughed-valley form seen in the Alai Valley tributaries. The bench or change of curve in this valley is but imperfectly preserved, but is occasionally well defined and can be traced to within a few versts of Bor Daba (fig. 99).

The stream rising in the heading cirque of this valley has cut back a gully to within 50 feet of the crest at Kizil-Art pass. This gully is about 10 feet deep and 10 feet wide at the pass, gradually widens downstream, and increases in depth for about 10 versts, where the bottom of the inner trough is about 100 feet above the stream. Here the pitch of the stream suddenly decreases, as a few versts farther down the bottom of the inner trough sinks under the flood plain.

MORAINES.

A few versts below Kizil-Art pass we begin to find portions of moraine left on the inner trough bottom to one side or the other and above the stream. Portions of this moraine occur at rare intervals all the way down to Bor Daba, where the Kizil-Art darya emerges into the Alai Valley. Here begins a moraine island extending over 10 miles transversely into the Alai Valley. It is not surrounded by water except in flood time, when a distributary of the Kizil-Art darya crosses the flood plain to the west and joins the neighboring stream from the Mount Kaufmann mass. The position of this moraine and the precipitous manner in which its unaltered slopes pitch under the stream gravels give it the unmistakable appearance of the mere top of a deeply buried mass beneath.

Thus the stream waste is filling back into the lower part of the Kizil-Art Valley, having partially buried the fresh moraine lying in its mouth and covered the inner trough bottom for some 7 versts upstream, so that, although the base is being raised by filling back of waste, the upper half of the stream has not yet recovered from some previous lowering of base and is still cutting down on rock bottom.

The only tributary amphitheater which I had occasion to examine in this valley was that opposite Bor Daba, 4 versts to the west. It contains grass-covered moraine of fresh topography, with kettle-hole lakes. Its bottom seems to be buried beneath the flood plain where it opens into the Kizil-Art or trunk valley. There appeared to be a mass of ice hanging on the slope some 2,000 feet above.

Two of the branch streams of the Kizil-Art darya were seen to head in glaciers. These branch streams and their valleys appeared to join conformably the Kizil-Art darya and its valley.

The occurrence of moraine in the inner trough of the Kizil-Art Valley and the occurrence of the partially-buried moraine island where the inner trough bottom lies buried at the mouth of the stream show that the glacial occupation of the inner trough was probably contemporary with the deposition of the fresh moraine island.