

mercury, its density will be doubled, the air being compressed into one half the space. If the pressure be increased threefold, the density is also trebled; and so on. The same law was soon afterwards (in 1676) proved experimentally by Mariotte. And this law of the air's elasticity, that the density is as the pressure, is sometimes called the *Boylean Law*, and sometimes the *Law of Boyle and Mariotte*.

Air retains its aerial character permanently; but there are other aerial substances which appear as such, and then disappear or change into some other condition. Such are termed *vapors*. And the discovery of their true relation to air was the result of a long course of researches and speculations.

[2nd Ed.] [It was found by M. Cagniard de la Tour (in 1823), that at a certain temperature, a liquid, under sufficient pressure, becomes clear transparent vapor or gas, having the same bulk as the liquid. This condition Dr. Faraday calls the *Cagniard de la Tour* state, (the *Tourian* state?) It was also discovered by Dr. Faraday that carbonic acid gas, and many other gases, which were long conceived to be permanently elastic, are really reducible to a liquid state by pressure.<sup>1</sup> And in 1835, M. Thilorier found the means of reducing liquid carbonic acid to a solid form, by means of the cold produced in evaporation. More recently Dr. Faraday has added several substances usually gaseous to the list of those which could previously be shown in the liquid state, and has reduced others, including ammonia, nitrous oxide, and sulphuretted hydrogen, to a solid consistency.<sup>2</sup> After these discoveries, we may, I think, reasonably doubt whether all bodies are not capable of existing in the three *consistencies* of solid, liquid, and air.

We may note that the law of Boyle and Mariotte is not exactly true near the limit at which the air passes to the liquid state in such cases as that just spoken of. The diminution of bulk is then more rapid than the increase of pressure.

The transition of fluids from a liquid to an airy consistence appears to be accompanied by other curious phenomena. See Prof. Forbes's papers on the *Color of Steam under certain circumstances*, and on the *Colors of the Atmosphere*, in the *Edin. Trans.* vol. xiv.]

<sup>1</sup> *Phil. Trans.* 1823.

<sup>2</sup> *Ib.* Pt. I. 1845.