

nately comprised under the term joint. The following theories may be enumerated.

(1) *Contraction*.—The contraction of rocks gives rise to fissures of retreat in their mass, whether it results from the drying and consolidation of aqueous sediments, or from the cooling of masses that have been molten or have been highly heated. The prismatic or columnar system of joints observable in the gypsum of the Paris Basin, of which the beds are divided from top to bottom into vertical hexagonal prisms, may be an instance of this cause.⁴ A columnar structure has often been superinduced upon stratified rocks (sandstone, shale, coal) by contact with intrusive igneous masses (Book IV. Part VIII).

(2) *Crystalline or Magnetic Forces*.—Jointing has been regarded as referable to forces analogous to those that have produced the cleavage of minerals, the difference between the two arising perhaps from the forces in the case of jointing being subordinated to terrestrial magnetism, while those concerned in mineral cleavage are obedient to crystalline polarity.⁵ But this theory has met with little support.

(3) *Compression*.—Jointing has been associated by some authors with cleavage as a result of the lateral compression of rocks (p. 532).

(4) *Torsion*.—From experiments on the behavior of various substances under the strain of torsion, M. Daubrée concludes that a system of joints may be explained as the results of the torsion of strata arising during the movements to which the crust of the earth has been subjected.⁶

⁴ Jukes's "Manual," 3d edition, p. 180.

⁵ Prof. W. King, Trans. Roy. Irish Acad. xxv. 1875, p. 641.

⁶ "Etudes de Geologie Experimentale," p. 300, and ante, p. 541.