

emission. Observations all over the world, however, have now demonstrated that lava, with all its characteristic features, can consolidate on slopes of even 35° and 40° .⁸⁰ The lava in the Hawaii Islands has cooled rapidly on slopes of 25° , that from Vesuvius, in 1855, is here and there as steep as 30° , while the older lavas in Monte Somma are sometimes inclined at 45° . On the east side of Etna, a cascade of lava, which in 1689 poured into the vast hollow of the Cava Grande, has an inclination varying from 18° to 48° , with an average thickness of 16 feet. On Mauna Loa some lava-flows are said to have congealed on slopes of 49° , 60° , and even 90° ,⁸¹ though in these cases it could only be a layer of rock, stiffening and adhering to the surface of the declivity. On the other hand, lava-streams have travelled considerable distances over ground that to the eye looks quite level. Among the Hawaiian Islands a declivity of 1° or less has been quite sufficient for the flow of the extremely liquid and mobile lavas of that region. In the great lava-fields of the Snake River region of the Western Territories of the United States the basalts, which must also have been extremely liquid, have flowed over slopes of much less than 1° .⁸² The breadth and length of a lava-stream, as well as the form of its surface, depend mainly upon the liquidity of the molten material at the time of outflow. Even when it consolidates on a steep slope, a stream of lava forms a sheet with parallel upper and under surfaces, a general uniformity of thickness, and often greater evenness of surface, than where the angle of descent is low. The thickness varies indefinitely; many basalts which have

⁸⁰ Lyell on the consolidation of lava on steep slopes, *Phil. Trans.* 1858.

⁸¹ J. D. Dana, *Amer. Jour. Sci.* xxxv. (1888), p. 32.

⁸² J. D. Dana, "Characteristics of Volcanoes," p. 12.