

ancient faunas assumes an abundant vegetation, and direct evidence of extinct floras is presented in the coal and bituminous deposits of the Carboniferous and other epochs. Other evidence is afforded in the silicified trunks of trees that occasionally are found in marine deposits, and have clearly been swept into the sea from adjacent lands.

Hutton then sets forth, in passages that have become classic in geological science, the slow processes of the subaerial denudation of land-surfaces. He describes the effects of atmospheric weathering, of chemical decomposition of the rocks, of their demolition by various causes, and the constant attrition of the soil by the chemical and mechanical action of water. He elucidates with convincing clearness the destructive physical, chemical, and mechanical agencies that effect the dissolution of rocks, the work of running water in transporting the worn material from the land to the ocean, the steady subsidence of coarser and finer detritus that goes on in seas and oceans, lakes and rivers, and the slow accumulation of the deposits to form rock-strata. Hutton impresses upon his readers the vastness of the geological æons necessary for the completion of any such cycle of destruction and construction. In proof of this, he calls attention to the comparative insignificance of any changes that have taken place in the surface conformation of the globe within historic time.

Hutton was thus the great founder of physical and dynamical geology; he for the first time established the essential correlation in the processes of denudation and deposition; he showed how, in proportion as an old continent is worn away, the materials for a new continent are being provided, how the deposits rise anew from the bed of the ocean, and another land replaces the old in the eternal economy of nature. The outcome of Hutton's argument is expressed in his words "that we find no vestige of a beginning,—no prospect of an end."

When we compare Hutton's theory of the earth's structure with that of Werner and other contemporary or older writers, the great feature which distinguishes it and marks its superiority is the strict inductive method applied throughout. Every conclusion is based upon observed data that are carefully enumerated, no supernatural or unknown forces are resorted to, and the events and changes of past epochs are explained from analogy with the phenomena of the present age.

The undeveloped state of physics and chemistry in the time