

laws are such as to secure us from increasing and destructive inequalities of heat; the arbitrary magnitudes are elements to which the organic world is adjusted.

CHAPTER IX.

The Laws of Heat with respect to Water.

THE manner in which heat is transmitted through fluids is altogether different from the mode in which it passes through solids; and hence the waters of the earth's surface produce peculiar effects upon its condition as to temperature. Moreover, water is susceptible of evaporation in a degree depending upon the increase of heat; and in consequence of this property it has most extensive and important functions to discharge in the economy of nature. We will consider some of the offices of this fluid.

1. Heat is communicated through water, not by being *conducted* from one part of the fluid to another, as in solid bodies, but (at least principally) by being *carried* with the parts of the fluid by means of an intestine motion. Water expands and becomes lighter by heat, and, therefore, if the upper parts be cooled below the subjacent temperature, this upper portion will become heavier than that below, bulk for bulk, and will descend through it, while the lower portion rises to take the upper place. In this manner the colder parts descend, and the warmer parts ascend by contrary currents, and by their interchange and mixture, reduce the whole to a temperature at least as low as that of the surface. And this equalization of temperature by means of such currents, is an operation of a much more rapid nature than the slow motion of conduction by which heat creeps through a solid body. Hence, alternations of heat and cold,