

EROSION CYCLES OF THE ANAU SU IN THE MOUNTAINS.

As the Kopet Dagh Mountains were simultaneously affected and their movements well recorded by erosion cycles, it is important to fix our attention upon them first. After their Tertiary rocks were laid down, a period of mountain-building activity resulted in deformation to synclines and anticlines with some overturned folding, most of which ran oblique to the general range axis. Then followed a lull in crustal movement, during which erosion progressed to maturity, leaving remnants of ancient crests as sharp talus-flanked peaks projecting from otherwise smoothly rounded ridges on either side of broad, shallow, longitudinal valleys. These valleys in general emptied into short trunk-streams discharging at right angles upon the plain, building immense deltas now partly exposed by the marginal tilt through which streams, descendants of the ancestral ones, have cut valleys to their present deltas just beyond.

This was the completion of what we may call the first erosion cycle, whereupon began, we suppose as a result of its shifting of load, a bodily sinking of the plains, with tilting of the border and cross-fracturing of mountains into huge blocks differentially uplifted. This cross-fracturing, evidenced by scarps both parallel and at right-angles to each other but oblique with the range axis, becomes of interest in connection with Woodworth's classification of rock-fractures. It seems to be a habit with Central-Asian ranges, even to the extent of oblique folding axes; indeed, the range structure is rarely parallel with its main axis and usually crosses at an angle of 30° to 45° . One block rose across the Anau trunk-stream, which, however, maintained its course, cutting down a gorge. The broad floors of longitudinal valleys were dissected by an extensive system of new tributaries developed from their main streams. Now there are commonly three terrace-levels: (1) the old first-cycle grade plains, (2) a narrow terrace about halfway between (1) and the present stream, (3) the broad flat of the valley bottom cut by the present narrow channel of the stream 10 to 25 feet deep with falls. This indicates division of crustal movement into a second and a third erosion cycle with relatively short lapses of quiet (as compared with the first cycle). In comparatively recent times there appears to have begun the third period of crustal movement. In the region of Manisht south of Anau dissection of the wide valley bottom (third-cycle flood-plain) had progressed till the fourth-cycle (present) channels were well incised. There but small portions of the old first-cycle floor remain as the flat tops of steep-sided hills rising several hundred feet above these channels. Streams were cutting back over small falls and rapids, and divides were shifting while pirating heads were capturing less active streams.

RECENT DECREASE OF SURFACE DRAINAGE.

A fourth erosion cycle had been well started and was actively progressing, when occurred a remarkably sudden decrease in surface drainage and most of these tributary channels have been left without running water to this day, and remain grown over with grass, the sod extending directly under the brinks of old falls. As this region is tributary to the Anau Su, it is important to explain