

tributary canal, they built their citadel, piling it up with clods of clay to a height of 34 feet, and around it threw up the massive walls of the inner city, of whose colossal height more than 70 feet still remains. That the outer city with its walls was laid out at the same time we have shown to be likely. So they built their city and from that time the distributary stream they had chosen is for physiographic purposes to be regarded as an irrigation canal, and the sediments laid down upon its flood-plain, irrigation and canal sediments, according to whether the area considered was under cultivation or not. While the débris of occupation rose within, these sediments grew upon the plain without the walls and to a certain extent continued growing after the abandonment of Ghiaur Kala in the eleventh century; for it was then that a new Merv, whose ruins are now called Sultan Sanjar, was founded but a few hundred yards away and water still found its way into this region.

Loess, dune-sand, alluvium, and human débris is, therefore, the stratigraphic order of our physiography at Merv, the record of Nature and man, the effect for which we seek a cause. And of all time-sections it has been our fortune to study, this one is the most beautiful illustration of the organic changes that constitute the process of a great interior desert region effected by climatic change.

During the accumulation of loess there must have been a sufficient precipitation to nourish grass over this area, but it is now too arid. It was then doubtless a time of greater precipitation over the Murg-ab's catch-basin which would enable that river to penetrate farther into the desert giving it a delta north of the present. The flying sands derived from wind-work over the delta were probably accumulated into more or less stationary dunes around it, while most of the finer material settled as loess between it and the mountains. Then, I believe, a decrease in precipitation demolished the grass, set free the dunes to drift over all neighboring areas free from alluviation, while the river shrank with its delta, receding mountainwards to build over the dune-strown loess topography of Ghiaur Kala, and at this stage the city was founded.