

available energy: he introduced the word "motivity," the conception of a quantity of a "possession the waste of which is called dissipation." Whilst Thomson was thus putting into scientific language and calculating an important and obvious property of nature—namely this, that her processes mainly proceed in a certain definable direction—Rankine and Clausius were labouring independently at the mathematical wording, the analytical expression, of this remarkable discovery. Wherever a change in a system of various elements, factors, or quantities takes place mainly in a definite sense or direction, it is presumable that there exists a definite quantity which is always growing or always decreasing. This quantity may not be directly observable or measurable, as in mechanical motion velocity or distance is directly measurable; it may be hidden—we may have no special sense with which we can perceive it, as we possess a pressure sense, a heat sense, a sound and light sense; nevertheless, it may be indirectly discoverable, being made up (a function) of definite observable quantities and factors (such as heat, temperature, mass, volume, pressure, &c.) Now Rankine and Clausius found that in all thermal changes

*mechanische Wärmetheorie,* vol. i. p. 387, and vol. ii. p. 324 *sqq.* A great deal of this confusion would have been avoided had Tait in 1868 introduced a really new term—viz., that suggested later (1876) by Thomson in a communication to the Royal Society of Edinburgh, and more fully explained in a paper in the 'Phil. Mag.,' May 1879, the term "Thermo-dynamic Motivity." We should then have two terms, inasmuch as the "con-

sideration of the *energy* and *motivity*, as two functions of all the independent variables specifying the condition of a body completely in respect to temperature, elasticity, capillary attraction, electricity, and magnetism, leads in the simplest and most direct way to demonstrations of the theorems regarding the thermo-dynamic properties of matter" (*loc. cit.*, 'Papers,' vol. i. p. 459).