sional pauses of 15 or 20 seconds." Kilauea, in Hawaii, . seems to show a regular system of grand eruptive periods. Dana has pointed out that outbreaks of lava have taken place from that volcano at intervals of from eight to nine years, this being the time required to fill the crater up to the point of outbreak, or to a depth of 400 or 500 feet."

Some volcanoes have exhibited a remarkable paroxysmal phase of activity, when after comparative or complete quiescence a sudden gigantic explosion has taken place, followed by renewed and prolonged repose. Vesuvius supplies the most familiar illustration of this character of volcanic energy. The great eruption of A.D. 79, which truncated the upper part of the old cone of Somma, was a true paroxysmal explosion, unlike anything that had preceded it within historic times, and far more violent than any subsequent manifestation of the same volcano. The crater-basin of Santorin, of which the islands Thera and Therasia represent portions of the rim, seems to have been blown out by some stupendous paroxysm in prehistoric times. The vast explosion of Krakatoa in 1883 was another memorable example. In these instances there was an earlier period of ordinary volcanic activity, during which a large cone was gradually built up. In the case of Somma and Krakatoa the energy died down for a time, and the paroxysm came with hardly any premonitory warning. It has been succeeded by a time of comparatively feeble activity. At Vesuvius the great explosion of 1631, which terminated nearly 1500 years of quiescence, may be regarded as a minor paroxysm, since which the mountain has remained more continuously active.

⁴¹ Trans. Seism. Soc. Japan, ix. part ii. p. 82. ⁴² "Characteristics of Volcanoes," p. 124. On periodicity of eruptions, see Kluge, Neues Jahrb. 1862, p. 582.