

Clay slate is a metamorphosed clay, differing from shale in having a superinduced tendency to split into thin plates, which may or may not coincide with the lamination of the rock.

Limestones embrace many varieties, as massive limestone, granular limestone, marbles, dolomite, oolite, chalk, and travertine. Most of these varieties are chemical deposits.

The time during which a number of rocks grouped into a formation is in the process of deposition, that is, until some important change takes place in the material or mode of production, is called a *geological period*; and the point of time when the change occurs is called an *epoch*.

We learn much of the history of the world from the lithological characters of the stratified rocks. They indicate the mode of formation; whether it was mechanical or chemical; whether the temperature was adapted to the existence of animals and plants; and in connection with fossils, whether a deposit was marine or fresh water; whether the deposition was made by a rough current or in placid waters; and whether the water was deep or shallow.

We shall describe the lithological characters of each of the great systems in succession, beginning with the lowest stratified rock, and proceeding in an ascending order. In this way we shall incidentally read the history of the earth during the different periods. The unstratified rocks, sometimes associated with the sedimentary groups, will be described subsequently. According to our classification, the rocks are divided into the following systems:

I. STRATIFIED ROCKS.

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| I. Azoic, | II. Palæozoic, |
| III. Mesozoic, | IV. Cainozoic. |

I. AZOIC, HYPOZOIC (*Sedgwick*), LAURENTIAN SYSTEM (*Logan*.)

The rocks to be described (including granite, porphyry, etc.,) were formerly called *Primary*, because they were supposed to have been produced before the deposition of the fossiliferous strata; whereas it now appears that several of these rocks have in some instances been formed at a later period. The term *Azoic* signifies *unfossiliferous*, and is the most satisfactory appellation for these crystalline rocks, which are not only the oldest rocks upon the globe, but are also found among the higher groups. The term *Hypozoic*, signifies that the rocks embraced in the system lie beneath those containing fossils. The term *Metamorphic*, which is sometimes applied to them, implies that they have been altered since their original production: but the same is true of some rocks containing fossils. The term Laurentian applies only to the lower part of the Azoic rocks, the upper part forming the Huronian system. It is a local name, derived from the Laurentine Mountains, in Canada, where this system is well developed. Prof. H. D. Rogers calls the Hypozoic or Laurentian rocks, Gneissic, and the Huronian, Azoic.

A subdivision of the Laurentian system has been proposed by Logan, which has not yet been carried out into details; viz., into those rocks which contain lime, either as carbonate, or as a lime feldspar, and those which are destitute of lime in any form. There is no certain order of superposition among the different groups of this formation; but we shall describe them in the order in which geologists have supposed them most commonly to occur.