

SECTION OF EROSION CYCLES.

First cycle (Pliocene).

High relief (Pliocene).

Base leveled in part (the peneplain stage of Central Asia).

Second cycle (Quaternary).

Uplifted.

Graded to $G - 25$ feet (first epoch of glacial period?).

Alluviation to $G + 500$ feet.

Third cycle (Quaternary).

Warped uplift.

Graded to $G - 300$ feet (extensive landslides).

Alluviation to $G - 100$ feet (close of second epoch of glacial period).

Aggraded to G (third and fourth epochs obliterated by present glacier).

Fourth cycle (Quaternary).

Warped uplift.

Cut down to $G - 300$ feet.

Still cutting down. (Present glacier and tributaries have made considerable advance in this cycle. During the present oscillation glacier has receded about 250 feet.)

FIRST EROSION CYCLE.

The vertical degree of cut and fill referred to G level, or the broad floor into which the canyon has cut, varies throughout the valley in such a way as to indicate warping. The values given are about average for the exaggerated portion of the valley, that from Urmitan to Oburdon. Of those far-reaching gradual slopes forming the 20-mile wide valley established by the close of the first cycle, but little now remains and must be looked for surmounting high spurs and whole mountains dissected from it between the present gorge and its two containing ranges. That uplift which ushered in the second cycle of erosion seems to have been especially great through this region and the rest of the Alai Mountains and, though probably contemporaneous with a general breaking up of our first cycle's topography throughout Central Asia, may have been somewhat sooner here where comparatively little of the old topography has survived. The Kopet Dagh, on the other hand, appear to have lagged behind the general uplift, while the remarkable peneplain of the Bural-bas-tau in the Tian Shan, so well described by Professor Davis, may have risen still later. Indeed, it is unlikely that all ranges throughout a region so vast as Central Asia would rise simultaneously. If these uplifts, all secondary movements posterior to the birth of the mountains, were, as we suppose, connected with loading and consequent sinking of their adjacent plains, the mountains originally highest ought to have risen first. And this appears to have been the case, for the Pamir and its border ranges, the Trans-Alai, Alai, and those on its east were already deeply gashed with well-developed valley systems long before the first glacial epoch.

SECOND EROSION CYCLE.

The second cycle appears to have lasted a long time after its uplift had ceased, for during it the river widened its floor, which seems to have been somewhat below the surface of terrace G , till it was in places even wider than that terrace is now. Even after this, erosion continued till by aggradation of the plains the base-level had risen up into the valley, filling it to a depth of some 500 feet with waste. But probably this refilling was partly a glacial alluviation in the first glacial epoch.