

tain ranges, the reasons for the directions of drainage courses over such regions are easily understood. The prevailing courses are longitudinal as regards the range; not because synclinal troughs are longitudinal, for these, in the case of bold flexures, are not ordinarily the courses of river valleys; but for the more general reason that the flexures and faults in the range are longitudinal. The greater valleys are made along anticlines, because of the profound longitudinal fracturing of their summits, in consequence of the tension produced by the upward bending of the strata. This leaves the intervening synclinal belt as the course of the mountain ridges. Besides, the synclinal strata come under extreme pressure during the flexing process, and may have derived by this means greater durability. If the rocks of the range are crystalline schists and limestone, the limestone yields easily to denudation, and would determine in general the course of the drainage channel. But among uncrystalline rocks, limestone is harder than shale and some sandstone.

It has been stated that in a region of upturned rocks, as that of the Appalachian Range, the flexures are made in series along a few parallel lines, and sometimes in a succession of groups; and consequently that those of different lines often overlap at their extremities. Hence, along these intervening or overlapping portions the strata are irregularly warped and fractured, and thus weakened. Here, consequently, erosion should be easy, and *transverse* or *oblique* courses of drainage would result.

Great mountain ranges and systems have been shown to have one or more curves in their courses. The Appalachian Range, for example, changes from its south-by-west course in New York to west-southwest in Pennsylvania, and then leaves this state with a south-southwest course, which to the southward veers again to west-southwest. Here is another cause for transverse lines of drainage; for such a range usually diminishes in height over its more nearly meridional or more latitudinal part. In the Appalachians the lower part is along the latter; and here, as Lesley's map of Pennsylvania shows (page 730), the range is crossed by the Susquehanna.

Finally, along a region of a number of close-pressed folds, having great longitudinal fractures with displacements, a drainage valley may take great width.

If the plications or monoclines over an extended area have small dip, then the broad synclines and the depression between monoclines or lines of displacement may become the courses of streams.

Epeirogenic movements that give a height of many thousands of feet to large continental areas add these thousands to the elevation of the mountain ranges along the region; and hence, besides causing flows of water down the gentle slopes, they produce a vast increase of precipitation and denudation about the summits, and make the streams great rivers. Over the interior of continents such movements may cause undulations or warpings of the surface, which occasionally reverse the flow of rivers, or unite independent river systems into one, or make depressions that become the basins of lakes.