judgment the conditions of their experiments and comparisons, making one quantity vary while the others remained constant. In this manner they found, that *the quickness of cooling for a constant excess of temperature, increases in geometrical progression, when the temperature of the surrounding space increases in arithmetical progression;* whereas, according to the Newtonian law, this quickness would not have varied at all. Again, this variation being left out of the account, it appeared that *the quickness of cooling, so far as it depends on the excess of temperature of the hot body, increases as the terms of a geometrical progression diminished by a constant number, when the temperature of the hot body increases in arithmetical progression.* These two laws, with the coefficients requisite for their application to particular substances, fully determine the conditions of cooling in a vacuum.

Starting from this determination, MM. Dulong and Petit proceeded to ascertain the effect of the medium, in which the hot body is placed, upon its rate of cooling; for this effect became a *residual phenomenon*,[20] when the cooling in the vacuum was taken away. We shall not here follow this train of research; but we may briefly state, that they were led to such laws as this;—that the rapidity of cooling due to any gaseous medium in which the body is placed, is the same, so long as the excess of the body's temperature is the same, although the temperature itself vary;—that the cooling power of a gas varies with the elasticity, according to a determined law; and other similar rules.

In reference to the process of their induction, it is worthy of notice, that they founded their reasonings upon Prevost's law of exchanges; and that, in this way, the second of their laws above stated, respecting the quickness of cooling, was a mathematical consequence of the first. It may be observed also, that their temperatures are measured by means of the air-thermometer, and that if they were estimated on another scale, the remarkable simplicity and symmetry of their results would disappear. This is a strong argument for believing such a measure of temperature to have a natural prerogative of simplicity. This belief is confirmed by other considerations; but these, depending on the laws of *expansion* by heat, cannot be here referred to; and we must proceed to finish our survey of the mathematical theory of heat, as founded on the phenomena of radiation and conduction, which alone have as yet been traced up to general principles.

We may observe, before we quit this subject, that this correction of

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[20] See *Phil. Ind. Sciences*, B. xiii. c. 7, Sect. iv.