

THE QUATERNARY UPLIFT.

The first process which belongs to recent or Quaternary geological history was a vast uplifting of the Tertiary peneplain, the area of the uplift probably extending considerably outside the limits of the region which we are now studying. Coupled with the uplifting of the peneplain as a whole, there was a warping by which it was deformed into basins, large and small, with intervening swells or ridges. As far as was observed, this warping does not seem to have initiated new lines of stress, but to have confirmed old ones of Tertiary age. In the old movements faulting took place abundantly; in the new movements warping was the rule and faulting took place rarely. The Quaternary basins seem to be revivals of former basins, first formed early enough to receive Tertiary deposits, for the Tertiary strata usually appear to have been deposited in basins similar to those which they now occupy, but less deep; that is, the strata are thickest in the center and grow thinner toward the edges, where also they are more warped, as though the edges of the basins had been gradually raised out of the area of deposition. The scale of the Quaternary warping was large, for some of the ridges, such as the main crests of the Tian Shan plateau and of the Alai range, were raised over 10,000 feet above the bottoms of the neighboring basins. The Quaternary uplift gave to the country the general form which it now possesses and divided it into portions which have distinct characteristics and may therefore be treated as natural physiographic provinces.

Consequent Drainage.—Before discussing the provinces separately, a few words should be said about the drainage and the evidence which it gives regarding the condition of the land previous to the Quaternary uplift. Throughout Central Turkestan the drainage is almost universally consequent upon the Quaternary warping, although in some places where the strata are soft the beginnings of a subsequent drainage are seen in process of development. The main streams follow the axes of the basins parallel to the general strike and leave the basins through gorges which seem to be located where the rims of the basins sag. Most of the basins contain Mesozoic and Tertiary strata, and the main streams usually traverse these weaker formations, so that from a mere inspection of a geological map they might seem to be subsequent. It is in the tributaries that the true consequent character is seen, for they flow down the slope of the warped peneplain surface and across the strike of both hard and soft strata. In the old age of the country previous to the Quaternary revival the main streams probably followed somewhat the present lines; for most of the basins, as has already been said, had been formed earlier by the down-faulting or folding of blocks of Mesozoic and Tertiary strata during the previous times of deformation, and at late maturity many streams must of course have searched out the softest formations. The altitude of the peneplain may then have amounted to thousands of feet because of its greatest distance from the ocean, but it must have been far lower than now. The hard rocks, the granite and the Paleozoic limestones, formed the uplands as they had done for ages and as they do to-day. At present there seems to be no sign of an old subsequent drainage in these uplands, a fact which indicates that the country was so far reduced to a peneplain that the streams paid little or no attention to structure.