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PRESENT STATUS OF THEORY AND EXPERIMENT AS TO ATOMIC DISINTEGRATION AND ATOMIC SYNTHESIS[1]

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MY task to-night is to attempt to trace the history of the development of scientific evidence bearing on the question of the origin and destiny of the physical elements. I shall list ten discoveries or developments all made within the past hundred years which touch in one way or another upon this problem and constitute indications or sign-posts on the road toward an answer. Prior to the middle of the nineteenth century little experimental evidence of any sort had appeared, so that the problem was wholly in the hands of the philosopher and the theologian. Then came, first, the discovery of the equivalence of heat and work and the consequent formulation of the principle of the conservation of energy, probably the most far-reaching physical principle ever developed.

[1] Address of the retiring president of the American Association for the Advancement of Science, Cleveland, December 29, 1930.

Following this and directly dependent upon it came, second, the discovery, or formulation, of the second law of thermodynamics which was first interpreted, and is still interpreted by some, as necessitating the ultimate "heat-death" of the universe and the final extinction of activity of all sorts; for all hot bodies are observed to be radiating away their heat, and this heat, after having been so radiated away into space, apparently can not be reclaimed by man. This is classically and simply stated in the humpty-dumpty rhyme.

As a natural if not a necessary corollary to this was put forward by some, in entire accord with the demands of medieval theology, a *deus ex machinâ* to initially wind up or start off this running-down universe.

Then came, third, the discovery, through studies both in geology and biology, of the facts of evolution