

temporaneous coral reefs and fine sedimentary deposits of the ocean, would have become in great part submerged, or covered by newer formations, or destroyed by denudation, during that immense interval of time which separates their origin from our own period.

In regard to the rarity of marine vertebrate animals in the oldest rocks, it may perhaps be no greater than is observed in strata of more modern date, formed in seas of equal depth, or at points as remote from the land. Many years have not elapsed since the Old Red sandstone was thought to be barren of ichthyolites; but now, in addition to the numerous genera found in Scotland by Mr. Hugh Miller, and those described by M. Agassiz, the last-mentioned zoologist has announced that nine genera of sharks of the division Cestracion occur in the Devonian beds of Russia, examined by Messrs. Murchison and De Verneuil. The appearance of fish so highly organized in some of the oldest formations, is strongly opposed to the theory of progressive development advocated by some writers, and imagined by them to derive support from recent geological discoveries.

In England, the remains of fish have long been known in the highest beds of the Upper Silurian, and they have lately been found as far down as the Wenlock limestone. The New York surveyors have met with them in more than one member of the Helderberg series (No. 11, Map. pl. II.) Long ichthyodolites, or spines of the dorsal fins of fishes, have been obtained, for example, from the Corniferous limestone. But the lowest rock in which they have been traced in America is, I believe, the Clinton group, which