had any appreciable quantity of water been present, whence the absence of alteration may perhaps be explicable on the supposition that these rocks were comparatively dry (p. 519).

Rise of temperature by chemical transformation.—To what extent this cause of internal heat may be operative, forms part of an obscure problem. But that the access of water from the surface, and the consequent hydration of previously anhydrous minerals must produce local augmentation of temperature, cannot be doubted. The conversion of anhydrite into gypsum, which takes place rapidly in some mines, gives rise to an increase of volume of the substance (p. 588). Besides the remarkable manner in which the rock is torn asunder by minute clefts, crystals of bitter-spar and quartz are reduced to fragments.[1] The amount of heat evolved during this process is capable of measurement. The conversion of limestone into dolomite, on the other hand, which involves a diminution of volume, might likewise be made the subject of similar experimental inquiry. Experiments with various kinds of rocks, such as clay-slate, clay, and coal, show that when these substances are reduced to powder and mixed with water, they evolve heat.[2]

Rise of temperature by rock-crushing.—A further store of heat is provided by the internal crushing of rocks during the collapse and readjustment of the crust. The amount of heat so produced has been made the subject of direct experiment. Daubrée has shown that, by the mutual friction of its parts, firm brick-clay can be heated in three-quarters of an hour from a temperature of 18° to one of 40° C. (65° to

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[1] The microscopic structure of the stages in the conversion of anhydrite into gypsum is described by F. Hammerschmidt, Tschermak's Mineral. Mittheil. v. (1883), p. 272.

[2] W. Skey, Chem. News, xxx. p. 290.