

already received local names extend into the adjoining, the introduction of new names in the latter is a wrong to the science.

5. In all cases, the characteristics of the species and the beds should be carefully scrutinized, lest abruptness due to local migrations (as those caused by slight changes of depth or currents and kinds of sea-bottom) should be mistaken for abruptness of real importance.

Physical and Organic Breaks. — Prominent among the events influencing the rock-structure and life of a continent is that of mountain-making. The Appalachian Mountains stand as a grand time-boundary between the Paleozoic æon and the Mesozoic; and cotemporaneous orographic movements make a like limit in European geology. Moreover, it was attended by the most remarkable of organic breaks. The Taconic mountains mark the close of the Lower Silurian, an epoch of abrupt change in North America; and parallel disturbances occurred in Britain and Europe. The Laramide or post-Cretaceous mountain system along the Rocky Mountains is another such boundary for America, separating Mesozoic and Cenozoic time, though not as complete in the attendant organic break as in the physical. But it so happens that no corresponding event occurred at this time in Europe, the orographic movements most nearly synchronous taking place after the commencement of Cenozoic time. Nevertheless, the organic break at the close of the Cretaceous period is even greater for Europe than for America. Such a fact seems to show that there was some other catastrophic event concerned; but its nature is yet to be studied out.

Part of the breaks referred to above were limited in their effects to the hemisphere including America, Europe, northern and middle Asia, and northern Africa. The opposite hemisphere, that of India, Australia, and South Africa, has been more or less independent, although the two were alike in many characteristics; and owing to this, the boundary closing Paleozoic time, so strongly marked in the geological history of Europe and America, cannot be satisfactorily defined in the latter. The coal period is of later date than that of Europe and America, it occurring in the Permian, and the Permian period blends with the Triassic.

Such orographic time-boundaries are registered not only in the rocks that are upturned, but also in unconformabilities between them and the succeeding rocks. It is important to note, however, as already stated, that *the unconformability exists only in upturned regions*. A short distance away, the succeeding beds will be found lying conformably over the same kinds that are upturned in the mountains; moreover, the organic break there may be less pronounced, and in more distant regions it may fail altogether. The unconformability is, however, none the less important as a time-boundary, for orographic upturnings have been events of great geographical extent after long ages of preparation.

The Subdivisions. — The several grades of subdivisions of geological time are named (1) *Æons*, (2) *Eras*, (3) *Periods*, (4) *Epochs*; and the corresponding terms applied to the formations are *Series*, *Systems*, *Groups*,