made of thermodynamics (the department of science which is especially concerned with the laws of energy transformation) a subject which few who cultivate the physical sciences may disregard. Countless developments and achievements of thermodynamics give very real ground for the belief that we may speculate about the transformations of energy in the universe with the same assurance that we have in discussing chemical changes.

Our reasons for confidence in the truth of current general notions of energy, and in their adequacy to account for any phenomena so far as energy is concerned, wherever life exists in the universe, are manifold, and not unlike those which have been reviewed in discussing the elements.

Centuries of search have revealed, in addition to that most obvious form which is studied in dynamics, a very small number of varieties or manifestations of energy, such as heat, electricity, magnetism, optical energy, and chemical energy. Such manifestations of energy are by no means confined to the earth or to the solar system. Indeed Newton first worked out the general laws of dynamics and erected them into a complete science with the aid, not of terrestrial, but of astro-