Sect. 3.—Dalton's Doctrine of Evaporation.

A portion of that which appears to be the true notion of evaporation was known, with greater or less distinctness, to several of the physical philosophers of whom we have spoken. They were aware that the vapor which exists in air, in an invisible state, may be condensed into water by cold: and they had noticed that, in any state of the atmosphere, there is a certain temperature lower than that of the atmosphere, to which, if we depress bodies, water forms upon them in fine drops like dew; this temperature is thence called the *dew-point*. The vapor of water which exists anywhere may be reduced below the degree of heat which is necessary to constitute it vapor, and thus it ceases to be vapor. Hence this temperature is also called the *constituent temperature*. This was generally known to the meteorological speculators of the last century, although, in England, attention was principally called to it by Dr. Wells's *Essay on Dew*, in 1814. This doctrine readily explains how the cold produced by rarefaction of air, descending below the constituent temperature of the contained vapor, may precipitate a dew; and thus, as we have said, refutes one obvious objection to the theory of independent vapor.

The other difficulty was first fully removed by Mr. Dalton. When his attention was drawn to the subject of vapor, he saw insurmountable objections to the doctrine of a chemical union of water and air. In fact, this doctrine was a mere nominal explanation; for, on closer examination, no chemical analogies supported it. After some reflection, and in the sequel of other generalizations concerning gases, he was led to the persuasion, that when air and steam are mixed together, each follows its separate laws of equilibrium, the particles of each being elastic with regard to those of their own kind only: so that steam may be conceived as flowing among the particles of air[12] "like a stream of water among pebbles;" and the resistance which air offers to evaporation arises, not from its weight, but from the inertia of its particles.

It will be found that the theory of independent vapor, understood with these conditions, will include all the facts of the case;—gradual evaporation in air; sudden evaporation in a vacuum; the increase of

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[12] *Manchester Memoirs*, vol. v. p. 581