INSTRUCTIONS TO OBSERVERS.

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There is considerable difference in the expansion produced in different kinds of bodies by the same increase of temperature. The expansion is least for solids, it is greater for liquids, and greatest for elastic fluids, such as air. Thus ordinary glass acquires an increase of about .000015 of its volume when its temperature increases 1°, while for an increase of 1° mercury expands about .0001 of its bulk, alcohol about .0006, and ordinary atmospheric air .002.

The expansion of water is irregular. As the temperature of water rises from 32° to 39°.2, instead of expanding it *contracts*; but above the latter temperature it expands, although at an unequal rate.

(68) On the Distribution of Heat among Bodies by Conduction, Convection and Radiation.— Whether bodies be in close proximity with each other, or be separated by distances small or great, the heat existing in them has a tendency to distribute itself among them until they attain an equality of, temperature. This distribution of heat is effected by the following three modes:

- (1) By Conduction.
- (2) By Convection.
- (3) By Radiation.

(69) Conduction, and Conductivity or Conducting Power.-When the transmission of heat from one particle or body to another is effected by the successive heating of the intermediate particles by contact communication, in the order reckoned from the warmer to the colder, the process is called "conduction." A familiar example is that of a metal rod held with one end in the fire, while the other is in the hand. When the particles contiguous to those in the fire receive heat from them, they in turn transmit it by contact to adjacent colder particles. and these latter to others, and so on, until after a time some of the heat reaches the hand. Substances differ greatly in the facility with which they conduct heat. If a spoon of metal be kept dipped in boiling water, the handle will soon become inconveniently hot; while if the spoon be of wood or earthenware it may be held without inconvenience, because the wood and earthenware have not such a facility as metals for conducting heat. While the process by which heat is transmitted from particle to particle is called conduction, the substance in relation to that process is called a conductor, and the property whereby the body conducts heat with greater or less rapidity is its conductivity or conducting power.

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