

Miocene. Dr. Sandberger divides the strata of the Mayence basin into two sections, an older and a newer, the former confessedly the equivalent of the Limburg (or Hempstead) beds, while in the upper he finds some fossil remains, which appear to him to have a more modern character. But when we separate from this higher division the sands of Eppelsheim, containing bones of *Deinotherium* and *Mastodon longirostris* which are most probably of falunian age, the rest of his upper series may be as old as the Limburg beds, though, for want of good sections, there is much obscurity in regard to the grouping of the beds. Dr. Sandberger, however, gives a list of twelve shells, besides some teeth of fish and other fossils, which are common to the Mayence basin and the Hesse-Cassel sands. Now the latter were classed as Subapennine or Pliocene by Philippi, and, although we have as yet no sufficient data for determining their true age, appear clearly to belong to a more modern fauna than that of the Mayence basin. If such a relationship could be established between the two as to indicate a passage from the Hesse-Cassel fauna to that of the Mayence beds, this fact would doubtless go some way towards bearing out the views of the author.

The reader has probably by this time begun to perceive that one cause of embarrassment, experienced in the classification of these tertiary formations, arises from the discovery of several missing links in the chain of historical records. I may remind him that for more than twenty years I have advocated in the Principles of Geology the doctrine that there has been a continual coming in of new species, and dying out of old ones, and a gradual change in the physical geography and climate of the earth, and not such a reiteration of sudden revolutions in the animate and inanimate worlds, as was once insisted upon by many English geologists of note, and is still maintained by not a few of the most distinguished continental writers. When, therefore, I proposed in 1833 the term Miocene for the faluns of Touraine, the fossil shells of which, according to the determination of M. Deshayes, contained an admixture of about seventeen in the hundred of recent species, I foretold that from time to time new sets of strata would come to light, and require to be intercalated between those already described, and in that case that the fossils of newly-found beds would "deviate from the normal types first selected, and approximate more and more to the types of the antecedent or subsequent epochs." According to this view, it was obvious from the first that the oldest Miocene records, whenever they were detected, would not be easily distinguishable from the youngest members of the Eocene series, especially in the proportion of the living to the extinct species of fossil shells. The importance, indeed, of the latter test must diminish rapidly the more we recede from the Pliocene and approach the Miocene, and still more the Eocene formations, although it is never without its value, and often furnishes the only common standard of comparison between strata of very distant countries.

I make these allusions to show that I am by no means unprepared