## James Hutton

upheaved and its hardened sediments had been tilted, plicated and fractured, in order to form the existing dry land, Hutton had next to look round for some probable cause for these phenomena. He inferred that the convulsions could only have been produced by some force that acted from below upward, but was so combined with the gravity and resistance of the mass to which it was applied, as to create a lateral and oblique thrust that gave rise to the contortions of the strata. He did not pretend to be able to explain the nature and operation of this subterranean force, though he believed it to be essentially due to the effects of heat. Far from sharing the ancient misconception that volcanoes are due to the combustion of inflammable substances, he connected them with the high internal temperature of the globe, and regarded them as "spiracles to the subterranean furnace in order to prevent the unnecessary elevation of land, and fatal effects of earthquakes."1

Unlike Werner, Hutton saw that while no mere combustion of inflammable substances could account for this high temperature of the subterranean regions, the actual conditions involved must be so far different from ordinary combustion as not improbably to require no circulation of air, nor any supply of carbonaceous or other materials as fuel. The nucleus of the globe might accordingly "be a fluid mass, melted, but unchanged by the action of heat."

In this way, appealing at every step to the actual facts of nature, Hutton built up the first part of his

<sup>1</sup> Theory of the Earth, vol. i. p. 146. It will be remembered that a similar opinion was expressed by Strabo.