

The classes adopted in this table are circumscribed according to the principles discussed in the first part of this work.⁶ I have nothing special to add with reference to the classes of Radiata, Mollusks, and Articulata; but it may be proper to state here, that the order of appearance of the classes of Vertebrata makes in favor of the subdivision of the Fishes into four classes. The Selachians, in particular, differ so completely from the ordinary Fishes, that it is surprising they have not long ago been considered as a distinct class.⁷ In a palæontological point of view, the early appearance of the Selachians has a deep meaning, when we consider how extensively the characters of the higher classes of Vertebrata (such as their few large eggs, which recall the true Reptiles and the Birds, and the placental connection of the embryo of some of their species, which recalls the Mammalia) are blended in their structure with embryonic features, (such as their cartilaginous skeleton and their branchial fissures,) whilst the Myzontes are purely embryonic. The Ganoids, on the other hand, stand in a special prophetic relation to the Reptiles proper;⁸ and their extensive reduction, at the time of the first appearance of the Fishes proper, is truly significant.

² The period of the first appearance of genuine Fishes is somewhat doubtful, and depends upon the appreciation of the true relations of the Leptolepids. If they are Ganoids, as I consider them, then the class of Fishes proper does not appear before the Cretaceous period.

³ This is the period of the first appearance of Testudinata; at a time when neither genuine Birds nor genuine Mammalia existed.

⁴ The presence of Birds in the Triassic period is only inferred from the numerous footprints found in the Red sandstone of the valley of the Connecticut, respecting the true characters of which I have expressed my doubts elsewhere. As it is now known that the earliest representatives of higher types often exhibit characters common to them and to lower types, it seems to me probable that the first Birds were not so completely different from the other Vertebrates as the Birds now living are. Before the first appearance of genuine Birds, there may have existed bird-like Vertebrates, combining in their structure Reptilian and Mammalian characters, as we find early Reptiles combining Fish characters, and even anticipating, in some of their features, peculiarities that are afterwards characteristic of Birds and of Mammalia. The foot-marks of the Trias suggest such suppositions much more

readily than the idea of a very close affinity to real Birds. For more details upon these tracks, see HITCHCOCK, (ED.) *An Attempt to Discriminate and Describe the Animals that made the Fossil Foot-marks of the United States, etc.*, Mem. Amer. Acad. 1848, vol. iii. p. 128, and DEANE, (JAMES,) *Illustrations of Fossil Footprints of the Valley of the Connecticut*, Mem. Amer. Acad., 1849, vol. iv., p. 204. No Bird remains are known from the Jura.

⁵ The presence, in the Jurassic period, of remains belonging apparently to the class of Mammalia, has long been known. But Owen for the first time set forth their true relations, in a paper published in the Transactions of the Geological Society of London, 2d series, vol. vi. Whether *Microlestes* of the Trias, described by Plieninger, belongs to the same type, is still questionable. If it is a *Didelphian*, it would carry this sub-class one period lower down. It is curious, that nothing like them has thus far been found in the Cretaceous formation. So the age of Mammalia proper begins with the Eocene period, unless some recently described Cetaceans truly belong to the Cretaceous period.

⁶ See Part I., Ch. 2, p. 145, and Ch. 3, p. 183.

⁷ Aristotle alludes here and there to the Selachians in contradistinction to the Fishes proper.

⁸ Comp. Part I., p. 116 to 118.