

the general circumstances of the earth, and are perfectly in accordance with the principles on which Fourier's theory rests.

2. *Climate*.—The term *climate*, which means *inclination*, was applied by the ancients to denote that inclination of the axis of the terrestrial sphere from which result the inequalities of days in different latitudes. This inequality is obviously connected also with a difference of thermotical condition. Places near the poles are colder, on the whole, than places near the equator. It was a natural object of curiosity to determine the law of this variation.

Such a determination, however, involves many difficulties, and the settlement of several preliminary points. How is the temperature of any place to be estimated? and if we reply, by its *mean* temperature, how are we to learn this mean? The answers to such questions require very multiplied observations, exact instruments, and judicious generalizations; and cannot be given here. But certain first approximations may be obtained without much difficulty; for instance, the mean temperature of any place may be taken to be the temperature of deep springs, which is probably identical with the temperature of the soil below the reach of the annual oscillations. Proceeding on such facts, Mayer found that the mean temperature of any place was nearly proportional to the square of the cosine of the latitude. This, as a law of phenomena, has since been found to require considerable correction; and it appears that the mean temperature does not depend on the latitude alone, but on the distribution of land and water, and on other causes. M. de Humboldt has expressed these deviations<sup>12</sup> by his map of *isothermal lines*, and Sir D. Brewster has endeavored to reduce them to a law by assuming two *poles of maximum cold*.

The expression which Fourier finds<sup>13</sup> for the distribution of heat in a homogeneous sphere, is not immediately comparable with Mayer's empirical formula, being obtained on a certain hypothesis, namely, that the equator is kept constantly at a fixed temperature. But there is still a general agreement; for, according to the theory, there is a diminution of heat in proceeding from the equator to the poles in such a case; the heat is propagated from the equator and the neighboring parts, and radiates out from the poles into the surrounding space. And thus, in the case of the earth, the solar heat enters in the tropical

<sup>12</sup> British Assoc. 1853. Prof. Forbes's *Report on Meteorology*, p. 215.

<sup>13</sup> Fourier. *Mém. Inst.* tom. v. p. 173.