

feet in vertical height, and many of the semicircular walls enclosing large cavities or *calderas*, four geographical miles in diameter. From the highest parts of many of these hollows rivers flow, which, in the course of ages, have cut out deep valleys in the mountain's side.*

To this rapid sketch of actually existing volcanic phenomena we may add a brief notice of submarine volcanoes. If these are known to us only in small numbers, the circumstance is explained by the fact that their appearance above the bosom of the sea is almost invariably followed by a more or less complete disappearance; at the same time such very striking and visible phenomena afford a sufficient proof of the continued persistence of volcanic action beneath the bed of the sea-basin. At various times islands have suddenly appeared, amid the ocean, at points where the navigator had not before noticed them. In this manner we have witnessed the island called Graham's, Ferdinanda, or Julia, which suddenly appeared off the south-west coast Sicily in 1831, and was swept away by the waves two months afterwards.† At several periods also, and notably in 1811, new islands were formed in the Azores, which raised themselves above the waves by repeated efforts all round the islands, and at many other points.

The island which appeared in 1796 ten leagues from the northern point of Unalaska, one of the Aleutian group of islands, is specially remarkable. We first see a column of smoke issuing from the bosom of the ocean, afterwards a black point appears, from which bundles of fiery sparks seem to rise over the surface of the sea. During the many months that these phenomena continue, the island increases in breadth and in height. Finally smoke only is seen; at the end of four years, even this last trace of volcanic convulsion altogether ceases. The island continued, nevertheless, to enlarge and to increase in height, and in 1806 it formed a cone, surmounted by four other smaller ones.

In the space comprised between the isles of Santorin, Tharasia, and Aspronisi, in the Mediterranean, there arose, 160 years before our era, the island of *Hyera*, which was enlarged by the upheaval of islets on its margin during the years 19, 726, and 1427. Again, in 1773, Micra-Kameni, and in 1707, Nea-Kameni, made their appearance. These islands increased in size successively in 1709, in 1711, in 1712. According to ancient writers, Santorin, Tharasia, and Aspronisi, made their appearance many ages before the Christian era, at the termination of earthquakes of great violence.

* Lyell's "Elements of Geology," p. 620.

† Ibid, p. 620.