

## THE TERTIARY PENEPLAIN.

The unity of Central Turkestan is shown not only in the wide extent of the various members of the rock series, but also in the extensive peneplain which truncates them. In all parts of the region there are numerous places where the surface of interstream areas presents a smooth, gentle slope quite out of harmony with the tilted strata which it truncates evenly without regard to whether they are hard or soft, and with the steep-sided valleys that are being cut in it. These areas are therefore regarded as uplifted and more or less dissected parts of a formerly low-lying peneplain of erosion. In the southern part of the Tian Shan plateau, for example, the large plateau basin containing Chadir Kul and the Ak Sai River and lying at a height of from 10,000 to 11,000 feet above the sea is bounded on the south by a broad ridge or swell rising to a height of from 13,000 to 14,000 feet. On the southern slope of the ridge there is a descent of 9,000 feet to the plain of the Kashgar basin in a distance of from 70 to 15 miles—that is, a descent of from 120 to 600 feet per mile. This descent is sufficient to cause active erosion, which in due time will produce the most irregular topography with a maximum of relief; but the valleys of the south slope are not yet profound and the interstream areas, though very rugged, rise everywhere to the height of a nearly smooth imaginary surface ascending from the Kashgar basin to the broad ridge which incloses it on the north. This surface is evident in the hard Paleozoic formations and can be detected even in the soft Tertiaries. A broad ridge with such a slope descending from it must soon become very rugged by reason of the headward erosion of the streams; but here, especially in the eastern portion, the southern ridge of Tian Shan is still quite smooth and level, and its surface is indifferent to rock structure; hence its elevation from the condition of a low-lying peneplain must be comparatively recent. A smooth plain (plateau) of large extent stretches northward from the ridge, sloping at an average rate of about 100 feet per mile toward the Ak Sai basin and truncating the almost vertical slates and limestones of Paleozoic age (see fig. 124, p. 172, southern end). Not far to the west, in the district southeast of Chadir Kul, there are a number of easy passes across the same ridge, which there forms the Chinese boundary. Two of these passes, Kara Kermak and Kuzzil Kur, are in the soft upper members of the Tertiary series, although at an elevation of over 12,000 feet.

It is evident that the smooth imaginary surface to which the tops of the hills rise on the southern slope of the Tian Shan, above described, and its more actual continuation in the plateau, which truncates the Paleozoic strata farther north, could not have been formed by any known process under the present conditions of altitude and drainage; nor could the weak Tertiary strata of the passes farther west have been long preserved in their present form at the elevation at which they now lie. In order to reduce the deformed strata to so smooth a surface the Tian Shan region must have stood many thousand feet lower than now, until it reached a late mature or oldish stage of erosion, deserving to be called a peneplain, over large areas. The present altitude of the region must be due to uplift and warping of the peneplain