Physics of the Ether - SECTION XI

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SECTION XI

94. Maximum Values of Cohesion, etc. — The phenomena of "cohesion," "chemical union," &c, or the general phenomena of the aggregation of molecules being dependent on the molecular vibrations as a physical cause, it would therefore be reasonable to conclude that variation of vibrating energy (variation of " temperature ") would have a most marked influence on these phenomena; as is found to be the fact. Further, since when a physical cause ceases to exist, the effect also ceases; it follows that at the absolute zero of temperature (absence of vibrating energy) the general phenomena of " cohesion," including the aggregation of molecules in " chemical union," would cease to exist. Also, since an increase of vibrating energy (elevation of" temperature") above a certain degree has the effect of separating all molecules from each other, as illustrated by the effect termed * evaporation " in the case of molecules of similar vibrating periods, and the effect termed " dissociation," in the case of molecules of dissimilar vibrating periods (molecules aggregated in chemical union), it follows, therefore, that a maximum value must exist for " cohesion," or in the case of the aggregation of molecules generally; or for every substance a certain degree of vibrating energy (temperature) must exist, which is most favourable to the stable aggregation of the molecules; an elevation of temperature above this point, or a fall of temperature below this point, being both followed by a weakening of the cohesion of the molecules of the substance.

Since the aggregation of similar molecules to form masses (usually distinctively termed " cohesion ") has a less stability than the more intimate grouping of dissimilar molecules about a common centre in definite numbers (definite proportions) to form clusters or compound molecules (chemical union), it would be reasonable to conclude that signs of a weakening of the molecular action, by lowering the temperature, would first present themselves in the case of "cohesion," though it is quite possible that the comparatively feeble means of reducing temperature at our command (when compared with the absolute temperature) might not be sufficient to give marked signs of a weakening of the molecular action. We are not aware that experiments with the best possible means for lowering the temperature have been made with this special object, nevertheless there may be certain effects which have presented themselves, and which would tend to illustrate this point. Thus it is a well-known and prevalent opinion, grounded on observation, that metals, such as iron, become brittle or more liable to fracture at low temperatures, which would indicate a weakening of the molecular action; indeed, it is perhaps scarcely a questionable point that an extreme reduction of temperature does conduce to render substances brittle or more friable,

which would tend to the same conclusion. However, since all substances on the earth's surface have a high absolute temperature, it would not perhaps be reasonable to expect marked effects to present themselves under the circumstances of the case. If, on the other hand, we turn to the case of cosmical matter in space, which may recede to vast distances from the sun, then the conclusion is necessary that the effect in question must occur. Although the absolute zero of temperature cannot be said to exist anywhere, since the stellar radiations must have their effect in all parts of the ether of the visible universe, still in the case of masses removed to vast distances from the sun, where the wave movement set up in the ether by the sun's action might be practically said to have ceased to exist, then the conclusion is necessary that the almost total loss of vibrating energy by the molecules of the mass by continual dissipation in the ether, must have its effect on the energy of the molecular action dependent on vibrating energy, resulting in almost total loss of cohesion by the mass. It is quite possible, however, that such effects under these conditions might escape our notice. However, there may be certain ob- served facts which would point to this, and which may perhaps be worth noticing in connection with this subject. Taking the case of those cosmical masses known as meteors: these bodies are of relatively small mass, and are known in some cases to recede to vast distances from the sun, the orbits of some of them having been determined, and, as a significant fact, identified in certain cases with those of comets. If there were an actual physical connection between these bodies and comets, it would appear as if an actual change or disintegration of the matter of these bodies were going on. The small mass of these meteoric bodies, and the

great distances to which some of them recede from the sun, would be precisely the two physical conditions most favourable to produce the effect in question. What may be the origin of the meteoric dust known to exist ? We do not mean to put forward that there is actually conclusive physical indication of the disintegration of matter at a low temperature, but what evidence there is would seem to favour the conclusion, which is at all events a necessary one on theoretic grounds.

The possibility of the separation of the molecules of matter effecting itself at a low temperature would appear to have an important bearing on the question as to the perpetuity of 'physical phenomena, or the continuance of physical change in the universe; for the separation of molecules would be the one condition necessary to render possible the eventual combination of the molecules under the action of the ether with the evolution of heat and light, or this would be the physical condition required for physical processes to recur or to repeat themselves, as consistent with the continuance of physical change and activity in the universe.