cases, the crushed particles have crystallized into a granulitic structure, or the recrystallization has taken place along the flow-planes and has given rise to a perfect foliation. The action that produced cleavage, if further developed, might be accompanied with sufficient augmentation of temperature to permit of extensive mineralogical transformation along the cleavage-planes. But probably a rise of temperature was not essential. The conversion of pyroxene into hornblende, which has been observed in regions of crystalline schists, points indeed to a lower temperature than that required for the crystallization of the original mineral.[70] A schistose structure of almost any degree of coarseness might conceivably be produced. A mixed rock, such as granite, has been converted into a foliated gneiss. Diorite, diabase, or gabbro has likewise by mechanical movement, with accompanying chemical and crystallographic transformation, been made to assume a schistose structure and pass into amphibolite-schist.

The study of metamorphism and metamorphic rocks leads us from unaltered mechanical sediments at the one end, into thoroughly crystalline masses at the other. We are presented with a cycle of change wherein the same particles of mineral matter pass from crystalline rocks into sedimentary deposits, then by increasing stages of alteration back into crystalline masses, whence, after being reduced to detritus and redeposited in sedimentary formations, they may be once more launched on a similar series of transformations. The phenomena of metamorphism appear to be linked together with those of igneous action as connected manifestations of hypogene change.

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[70] See G. H. Williams, Amer. Journ. Sci. 3d ser. xxviii. (1884), p. 259.