

It is important to note, however, that coal has seldom been metamorphosed into coke. As to the limestone, it is sometimes, as we have seen, transformed into marble; we even find in its interior divers minerals, notably silicates with a calcareous base, such as garnets, pyroxene, hornblende, &c. The sandstones and clay-slates have alike been altered.

The surrounding deposit and the eruptive rock are both frequently impregnated with quartz, carbonate of lime, sulphate of baryta, fluorides, and, in a word, with the whole tribe of metalliferous minerals, which present themselves, besides, with the characteristics which are common to them in the veins.

GENERAL METAMORPHISM.

Sedimentary rocks sometimes exhibit all the symptoms of metamorphism where there is no evidence of direct eruptive action, and that upon a scale much grander than in the case of special metamorphism. It is observable over whole regions, in which it has modified and altered simultaneously all the surrounding rocks. This state of things is called general, or normal, metamorphism. The fundamental gneiss, which covers such a vast extent of country, is the most striking instance known of general metamorphism. It was first described by Sir W. E. Logan, Director of the Canadian Geological Survey, who estimates its thickness at 30,000 feet. The Laurentian Gneiss is a term which is used by geologists to designate those metamorphic rocks which are known to be older than the Cambrian system. They are parts of the old pre-Cambrian continents which lie at the base of the great American continent, Scandinavia, the Hebrides, &c.; and which are largely developed on the west coast of Scotland. In order to give the reader some idea of this metamorphism, we shall endeavour to trace its effects in rocks of the same nature, indicating the characters successively presented by the rocks according to the intensity of the metamorphism to which they have been subjected.

Combustibles, which have a special composition, totally different from all other rocks, are obviously the first objects of examination. When we descend in the series of sedimentary deposits, the combustibles are observed completely to change their characters. From the *peat* which is the product of our own epoch, we pass to *lignite*, to *coal*, to *anthracite*, and even to *graphite*; and find that their density increases, varying up to at least double. Hydrogen, nitrogen, and,