

are intermingled with siliceous, bituminous, or other material which may be melted under the influence of heat. This suggested to Hutton his theory that at a certain depth the sedimentary deposits are melted by the heat to which they are subjected, but that the tremendous weight of the superincumbent water causes the mineral elements to consolidate once more into coherent rock-masses. He applied this theory of the melting and subsequent consolidation of rock-material universally, to all pelagic and terrestrial sediments.

In the third part it is shown that the present land-areas of the globe are composed of rock-strata which have consolidated during past ages in the bed of the ocean. These are said to have been pushed upward by the expansive force of heat, while the strata have been bent and tilted during the upheaval. Hutton next describes the occurrence of crust-fissures both during the consolidation of the rock and during the elevation of large areas, and the subsequent inrush of molten rock or mineral ores into the fissures. He regards volcanoes as safety-valves during upheaval, which by affording exit at the surface for the molten rock-magma and superheated vapours prevent the expansive forces from raising the continents too far.

The evidences of volcanic eruption in the older geological epochs are next discussed. Hutton expresses the opinion that during the earlier eruptions the molten rock-material spread out between the accumulated sediments or filled crust-fissures, but did not actually escape at the surface; consequently, that the older rock-magmas had solidified at great depths in the crust and under enormous pressure of superincumbent rocks. He calls the older eruptive rocks "*subterraneous lavas*," and includes amongst them porphyry and the whinstones (eq. trap-rock, greenstone, basalt, wacke, amygdaloidal rocks); granite was also added in a later treatise. Hutton points out that the subterraneous lavas have a crystalline structure, whereas those that solidify at the surface have a slaggy or vesicular structure.

In the fourth part, Hutton concentrates attention on the pre-existence of older continents and islands from which the materials composing more recent land areas must have been derived. He likewise discusses the evidences of pre-existing pelagic, littoral, and terrestrial faunas from which existing faunas must have sprung. But, he continues, the existence of