

*more of the ingredients of rocks and simple minerals.* If a calcareous sandstone, for instance, should be permeated by water containing some ingredients that would abstract the carbonic acid, a porous quartz rock would remain, with perhaps some silicate of lime. Most of the magnesia of the talcose schists of the Green and Hoosic Mountains has been removed, as the chemists prove by analysis. If one or more proportions of oxygen were abstracted from peroxide of iron or manganese, quite different ores would result. In this way have many of the simple minerals and many of the rocks been essentially changed.

3. Similar results, only more complicated, would result from the introduction of new ingredients, held in solution by the water diffused through the plastic materials. Hence mineralogists reckon a large number of what they call pseudomorphs; that is, minerals which have the crystalline form of other minerals whose cavities they occupy. In this way, too, the characters of rocks may be essentially changed.

4. Though the problem be often quite difficult, yet chemical geologists have been able to point out a great number of these metamorphoses in the rocks with much probability, by comparing the composition of the unchanged with the changed. We give some examples.

Clay slate has been converted into mica schist, talcose schist, gneiss, and granite.

The origin of clay slate from clay is obvious to the most common inspection.

Almost any of the silicious sedimentary rocks can be converted into mica schist. Indeed, hand specimens of micaceous sandstones can hardly be distinguished from mica schist. This rock has also been derived from chlorite schist and from greenstone.

Mica may be produced from feldspar. That in sandstone was not improbably formed by the agency of meteoric water, subsequent to the deposition of the sandstone.

Talc, steatite, and chlorite have been found to result from the decomposition of feldspar, hornblende, augite, garnet, mica, etc. The excess of silica in these minerals may have produced the quartz in talcose and chloritic schists.

Pulverulent carbonate of lime, such as chalk and marl, readily becomes crystalline or saccharine by being brought into a liquid condition, as is sometimes seen in the vicinity of trap dikes.

Bischoff contends that dolomite, which is a double carbonate of lime and magnesia, is produced wherever there is "a formation of carbonate of lime by water containing bicarbonate of magnesia, which is one of the most common constituents of spring water." Hunt, of the Canada Survey, maintains that "dolomites, magnesites, and magnesian marls, have had their origin in sediments of magnesian carbonate, formed by the evaporation of solutions of bi-