

that it is gradually diminishing. Lyell and others, however, are of a different opinion, and quote as equalling any of the ancient eruptions, the outbursts from Skapter Jokul, in 1783, and from Mauna Loa and Kilauea in the nineteenth century.

EARTHQUAKES.

Earthquakes almost always precede a volcanic eruption; and cease when the lava gets vent.

Hence, the proximate cause of earthquakes is obvious; viz., the expansive efforts of volcanic matter, confined beneath the earth's surface.

Hence, too, the ultimate cause of volcanoes and earthquakes is the same, whatever that cause may be.

During the paroxysm of the earthquake, heavy rumbling noises are heard: the ground trembles and rocks; fissures open on the surface, and again close, swallowing up whatever may have fallen into them; fountains are dried up; rivers are turned out of their courses; portions of the surface are elevated, and portions depressed; and the sea is agitated and thrown into vast billows.

The *concussions* of earthquakes, or the violent commotions of the surface, are of three kinds: the first being distinguished by a series of perpendicular, the second by horizontal or undulatory, and the third by rotatory motions, following each other in rapid succession. The perpendicular motions act from below upwards; as during the destruction of Riobamba, in 1797, when dead bodies were thrown upon a hill several hundred feet high. The horizontal motions act in an undulating manner, causing an alternate rising and sinking of the earth. The rotatory or circular motions are the most rare, but are the most destructive. They consist of whirling movements of the earth, whereby buildings without being overturned are twisted, parallel rows of trees deflected, and fields when covered with grain made to change their relative positions.

The *progression* of earthquakes is generally in a linear direction, undulating with a velocity of from twenty to thirty geographical miles in a minute. Sometimes the progression is in concussion circles or great ellipses, in which, as from a center, the vibrations extend with decreasing force to the circumference.

Several thousand cases of earthquakes have been recorded. During many of them tracts of land have been elevated or depressed. The following are a few of them. In 1692, a part of Port Poyal, in the West Indies was sunk;