

towards the lines of least resistance in the mountain-system, namely, the anticlinal axes of the folds and arches. Thus they accentuate the appearance of upheaval at the surface, and form the axes of the highest chains, which as a rule consist of ancient crystalline rocks.

But as the origin of a mountain-system occupies long geological epochs, many changes of temperature may take place in the subterranean masses. Every rise of temperature causes a new movement of expansion, and the mountain-chains may rise higher and higher above the surrounding areas. Fissures and faults are phenomena of contraction produced by cooling, and are therefore usually younger than the folding and upheaval of the mountain-chains. With every crust-rupture a subsidence of one or both sides of the fissure is commonly associated.

Mellard Reade cites examples chiefly from British and North American geological literature in support of his theory. The weakness of the theory consists in its treatment of mountain-making as a merely local phenomenon; it assumes rather than explains that the expansion of limited crust-blocks by little and little can effect the uprising of vast mountainous tracts.

The American geologist, C. E. Dutton, in a paper "On some of the Greater Problems of Physical Geology," in 1892 also contests the Contraction Theory and proposes his theory of "Isostasy." He points out that the earth's crust is not homogeneous, but consists of heavier and lighter masses; the effort to arrive at equilibrium causes the heavier masses to subside and the lighter masses to rise as crust-buckles. If an area which has already subsided is weighted by thick masses of sediment it must sink farther, and if simultaneously the adjacent crust-buckle is lowered by the agencies of surface denudation, the socket of the arch is so much lightened and rises farther. Should these movements overcome the rigidity of the earth's crust, Dutton supposes that in the littoral sediments, crust-creep or flow takes place towards the continent in course of denudation, and this flow movement may become so intense as to produce folds and build up mountain-chains.

Dr. Reyer, another opponent of the Contraction Theory, has suggested a theory of mountain-making based upon extensive crust-slip. He assumes that every system of crust-folds begins with a crust-rupture and with the sinking of several crust-blocks towards one direction, so that the earth's relief is made unsymmetrical, with a definite slope on one side. If