

tion ; secondly, joints ; and thirdly, slaty cleavage ; the two last having no connexion with true bedding, and having been superinduced by causes absolutely independent of gravitation. . . Before treating of joints, it may be well to speak of the probable origin of slaty cleavage in those cases where it is decidedly unconnected with sedimentary deposition. It must be referred to crystalline or polar forces acting simultaneously and somewhat uniformly, in given directions, on large masses having a homogeneous composition. . . The cause of this tendency to a jointed structure is by no means understood.* Here we have pure conjecture as to the origin of cleavage, and a confession of ignorance as to the cause of joints. We are assured by geological writers that influences now operative in the globe would produce (plenty of time being allowed) all the appearances presented by its contents. This is the grand principle of modern geology in the estimation, at least, of some of its advocates ; and yet the important exception occurs of new races taking the place of extinct races—a revolution many a time repeated in the earth's geological history,

* Lyell's Principles of Geology, book iv., chap. 27.