

In truth, we know causes only by their effects; and in order to learn the nature of the causes which modify the earth, we must study them through all ages of their action, and not select arbitrarily the period in which we live as the standard for all other epochs. The forces which have produced the Alps and Andes are known to us by experience, no less than the forces which have raised Etna to its present height; for we learn their amount in both cases by their results. Why, then, do we make a merit of using the latter case as a measure for the former? Or how can we know the true scale of such force, except by comprehending in our view all the facts which we can bring together?

In reality when we speak of the *uniformity* of nature, are we not obliged to use the term in a very large sense, in order to make the doctrine at all tenable? It includes catastrophes and convulsions of a very extensive and intense kind; what is the limit to the violence which we must allow to these changes? In order to enable ourselves to represent geological causes as operating with uniform energy through all time, we must measure our time by long cycles, in which repose and violence alternate; how long may we extend this cycle of change, the repetition of which we express by the word *uniformity*?

And why must we suppose that all our experience, geological as well as historical, includes more than *one* such cycle? Why must we insist upon it, that man has been long enough an observer to obtain the *average* of forces which are changing through immeasurable time?

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now in progress." In the sixth edition, in that which is, I presume, the corresponding passage, although it is transferred from the fourth to the first Book (B. i. c. xiii. p. 325) he recommends, instead, "an earnest and patient inquiry how far geological appearances are reconcileable with the effect of changes now in progress." But while Mr. Lyell has thus softened the advocate's character in his language in this passage, the transposition which I have noticed appears to me to have an opposite tendency. For in the former edition, the causes now in action were first described in the second and third Books, and the great problem of Geology, stated in the first Book, was attempted to be solved in the fourth. But by incorporating this fourth Book with the first, and thus prefixing to the study of existing causes arguments against the belief of their geological insufficiency, there is an appearance as if the author wished his reader to be prepared by a previous pleading against the doctrine of catastrophes, before he went to the study of existing causes. The Doctrines of Catastrophes and of Uniformity, and the other leading questions of the Palætiological Sciences, are further discussed in the *Philosophy of the Inductive Sciences*, Book x.]