extensive class of phenomena which are not produced by mechanical forces, but which result solely from the presence and accumulation of heat. This part of natural philosophy cannot be brought under dynamical theories; it has principles peculiar to itself, and is based upon a method similar to that of the other exact sciences.[1] . . . The dilatations, indeed, caused by the repulsive force of heat, the observation of which dilatations serves as a measure of temperature, are dynamical effects; but it is not these dilatations which we calculate when we investigate the laws of the propagation of heat."[2] He proceeds to build up this new science "upon a very small number of simple facts, of which the causes are unknown, but which are gathered by observation and confirmed by experiments,"[3] and he thus arrives at certain general relations, expressed in the form of equations, which are different from, though analogous to, and not less rigorous than, the general equations of dynamics.

One of the great experimental facts upon which Fourier bases his theory of the propagation (*i.e.*, the conduction and radiation) of heat is this, that all motion of heat depends on differences of temperature. He examines how differences of temperature are equalised and deduces the law of the flow of heat.[4] Although he does

[1] Fourier, 'Théorie analytique,' p. 13.

[2] Ibid., p. 14.

[3] Ibid., pp. xi, 18, 39.

[4] I cannot here omit to point out how elegantly Prof. Mach has translated into the language of common-sense the whole process of Fourier for establishing the fundamental equation of the theory. See his 'Principien der Wärmelehre' (Leipzig, 1896), pp. 78, &c., 116 *sqq.* Every student of physics should read the chapters referring to this subject. The mathematical formulæ will thus become living to him; but he will also see how necessary the abstract mathematical expression of common-sense conceptions is in order to avoid false reasoning.