

but rather to agencies at work in a cooling igneous mass. The igneous origin of gneisses, petrosilex-porphyrines, diorites, serpentines, and even of magnetic and specular iron ores was held and taught almost universally by our geologists a generation since, and has still its avowed partizans; some maintaining that these various crystalline rocks are portions of the first-formed crust of the planet, while others imagine them to be volcanic matters extravasated at more recent date; in either case however, more or less modified by supposed metasomatic processes. By the term *metasomatosis* are conveniently designated those changes which are not simply internal (*diagenesis*), but are effected from without,—as a result of which the chemical elements of the original rock are supposed to be either wholly or in part replaced by others from external sources (*epigenesis*).

The other school, to which allusion has been made, and which, not less than the preceding, has helped to discourage, in the writer's opinion, the intelligent geognostical study of the crystalline stratiform rocks, is that which believes them to be, in great part at least, the result of chemical changes, often metasomatic in their nature, which have been effected in paleozoic and more recent sedimentary beds, obliterating their organic remains, and transforming them into crystalline strata. According to this view, feldspathic, hornblendic, and micaceous stratiform crystalline rocks having similar mineralogical and lithological characters, may belong to widely separated geological periods,—while the same geological series may, in one part of its distribution, consist of uncrystalline silicious, calcareous, and argillaceous fossiliferous sediments, and in another locality, not far remote, be found, as the result of subsequent changes effected in these strata, transformed into gneiss, hornblende-schist or mica-schist, by what is vaguely designated as metamorphism.

The recent history of geology abounds in striking illustrations of the fact that in a great number of cases these views have been based on misconceptions in stratigraphy, and without entering into the discussion of the question, it may be said that, in the writer's opinion, careful stratigraphical study will, in all cases, suffice to show the error, both of the plutonic and the metamorphic hypotheses of the origin of crystalline rocks. The former is supported chiefly by the lithological resemblances between certain stratified and unstratified rocks, and by the appearances of stratification occasionally found in these; while the latter is