causes purely hypothetical, such as a shifting of the earth's axis of rotation, bringing the sea to overflow the land, by a change in the place of the longer and shorter diameters of the spheroidal figure, nor to tides produced by the attraction of comets suddenly approaching very near the earth, nor to any other fanciful and arbitrarily assumed hypotheses; but rather endeavor to confine themselves to a careful consideration of causes evidently in action at present, with a view to ascertain how far they, in the first instance, are capable of accounting for the facts observed, and thus legitimately bringing into view, as residual phenomena, those effects which cannot be so accounted for. When this shall have been in some measure accomplished, we shall be able to pronounce with greater security than at present respecting the necessity of admitting a long succession of tremendous and ravaging catastrophes and cataclysms,—epochs of terrific confusion and violence which many geologists (perhaps with justice) regard as indispensable to the explanation of the existing features of the world. We shall learn to distinguish between the effects which require for their production the sudden application of convulsive and fracturing efforts, and those, probably not less extensive, changes which may have been produced by forces equally or more powerful, but acting with less irregularity, and so distributed over time as to produce none of those *interregnums* of chaotic anarchy which we are apt to think (perhaps erroneously) great disfigurements of an order so beautiful and harmonious as that of nature.

(321.) But to estimate justly the effects of causes now in action in geology is no easy task. There is no *à priori* or deductive process by which we can estimate the amount of the annual erosion, for instance, of a continent by the action of meteoric agents, rain, wind, frost, &c., nor the quantity of destruction produced on its coasts by the direct violence of the sea, nor the quantity of lava thrown up *per annum* by volcanoes over the whole surface of the earth, nor any similar effect. And to consult experience on all such points, is a slow and pain-