

which the recognisable strata of the earth's crust with their fossil remains indicate as having occurred in former ages. It was an attempt to "reconcile the former and the present state of nature."¹ This was to break with the idea of great and general convulsions, to which the Continental school resorted in their explanations, and it also meant upsetting the vague notions which set a limit to the time² which should be allowed for the operations of natural causes. It is possible to admit that in both directions, in their uniformitarian explanation and in their geological time-reckoning, the new school frequently went too far, the indications of actual catastrophes and paroxysmal convulsions being to many observers quite unmistakable. On the other side, the arguments based upon physical astronomy, mechanics, and thermodynamics, which afford an independent basis for geological time-reckoning, were not yet elaborated,³ or were deemed too crude⁴ to be of value; and for a good while geologists were permitted

¹ Lyell, vol. i. p. 114.

² Id. *ibid.*, p. 241: "When difficulties arise in interpreting the monuments of the past, I deem it more consistent with philosophical caution to refer them to our present ignorance of all the existing agents, or all their possible effects in an indefinite lapse of time, than to causes formerly in operation but which have ceased to act."

³ See Lyell, vol. i. p. 154, &c., also vol. ii. p. 274: "It has long been a favourite conjecture that the whole of our planet was originally in a state of igneous fusion, and that the central parts still retain a great portion of their primitive heat. Some have imagined with the late Sir W. Herschel that the

elementary matter of the earth may have been first in a gaseous state, resembling those nebulae which we behold in the heavens, and which are of dimensions so vast that some of them would fill the orbits of the remotest planets of our system. . . . Without dwelling on such speculations which can never have any direct bearing on geology," &c.

⁴ See Lyell, vol. i. p. 206, where he refers to "astronomical causes of fluctuations in climate," and to the calculations of Sir J. Herschel and the fact that "this matter is still under discussion," and that "M.M. Fourier and Herschel have arrived at very different opinions."