in fresh waters will differ in its fossils still more widely from that made synchronously in salt waters; a rock made in shallow waters from one made at great depths; a rock made in the tropics from one made in the temperate zone or the arctic, provided the zones at the time of the making differed as they do now in climate. Hence, *a very considerable difference in the fossils of rocks is consistent with their being contemporaneous in origin.*

2. As a consequence of the above facts, or the dependence of life on food, temperature, and other physical conditions, *migrations in species or faunas* will take place whenever there is a marked change in the waters; it may be for a few miles or many. Barrande, first in 1852, pointed to examples of such migrations in his "Colonies," as he styled them; cases of advanced occurrence locally of a fauna that afterwards disappeared, but later became the prevailing fauna of a region, which he explained by *migration*, implying, as Geikie observes, that "particular species appeared with the conditions favorable to their spread and disappeared when these ceased." The case is the same when the fauna of a bed, which has apparently become extinct, has recurrences in an overlying stratum whenever there is a recurrence of the kind of deposit. In and out the species go with the changing conditions. Hence, as H. S. Williams has said, "the actual order of faunas met with in a vertical section is not necessarily expressive of biological sequence, but only of the sequence of the occupants of that particular area." Such recurrences of species are likely to be met with in all regions where fine shales, coarse shales, argillaceous sandstones, quartzose sandstones, with or without limestones of varying purity, are in alternation.

3. *The difference in the time at which species or groups have begun to exist in different regions.* The several continents may not have been exactly parallel, in all the steps of progress in the life of the globe. Certain families may have commenced a little earlier in one than in another; or again, one continental sea or region, over a continent, may have received some of its species by *migration* from another, long after their first appearance. Here is a source of doubt: what may be due, on one side, to special *continental idiosyncrasies* in condition or history, and, on the other, to *migrational distribution*, is always to be carefully considered. An example of the doubts and difficulties which may be thus occasioned is afforded by the Cretaceous and Tertiary formations of North America and Europe. Fossil plants of the Rocky Mountain Cretaceous have been pronounced Tertiary by European paleontologists who judged from comparisons with European Tertiary species; and yet the animal fossils of associated beds made it certain that they were Cretaceous: and the query has thence arisen whether the European plants may not be the successors of emigrants of Cretaceous American species which, through this means, became characteristic in Europe of a post-Cretaceous period, or, whether the differences are not indigenous to the separate continents.

4. *The difference in the time at which species or groups of species of different regions have become extinct.* In one region, changes may have caused