its decrease in surface-water contributions. Most of the Anau valley system is developed in soluble rocks, limestones, and gypsiferous beds, with occasional deposits of pure gypsum. Caverns are rare as compared with a land that has always received much rainfall, but we must believe a good system of underground drainage has been developed—a system competent to lead off most of the present rainfall, which, though sufficient to nourish a varied and profuse vegetation on these mountains, is nearly absent from their surface streams.

The upper branches of the Gyourse valley, about 15 miles southeast of Anau, tell a similar story. Their sodded-over channels and falls join about 10 miles south of Gyourse, where the lower terrace broadens into a wide grass plain confronted by a bare rock wall running northwest, straight across and conformable to the 40° dip of the red sandstone beds of an uptilted block, bounded elsewhere with battered fault-scarps. Here the Gyourse trunk-stream enters the block at right angles to its rock face, having carved its way down as the block rose across it. All this represents a stream of erosive activity and rapid enough to leave a valley of the canyon class, but recently the stream has dwindled, till now its waters can barely creep over the slight grade established under its former large flow. The old rock floor is covered with an organic mud grown over with reeds, which still more retard its thin sheet of slowly moving water. After traversing this swampy bottom of the old canyon it passes through a narrow valley in the tilted piedmont and emerges upon the apex of its fan, where it is entirely consumed in irrigating a small area of Turkoman fields. Except in flood the water is clear, though vile from organic solutions. Formerly during its active time this stream was charged with silt and spread over a large delta.

This remarkable decrease of surface drainage was obviously so recent that it becomes of vital interest to the archeology of Anau. Our problem as a whole is peculiar and a new one to physiography. Here are mountains in whose soluble rocks there has been developed a system of underground drainage of capacity sufficient to consume most of the present precipitation, all of it in some valleys, but until recently there was such an excess over this capacity that surface streams were well supplied and actively eroding. Two explanations may be offered: Either the underground capacity has suddenly increased, or precipitation has decreased. It is improbable, if not impossible, that underground drainage of all this area simultaneously perfected to sudden monopoly. On the other hand, if we postulate a decrease in precipitation, it need only be general, not sudden. As long as the underground system remained saturated as it would be with an excess of supply, a slow and continuous decrease of precipitation would cause only a correspondingly slow decrease in surface drainage. But as soon as precipitation decreased to the value of underground capacity, surface drainage would vanish. Or, to put it mathematically, let

P = inches of precipitation t years ago.
G = capacity of underground drainage; a constant to be expressed in inches of precipitation.
S = surface drainage or excess over G.
p = rate of decrease in precipitation (inches per year).
t = time in years.