

it; but Fourier, who was the most distinguished of the cultivators of this mathematical doctrine of conduction, follows a course of reasoning in which the difficulty does not present itself. Indeed it is stated by Laplace, in the Memoir above quoted,³ that Fourier had already obtained the true fundamental equations by views of his own.

The remaining part of the history of the doctrine of conduction is principally the history of Fourier's labors. Attention having been drawn to the subject, as we have mentioned, the French Institute, in January, 1810, proposed, as their prize question, "To give the mathematical theory of the laws of the propagation of heat, and to compare this theory with exact observations." Fourier's Memoir (the sequel of one delivered in 1807,) was sent in September, 1811; and the prize (3000 francs) adjudged to it in 1812. In consequence of the political confusion which prevailed in France, or of other causes, these important Memoirs were not published by the Academy till 1824; but extracts had been printed in the *Bulletin des Sciences* in 1808, and in the *Annales de Chimie* in 1816; and Poisson and M. Cauchy had consulted the manuscript itself.

It is not my purpose to give, in this place,⁴ an account of the analytical processes by which Fourier obtained his results. The skill displayed in these Memoirs is such as to make them an object of just admiration to mathematicians; but they consist entirely of deductions from the fundamental principle which I have noticed,—that the quantity of heat conducted from a hotter to a colder point is proportional to the excess of heat, modified by the *conductivity*, or conducting power of each substance. The equations which flow from this principle assume nearly the same forms as those which occur in the most general problems of hydrodynamics. Besides Fourier's solution, Laplace, Poisson, and M. Cauchy have also exercised their great analytical skill in the management of these formulæ. We shall briefly speak of the comparison of the results of these reasonings with experiment, and notice some other consequences to which they lead. But before we can do this, we must pay some attention to the subject of radiation.

³ Laplace, *Mém. Inst.* for 1809, p. 538.

⁴ I have given an account of Fourier's mathematical results in the *Reports of the British Association for 1835*.