

GENERAL OBSERVATIONS ON THE TERTIARY.

BIOLOGICAL CHANGES AND PROGRESS.

The precursors of the Tertiary Mammals.—No immediate precursors of the Tertiary non-marsupial or placental Mammals, linking them to the Marsupial, have yet been found in any part of the world, notwithstanding the occurrence in many regions over America as well as the other continents of a gradual passage from the Cretaceous formation into the Tertiary. They are naturally supposed to have existed in the later Cretaceous over the dry land of eastern and western America; but still it is strange that they did not find resorts somewhere on the border of the Cretaceous seas along with the Marsupials. The nearest approach in the Reptilian type to the Mammalian yet known was made by the stupidest of the Dinosaurs, which had a pair of Bovine horns and two-pronged teeth.

Early prototypic character.—Another strange fact is that although the Marsupials of earlier time had become variously specialized, their placental successors should have had unspecialized or prototype characteristics, such as have been described; that there should have been at this time so striking a starting from what appears to be a new beginning. The removal of the former mystery may also remove this. Moreover, it is to be considered that among the fossils of the Mesozoic Marsupials, remains of the limbs, or of any parts of the skeleton excepting the jaws and teeth, are of very rare occurrence.

DIVERSITY OF EOCENE MAMMALS.—Another remarkable fact is that so great a diversity of Mammals, diversity in structure as well as size, should have appeared before the Eocene period had passed. The prototypic plant-eaters and flesh-eaters of the earliest part, supposed to be plantigrade in feet, were followed, even in the Wasatch division of the Lower Eocene, by species of large, short-footed Ungulates, the Coryphodonts, and in the later Eocene huge Dinocerata, the latter supplied with horns for attack and defense. In the Eocene, also, the Tapir-like species advanced far toward the modern genera, Tapirus and Rhinoceros. There also appeared various species with paired toes, in the line of the Hogs, Hippopotamus, Camel, so that the type of Artiodactyls, and the types of several of its principal subdivisions, were established. There were also some prominent Eocene types of Rodents and Insectivores. Further, the Quadrumana of the Early Eocene, having the typical number of teeth, 44, were followed in the Later Eocene, by others, in which the number of teeth was reduced to 32, the final limit in the Quadrumana, and that characterizing Man.

Moreover, there were several successions of Mammalian faunas in this first period of the North American Tertiary, and the species in each of them probably outnumbered those of Recent North America. The kinds found fossil may have been a fourth of all then existing in the region, and probably not more.

Loss of prototype characters.—Very early in the Eocene, prototype charac-