land has really been witnessed so often, and on such a scale, as to qualify it for a *vera causa* available in sound philosophy.

(139.) To take another instance, likewise drawn from the same deservedly popular science:—The fact of a great change in the general climate of large tracts of the globe, if not of the whole earth, and of a diminution of general temperature, having been recognised by geologists, from their examination of the remains of animals and vegetables of former ages enclosed in the strata, various causes for such diminution of temperature have been assigned. Some consider the whole globe as having gradually cooled from absolute fusion; some regard the immensely superior activity of former volcanoes, and consequent more copious communication of internal heat to the surface, in former ages, as the cause. Neither of these can be regarded as real causes in the sense here intended; for we do not *know* that the globe has so cooled from fusion, nor are we sure that such supposed greater activity of former than of present volcanoes really did exist. A cause, possessing the essential requisites of a *vera causa*, has, however, been brought forward* in the varying influence of the distribution of land and sea over the surface of the globe: a change of such distribution, in the lapse of ages, by the degradation of the old continents, and the elevation of

* Lyell's Principles of Geology, vol. i. Fourrier, Mém. de l'Acad. des Sciences, tom. vii. p. 592. L'établissement et le progrès des sociétés humaines, l'actions des forces naturelles, peuvent changer notablement, et dans de vastes contrées, l'état de la surface du sol, la distribution des eaux, et les grands mouvemens de l'air. De tels effets sont propres à faire varier, dans le cours de plusieurs siècles, le dégré de la chaleur moyenne; car les expressions analytiques comprennent des coefficiens qui se rapportent à l'état superficiel, et qui influent beaucoup sur la valeur de la température." In this enumeration, by M. Fourrier, of causes which may vary the general relation of the surface of extensive continents to heat, it is but justice to Mr. Lyell to observe, that the gradual shifting of the *places* of the continents themselves on the surface of the globe, by the abrading action of the sea on the one hand, and the elevating agency of subterranean forces on the other, does not expressly occur, and cannot be fairly included in the general sense of the passage, which confines itself to the consideration of such changes as may take place on the existing surface of the land.