

IN the first chapter it was stated that the four great classes of rocks, the aqueous, the volcanic, the plutonic, and the metamorphic, would each be considered not only in reference to their mineral characters, and mode of origin, but also to their relative age. In regard to the aqueous rocks, we have already seen that they are stratified, that some are calcareous, others argillaceous or siliceous, some made up of sand, others of pebbles; that some contain freshwater, others marine fossils, and so forth; but the student has still to learn which rocks, exhibiting some or all of these characters, have originated at one period of the earth's history, and which at another.

To determine this point in reference to the fossiliferous formations is more easy than in any other class, and it is therefore the most convenient and natural method to begin by establishing a chronology for these strata, and then to refer as far as possible to the same divisions the several groups of plutonic, volcanic, and metamorphic rocks. Such a system of classification is not only recommended by its greater clearness and facility of application, but is also best fitted to strike the imagination by bringing into one view the contemporaneous revolutions of the inorganic and organic creations of former times. For the sedimentary formations are most readily distinguished by the different species of fossil animals and plants which they inclose, and of which one assemblage after another has flourished and then disappeared from the earth in succession.

But before entering specially on the subdivisions of the aqueous rocks arranged according to the order of time, it will be desirable to say a few words on the chronology of rocks in general, although in doing so we shall be unavoidably led to allude to some classes of phenomena which the beginner must not yet expect fully to comprehend.

It was for many years a received opinion, that the formation of entire families of rocks, such as the plutonic and those crystalline schists spoken of in the first chapter as metamorphic, began and ended before any members of the aqueous and volcanic orders were produced; and although this idea has long been modified, and is nearly exploded, it will be necessary to give some account of the ancient doctrine, in order that beginners may understand whence many prevailing opinions, and some part of the nomenclature of geology, still partially in use, was derived.

About the middle of the last century, Lehman, a German miner, proposed to divide rocks into three classes, the first and oldest to be called primitive, comprising the hypogene, or plutonic and metamorphic rocks; the next to be termed secondary, comprehending the aqueous or fossiliferous strata; and the remainder, or third class, corresponding to our alluvium, ancient and modern, which he referred to "local floods, and the deluge of Noah." In the primitive class, he said; such as granite and gneiss, there are no organic remains, nor any signs of materials derived from the ruins of pre-existing rocks. Their origin, therefore, may have been purely chemical, antecedent to the creation of living beings, and probably coeval with the birth of the world itself. The secondary formations, on the contrary, which often contain sand, pebbles, and organic remains, must have been mechanical deposits, produced after the