

bases and porphyrites with tuffs and agglomerates. He distinguishes four principal periods of eruption—1. Cambrian and Lower Silurian; 2. Middle and Upper Silurian; 3. Upper Devonian; 4. Carboniferous.¹⁵⁰ The Permian period was marked in Germany and also in the south of France by the discharge of great masses of various quartz-porphyrines. The Triassic period likewise witnessed numerous eruptions. But from that period onward the same remarkable quiescence appears to have reigned all over Europe which characterized the geological history of Britain during Mesozoic time.¹⁵¹ In Tertiary time a prodigious outpouring of lavas, both acid and basic, continued from the Miocene epoch down even perhaps to the historic period. Examples of this great series are met with in Central France, the Eifel, Italy,¹⁵² Bohemia, and Hungary, almost to the existing period.¹⁵³ Recent research has brought to light evidence of a long succession of Tertiary and post-Tertiary volcanic outbursts in Western America (Nevada, Oregon, Idaho, Utah, etc.). Contemporaneous volcanic rocks are associated with Palæozoic, Secondary, and Tertiary formations in New Zealand, and volcanic action there is not yet extinct.

Thus it can be shown that, within the same comparatively limited geographical space, volcanic action has been

¹⁵⁰ Carte Geol. detail. France, No. 7, 1889.

¹⁵¹ Some trifling exceptions to this general statement are said to occur. C. E. M. Rohrbach describes Cretaceous teschenites and diabases in Silesia (Tschermak's *Min. Mittheil.* vii. (1885, p. 15). P. Choffat refers to Cenomanian eruptions in Portugal (*Journ. Sciencias Math. Phys. Natur.* Lisbon, 1884). A. E. Lagorio has found in the Crimea a series of sheets, dikes and bosses, ranging from nevadites to basalts.

¹⁵² For early and classical accounts of the Italian volcanic districts, see Spallanzani's "Voyages dans les deux Siciles," and Breislak's "Voyages Physiques et Lythologiques dans la Campanie." Consult also Mercalli's "Vulcani," etc., and Johnston-Lavis' "South Italian Volcanoes," already cited.

¹⁵³ For a recent attempt to give a stratigraphical and geographical view of the distribution of igneous rocks in Europe, see M. Bertrand, *Bull. Soc. Geol. France*, xvi. (1888), p. 573.