

based only on a *rational foundation*—that is to say, of being deduced from ideas alone.

It seems to me that a like degree of empiricism attaches to the Description of the Universe and to Civil History; but in reflecting upon physical phenomena and events, and tracing their causes by the process of reason, we become more and more convinced of the truth of the ancient doctrine, that the forces inherent in matter, and those which govern the moral world, exercise their action under the control of primordial necessity, and in accordance with movements occurring periodically after longer or shorter intervals.

It is this necessity, this occult but permanent connection, this periodical recurrence in the progressive development of forms, phenomena, and events, which constitute *nature*, obedient to the first impulse imparted to it. Physics, as the term signifies, is limited to the explanation of the phenomena of the material world by the properties of matter. The ultimate object of the experimental sciences is, therefore, to discover laws, and to trace their progressive generalization. All that exceeds this goes beyond the province of the physical description of the universe, and appertains to a range of higher speculative views.

Emanuel Kant, one of the few philosophers who have escaped the imputation of impiety, has defined with rare sagacity the limits of physical explanations, in his celebrated essay *On the Theory and Structure of the Heavens*, published at Königsberg in 1755.

The study of a science that promises to lead us through the vast range of creation may be compared to a journey in a far-distant land. Before we set forth, we consider, and often with distrust, our own strength, and that of the guide we have chosen. But the apprehensions which have originated in the abundance and the difficulties attached to the subjects we would embrace, recede from view as we remember that with the increase of observations in the present day there has also arisen a more intimate knowledge of the connection existing among all phenomena. It has not unfrequently happened, that the researches made at remote distances have often and unexpectedly thrown light upon subjects which had long resisted the attempts made to explain them within the narrow limits of our own sphere of observation. Organic forms that had long remained isolated, both in the animal and vegetable kingdom, have been connected by the discovery of intermediate links or stages of transition. The geography of beings endow-