

(358.) A similar analogy leads us to conclude that all aëriform fluids are merely liquids kept in the state of vapor by heat. Many of them have been actually condensed into the liquid state by cold accompanied with violent pressure; and as our means of applying these causes of condensation have improved, more and more refractory ones have successively yielded. Hence we are fairly entitled to extend our conclusion to those which we have not yet been able to succeed with; and thus we are led to regard it as a general fact, that the liquid and aëriform or vaporous states are entirely dependent on *heat*; that, were it not for this cause, there would be nothing but solids in nature; and that, on the other hand, nothing but a sufficient intensity of heat is requisite to destroy the cohesion of every substance, and reduce all bodies, first to liquids, and then into vapor.

(359.) But solids, themselves, by the abstraction of heat shrink in dimension, and at the same time become harder, and more brittle; yielding less to pressure, and permitting less separation between their parts by tension. These facts, coupled with the greater compressibility of liquids, and the still greater of gases, strongly induce us to believe that it is heat, and heat alone, which holds the particles of all bodies at that distance from each other which is necessary to allow of compression; which in fact gives them their elasticity, and acts as the antagonist force to their mutual attraction, which would otherwise draw them into actual contact, and retain them in a state of absolute immobility and impenetrability. Thus we learn to regard heat as one of the great maintaining powers of the universe, and to attach to all its laws and relations a degree of importance which may justly entitle them to the most assiduous inquiry.

(360.) It was first ascertained by Dr. Black that when heat produces the liquefaction of a solid, or the conversion of a liquid into vapor, the liquid or the vapor resulting is no *hotter* than the solid or liquid from which it was produced, though a great deal of heat has been expended in producing this effect, and has actually entered into the substance.