Thus the earth is still undergoing changes from paroxysmal movements and prolonged oscillations. The changes, while probably more restricted than in the ages of progress, are yet the same in kind.

Characteristics of Disturbed Regions and Mountains.

General Explanations.

1. *The general range of effects.* — A disturbance, in geological usage, is an event in which rocks — formations of wide extent — are moved, and more or less fractured in the process. Over some great areas they have been shoved up or depressed with little variation from horizontality; and over others there have been profound flexures and faults involving thousands of feet of strata throughout regions hundreds of miles wide and thousands long. Explanations and illustrations have already been given of upturned beds, flexures, faults, and flexure-faults (page 99), and of the metamorphism and vein-making, which have attended great mountain-making movements. The object of the present chapter is to present all the various orographic phenomena in their relations as they occur combined in the structure of mountain ranges and systems of ranges, and to explain, so far as is at present possible, the origin of orographic movements and of the resulting structures.

In the first place, some facts in molecular physics of fundamental importance as regards flexures, fractures, and faultings of solids, are here briefly illustrated, and then follow descriptive examples of several mountain-structures, as a prelude to the discussion of the question of origin.

2. *The flow of solids.* — Solid metal and rock, when under pressure, as first illustrated by Tresca, yield through molecular movement, and may thus become compressed, drawn out, flexed, and otherwise deformed. The yielding is very much like that in a bent bag of shot, through movements in the shot. In the case of metals, ice, and rocks of even texture, the change, if slow enough, may take place without fractures. In the bending of a mass of rock or ice by gravity, molecules of one side push the adjoining, and these others throughout the mass, until the adjustment is complete. Hence the density is nowhere changed. The flow of metals is now utilized extensively in the shaping and punching of cold metal for various purposes in the arts. In experiments at the Stevens Institute, Hoboken, by Mr. David Townsend (*Journal of the Franklin Institute* for March, 1878), rectangular blocks of iron, accurately planed and measured (being made about 1·75 inches wide and thick, and 2·5 inches long), were punched cold through the center with a punch $\frac{7}{16}$ of an inch in diameter. The core which came out (Fig. 323) was only $\frac{11}{16}$ of an inch (instead of 1·75 inches $= \frac{28}{16}$) long; and yet, like the punched block, it was essentially *unchanged in density.* Mr. Townsend's experiments and measurements show that six tenths of the metal which had filled the hole had moved off lat-