

amount of labor, of persevering and combined observation, the progress of this branch of knowledge requires. I do not even speak of the condition of the more elevated parts of the atmosphere. The diminution of temperature as we ascend, one of the most marked of atmospheric facts, has been variously explained by different writers. Thus Dalton²⁸ (1808) refers it to a principle "that each atom of air, in the same perpendicular column, is possessed of the same degree of heat," which principle he conceives to be entirely empirical in this case. Fourier says²⁹ (1817), "This phenomenon results from several causes: one of the principal is the progressive extinction of the rays of heat in the successive strata of the atmosphere."

Leaving, therefore, the application of thermotical and atmological principles in particular cases, let us consider for a moment the general views to which they have led philosophers.

CHAPTER IV.

PHYSICAL THEORIES OF HEAT.

WHEN we look at the condition of that branch of knowledge which, according to the phraseology already employed, we must call *Physical Thermotics*, in opposition to *Formal Thermotics*, which gives us detached laws of phenomena, we find the prospect very different from that which was presented to us by physical astronomy, optics, and acoustics. In these sciences, the maintainers of a distinct and comprehensive theory have professed at least to show that it explains and includes the principal laws of phenomena of various kinds; in Thermotics, we have only attempts to explain a part of the facts. We have here no example of an hypothesis which, assumed in order to explain one class of phenomena, has been found also to account exactly for another; as when central forces led to the precession of the equinoxes, or when the explanation of polarization explained also double refraction; or when the pressure of the atmosphere, as measured by the barometer, gave the true velocity of sound. Such coincidences, or *consiliences*, as I have elsewhere called them, are the test of truth; and thermotical theories cannot yet exhibit credentials of this kind.

²⁸ *New Syst. of Chem.* vol. i. p. 125.

²⁹ *Ann. Chim.* vi. 285.