pressure on the lava underneath, saturated with vapors or superheated water. This lava therefore begins to rise in the funnel until it forces its way through some weak part of the cone, or pours over the top of the crater. After a time, the vapor being expended, the energy of the volcano ceases, and there comes a variable period of repose, until a renewal of the same phenomena brings on another eruption. By such successive paroxysms, the forms of the internal reservoirs and tunnels may be changed; new spaces for the accumulation of superheated water being opened, whence in time fresh volcanic vents issue, while the old ones gradually die out.

An obvious objection to this explanation is the difficulty of conceiving that water should descend at all against the expansive force within. But Daubrée's experiments have shown that, owing to capillarity, water may permeate rocks against a high counter-pressure of steam on the further side, and that so long as the water is supplied, whether by minute fissures or through pores of the rocks, it may, under pressure of its own superincumbent column, make its way into highly heated regions.[164] Experience in deep mines, however, rather goes to show that the permeation of water through the pores of rocks gets feebler as we descend.

Reference may be made here to a theory of volcanic action in which the influence of terrestrial contraction as the grand source of volcanic energy was insisted upon by the late Mr. Mallet.[165] He maintained that all the present mani-

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[164] Daubrée, "Geologie Experimentale," p. 274 (criticised adversely by Fisher, "Physics of Earth's Crust," 2d ed. p. 144). Tschermak, cited on page 450. Reyer, "Beitrag zur Physik der Eruptionen," § 1.

[165] Phil. Trans. 1873. See also Daubrée's experimental determination of the quantity of heat evolved by the internal crushing of rocks. "Geologie Experimentale," p. 448. For an adverse criticism of Mallet's view, see Fisher, op. cit. chap. xxii.