

2. Subordinate divisions should recognize the same criterion, but should depend for their limits, as far as practicable, on physical breaks or events registered in the rock-series, and on abrupt transitions in kinds or groups of fossils. Since the latter are dependent on physical changes, they are a convenient criterion when characterizing large areas.

3. When subordinate divisions of the higher grades have been established on any continent, or part of a continent, these divisions should be recognized and adopted as nearly as possible in the study of other regions, and their limits determined if possible by means of the fossils; for only in this way can the history of different regions be brought together into one system. For example: the Permian period, recognized and defined in European geological history, should have its place in American geological history, however intimately the beds and their fossils in America may blend with those of the Carboniferous period. So also the Devonian of Europe should be recognized and have like limits, as nearly as may be, in the Devonian of America. A degree of fixedness in the higher subdivisions and their names is necessary to prevent confusion in the literature of the science and the frustration of its great purpose, — the production of a comprehensive earth-history.

4. Inferior subordinate divisions so far depend on local conditions, that those of different continents, and even of distant parts of the same continent, generally require, in the first study of a region, special designations to avoid assumptions of closer relationships or equivalency than can be made out. The different continents, and often also unlike regions of the same continent, have had their special histories. The periods and epochs of America and Europe are not in general the same in limits, and much less so in rocks. The Devonian subdivisions are different on the two continents; and it is far from certain, also, that the commencement assigned to the Devonian in North America is synchronous with that in Europe. In the Carboniferous, Reptilian, and Mammalian eras the American epochs differ from the European. There is much diversity between the subdivisions in New York and those of the Mississippi valley, and still greater between these and the subdivisions of the Pacific slope and border. Even in Pennsylvania the formations fail of many of the subdivisions that are prominent in New York.

Hence in the study of a new region it is necessary at the outset to make arbitrary subdivisions of its formations, such as may seem most convenient and natural, and give them local names. These names have at first only a note-book value. When the relations of the beds to those recognized in other regions have been ascertained through fossils, the facts begin to take their places in the general geological history of the country; and should the correlation be complete, the local names may give way to those generally accepted elsewhere.

It is of the highest importance to remember that state boundaries are only political limits, and not, ordinarily, at least in America, true geographical or geological limits; and if the subdivisions of one state which have