

It may perhaps be suggested that some metamorphic strata, and some granites, may be anterior in date to the oldest of the primary fossiliferous rocks. This opinion is doubtless true, and will be discussed in future chapters; but I may here observe, that when we arrange the four classes of rocks in four parallel columns in one table of chronology, it is by no means assumed that these columns are all of equal length; one may begin at an earlier period than the rest, and another may come down to a later point of time. In the small part of the globe hitherto examined, it is hardly to be expected that we should have discovered either the oldest or the newest members of each of the four classes of rocks. Thus, if there be primary, secondary, and tertiary rocks of the aqueous or fossiliferous class, and in like manner primary, secondary, and tertiary hypogene formations, we may not be yet acquainted with the most ancient of the primary fossiliferous beds, or with the newest of the hypogene.

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## CHAPTER IX.

### ON THE DIFFERENT AGES OF THE AQUEOUS ROCKS.

On the three principal tests of relative age—Superposition, mineral character, and fossils—Change of mineral character and fossils in the same continuous formation—Proofs that distinct species of animals and plants have lived at successive periods—Distinct provinces of indigenous species—Great extent of single provinces—Similar laws prevailed at successive geological periods—Relative importance of mineral and palæontological characters—Test of age by included fragments—Frequent absence of strata of intervening periods—Principal groups of strata in western Europe.

In the last chapter I spoke generally of the chronological relations of the four great classes of rocks, and I shall now treat of the aqueous rocks in particular, or of the successive periods at which the different fossiliferous formations have been deposited.

There are three principal tests by which we determine the age of a given set of strata; first, superposition; secondly, mineral character; and, thirdly, organic remains. Some aid can occasionally be derived from a fourth kind of proof, namely, the fact of one deposit including in it fragments of a pre-existing rock, by which the relative ages of the two may, even in the absence of all other evidence, be determined.

*Superposition.*—The first and principal test of the age of one aqueous deposit, as compared to another, is relative position. It has been already stated, that where strata are horizontal, the bed which lies uppermost is the newest of the whole, and that which lies at the bottom the most ancient. So, of a series of sedimentary formations, they are like volumes of history, in which each writer has recorded the annals of his own