

steam and hot vapors that it might break out into activity at any moment. But in many cases, it is impossible to decide whether a volcano should be called extinct or only dormant. The volcanoes of Silurian age in Wales, of Carboniferous age in Ireland, of Permian age in the Harz, of Miocene age in the Hebrides, of younger Tertiary age in the Western States and Territories of North America, are certainly all extinct. But the older Tertiary volcanoes of Iceland are still represented there by Skaptar-Jökull, Hecla, and their neighbors.<sup>29</sup> Somma, in the first century of the Christian era, would have been naturally regarded as an extinct volcano. Its fires had never been known to have been kindled; its vast crater was a wilderness of wild vines and brushwood, haunted, no doubt, by wolf and wild boar. Yet in a few days, during the autumn of the year 79, the half of the crater walls was blown out by a terrific series of explosions, the present Vesuvius was then formed within the limits of the earlier crater, and since that time volcanic action has been intermittently exhibited up to the present day. Some of the intervals of quietude, however, have been so considerable that the mountain might then again have been claimed as an extinct volcano. Thus, in the 131 years between 1500 and 1631, so completely had eruptions ceased that the crater had once

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<sup>29</sup> On the volcanic phenomena of Iceland consult G. Mackenzie's "Travels in the Island of Iceland during the Summer of 1810." E. Henderson's "Iceland." Zirkel, "De geognostica Islandæ constitutione observationes," Bonn, 1861. Thoroddsen, "Oversigt over de islandske Vulkaners Historie," translated in resumé by G. H. Boehmer, Smithsonian Inst. Rep. 1885, part i. p. 495; also Bihang t. Svensk. Vet. Akad. Handl. 14, ii. (1888), 17, ii. (1891); Geol. Mag. 1880, p. 458; Nature, Oct. 1884. Mitth. K. K. Geogr. Ges. Vienna, xxiv. (1891), p. 117. Keilhack, Zeitsch. Deutsch. Geol. Gesel. xxxviii. (1886), p. 376; Schmidt, op. cit. xxxvii. (1885), p. 737; A. Helland, "Lakis Kratere og Lava-ströme," Universitets Programme, Christiania, 1885; Bréon, "Géologie de l'Islande, et des Iles Foeroe," Paris, 1884; T. Anderson, Journ. Soc. Arts, vol. xl. (1892), p. 397.