

range corresponded to the depth of a crust-hollow on the neighbouring portion of the ocean-floor.

This preliminary hypothesis is clearly open to question, but a more important feature is Dana's assumption that the centripetal movement of the crust, as it endeavours to shrink along with the nucleus, is transmuted into tangential tension comparable with the strains that would be set up in the case of a falling arch. In Dana's opinion the horizontal pressure components thus originated fold the crust into arched ridges and trough-like hollows. Dana called the latter *geo-synclinals*, the former *ge-anticlinals*; and he applied the qualifying term "monogenetic" to mountain-systems which owe their origin to a single arch or ge-anticlinal such as the Uinta mountains of Wyoming and Utah. On account of their frequent cracks and fissures, monogenetic crests are rapidly lowered by the action of subaerial denudation.

The mountain-systems composed of several chains always arise, according to Dana, within geo-synclinals where immense masses of sediment have collected. As the older rock-horizons become mantled by ever-increasing thicknesses of sediment above, and the subsidence continues, the deeper strata are weakened by heat and pressure and readily tear asunder. The broken fragments yield to the horizontal pressures, are crushed into a narrower space against the lines of tearing, are folded and thereby uplifted. Dana called a mountain-system elevated from a synclinal area of subsidence a "synclinatorium." The deeper geo-synclinals of past geological epochs have been as a rule next the continents, and the new mountains originated there slowly, the movements occupying vast geological ages; after their emergence they were incorporated with the main continental masses.

Dana then discussed the conditions under which volcanic rocks might take a dominant part in the building up of mountain-chains. The earth's crust, he said, grew thicker by the continued progress of cooling, and the rocks became more and more resistant owing to the mechanical and chemical metamorphoses which they experienced in the crust. The process of mountain-making was consequently made more and more difficult in the older areas of disturbance, but as the tangential strain never relaxed, it might effect an upward pressure of the crust, culminating in rupture, and allowing the escape of volcanic rock at the surface. Hence the