

mineral masses has been produced. These forces are probably identical, on the one hand, with the cohesive forces from which rocks derive their solidity and their physical properties; while, on the other hand, they are closely connected with the forces of chemical attraction. No attempts, of any lucid and hopeful kind, have yet been made to bring such forces under definite mechanical conceptions: and perhaps mineralogy, to which science, as the point of junction of chemistry and crystallography, such attempts would belong, is hardly yet ripe for such speculations. But when we look at the universal prevalence of crystalline forms and cleavages, at the extent of the phenomena of slaty cleavage, and at the *segregation* of special minerals into veins and nodules, which has taken place in some unknown manner, we cannot doubt that the forces of which we now speak have acted very widely and energetically. Any elucidation of their nature would be an important step in Geological Dynamics.

[2nd Ed.] [A point of Geological Dynamics of great importance is, the change which rocks undergo in structure after they are deposited, either by the action of subterraneous heat, or by the influence of crystalline or other corpuscular forces. By such agencies, sedimentary rocks may be converted into crystalline, the traces of organic fossils may be obliterated, a slaty cleavage may be produced, and other like effects. The possibility of such changes was urged by Dr. Hutton in his Theory; and Sir James Hall's very instructive and striking experiments were made for the purpose of illustrating this theory. In these experiments, powdered chalk was, by the application of heat under pressure, converted into crystalline calcspar. Afterwards Dr. McCulloch's labors had an important influence in satisfying geologists of the reality of corresponding changes in nature. Dr. McCulloch, by his very lively and copious descriptions of volcanic regions, by his representations of them, by his classification of igneous rocks, and his comprehensive views of the phenomena which they exhibit, probably was the means of converting many geologists from the Wernerian opinions.]

Rocks which have undergone changes since they were deposited are termed by Mr. Lyell *metamorphic*. The great extent of metamorphic rock changed by heat is now uncontested. The internal changes which are produced by the crystalline forces of mountain masses have been the subjects of important and comprehensive speculations by Professor Sedgwick.]