

evidently, formed after the rocks on which they rest. Even were we to admit the subsequent fusion of granite, it obviously, preexisted, in another form, as a substratum of the upper rocks, as these must always have had a foundation. It has been before observed, that those rocks which contain different species of organic remains, separated by strata in which no such remains occur, must have been formed, in succession, over each other, and probably at very distant intervals of time. This inference appears conclusive, nor can it be invalidated, by the crystalline arrangement and cleavage of some of those rocks.\*

Rocks, of the primary class, frequently cover each other in an order, which, viewed on a grand scale, may be said to be conformable; but, the different rocks in each class are generally of such vast and irregular thickness, that their order of succession is often, not easy to trace: besides, some of these rocks pass, by a change of structure, into each other, and their line of junction or separation can, seldom, be observed. Viewed, however, as composing mountain chains, the more general arrangement is represented Plate III. fig. 1. Granite, or the foundation rock, *a*; gneiss, *b*; mica slate, *c*; common slate (called clay slate); *d d*. The transition series, *e e*. The lower strata with coal, *f f*. A bed of limestone, or any other rock, in a slate mountain, is represented, *x x*: in this position it is said to be *imbedded*; and if a number of these beds occur, at different intervals, they are said to be subordinate. A bed of conglomerate, composed of bowlders and fragments of the lower rocks, as at *g*, is frequently interposed, between slate rocks and transition limestone.

The unconformable position of unstratified rocks is represented Plate III. fig. 2., where a mass of porphyry *A*, ranging from *c* to *c*, covers the rocks 1, 2, 3, without any conformity to the inclination or form of the lower beds. The lower beds are, however, cut through by veins of porphyry, which indicate that the porphyry had been erupted, in a melted state, through these veins, and poured over the surface of the lower rocks. A similar arrangement of porphyry, which occurs in Norway, will be described in Chap. IX.

Basalt, either massive or columnar, frequently, covers rocks in an unconformable position. See Plate III. fig. 2. *B*, *d*, and *b*.

The superincumbent rocks, in this situation, are evidently, of more recent origin than those which they cover: the lower must have been hard and unyielding, when the upper were thrown upon

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\* We have reason to believe that many rocks which present no indications of stratification, were, originally, arranged in regular strata. In some limestone rocks, where the stratification is extremely well defined by distinct partings, there occur spaces in which different strata are blended into one mass. These masses are called by the quarrymen, knobs, and are more hard and difficult to work than the stratified limestone, but are equally good in quality.