

position, giving rise to the superposition of crystalline upon fossiliferous formations.

It was remarked, in Chap. XXXIV., that as the hypogene rocks, both stratified and unstratified, crystallize originally at a certain depth beneath the surface, they must always, before they are upraised and exposed at the surface, be of considerable antiquity, relatively to a large portion of the fossiliferous and volcanic rocks. They may be forming at all periods; but before any of them can become visible, they must be raised above the level of the sea, and some of the rocks which previously concealed them must have been removed by denudation.

In Canada the fossiliferous beds of the Cambrian formation repose unconformably on gneiss, which was evidently crystalline before the deposition of the Cambrian (or Potsdam) sandstone. In Anglesea, as was before remarked, the metamorphism of the schists, according to the observations of Professor Ramsay, took place during the Lower Silurian period. Coupling these conclusions with the fact that a hypogene texture has been superinduced in the Alps on Middle Eocene deposits (see p. 600), we cannot doubt that, hereafter, geologists will succeed in detecting crystalline schists of almost every age in the chronological series, although the quantity of metamorphic rocks visible at the surface must, for reasons above explained, diminish rapidly in proportion as the monuments of newer eras are investigated.

*Order of succession in metamorphic rocks.*—There is no universal and invariable order of superposition in metamorphic rocks, although a particular arrangement may prevail throughout countries of great extent, for the same reason that it is traceable in those sedimentary formations from which crystalline strata are derived. Thus, for example, we have seen that in the Apennines, near Carrara, the descending series, where it is metamorphic, consists of, 1st, saccharine marble; 2dly, talcoschist; and 3dly, of quartz-rock and gneiss; where unaltered, of, 1st, fossiliferous limestone; 2dly, shale; and 3dly, sandstone.

But if we investigate different mountain chains, we find gneiss, mica-schist, hornblende-schist, chlorite-schist, hypogene limestone, and other rocks, succeeding each other, and alternating with each other, in every possible order. It is, indeed, more common to meet with some variety of clay-slate forming the uppermost member of a metamorphic series than any other rock; but this fact by no means implies, as some have imagined, that all clay-slates were formed at the close of an imaginary period, when the deposition of the crystalline strata gave way to that of ordinary sedimentary deposits. Such clay-slates, in fact, are variable in composition, and sometimes alternate with fossiliferous strata, so that they may be said to belong almost equally to the sedimentary and metamorphic order of rocks. It is probable that had they been subjected to more intense plutonic action, they would have been transformed into hornblende-schist, foliated chlorite-schist, scaly talcose-schist, mica-schist, or other more perfectly crystalline rocks, such as are usually associated with gneiss.