It will be recollected that the main laws of phenomena for which we have to account, by means of such an hypothesis, are the following :—

(1.) The law of Boyle and Mariotte, that the elasticity of an air varies as its density. See Chap. iii., Sect. 1 of this Book.

(2.) The Law of Gay-Lussac and Dalton, that all airs expand equally by heat. See Chap. ii. Sect. 1.

(3.) The production of heat by sudden compression. See Chap. ii. Sect. 2.

(4.) Dalton's principle of the mechanical mixture of airs. See Chap. iii. Sect. 3.

(5.) The Law of expansion of solids and fluids by heat. See Chap. ii. Sect. 1.

(6.) Changes of consistence by heat, and the doctrine of latent heat. See Chap. ii. Sect. 3.

(7.) The Law of the expansive force of steam. See Chap. iii. Sect. 4.

Besides these, there are laws of which it is doubtful whether they are or are not included in the preceding, as the low temperature of the air in the higher parts of the atmosphere. (See Chap. iii. Sect. 5.)

Laplace's hypothesis[4] is this :—that bodies consist of particles, each of which gathers round it, by its attraction, a quantity of caloric : that the particles of the bodies attract each other, besides attracting the caloric, and that the particles of the caloric repel each other.

In gases, the particles of the bodies are so far removed, that their mutual attraction is insensible, and the matter tends to expand by the mutual repulsion of the caloric. He conceives this caloric to be constantly radiating among the particles; the density of this internal radiation is the *temperature*, and he proves that, on this supposition, the elasticity of the air will be as the density, and as this temperature. Hence follow the three first rules above stated. The same suppositions lead to Dalton's principle of mixtures (4), though without involving his mode of conception; for Laplace says that whatever the mutual action of two gases be, the whole pressure will be equal to the sum of the separate pressures.[5] Expansion (5), and the changes of consistence (6), are explained by supposing[6] that in solids, the mutual attraction of the particles of the body is the greatest force; in liquids, the attraction of the particles for the caloric; in airs, the repulsion of

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[4] *Méc. Cél.* t. v. p. 89. [5] Ib. p. 110. [6] Ib. p. 92.