in which these two original magmas have been combined are, in Bunsen's view, the cause of the differences of volcanic rocks. We may conceive these two layers to be superposed upon each other, according to relative densities, and the composition of the last material erupted at the surface to depend upon the depth from which it has been derived.[167] The earliest explosions may be supposed to have taken place usually from the upper lighter and more siliceous layer, and the lavas ejected would consequently be in general acid, while later eruptions, reaching down to deeper and heavier zones of the magma, brought up such basic lavas as basalt. Certainly the general similarity of the volcanic rocks all over the globe would appear to prove that there must be considerable uniformity of composition in the zones of intensely hot material from which volcanic rocks are derived.[168]

Many difficulties, however, remain yet to be explained before our knowledge of volcanic action can be regarded as more than rudimentary. In Book IV. Part VII. a description is given of the part volcanic rocks have played in building up what we see of the earth's crust, and the student will there find other illustrations of facts and deductions which have been given in the previous pages.

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[167] See R. Bunsen, Pogg. Ann. lxiii. (1851), p. 204; Sartorius von Waltershausen, "Sicilien und Island," p. 416; Reyer, "Beitrag zur Physik der Eruptionen," iii. Scrope had long before suggested a classification of volcanic rocks into Trachyte, Graystone, and Basalt, Journ. Science, xxi.

[168] In the memoir by Captain Dutton, cited in a previous note, the hypothesis is maintained that the order of appearance of the lavas is determined by their relative density and fusibility, the most basic and heaviest, though most easily fused, requiring the highest temperature to diminish their density to such an extent as to permit them to be erupted.