

stage (200 feet thick) consists of limestones and marls (*Astarte minima*); the Pterocerian is well developed, and shows its characteristic fossils; while the Bononian comprises the so-called "Portlandian" limestones of the Jura, its upper part becoming the yellow or red unfossiliferous "Portlandian dolomite." In the department of the Jura, the Pterocerian sub-stage contains a coral-reef, more than 300 feet thick, near Saint Claude, and further south another occurs at Oyonnax. In the same region, the Virgolian sub-stage, composed of bituminous shales and thin lithographic limestones, has yielded numerous fishes, reptiles, and abundant cycads and ferns. The position of these beds is fixed by the occurrence of the *Exogyra virgula* below them, and of the Bononian limestones with *Nerinæa* and *Amm. gigas* above them. From what we said above under the Portlandian stage, it will be seen that the Kimeridgian appears in a totally different aspect in the Mediterranean basin, being there composed of thick limestones with a mixed assemblage of ammonites, and characterized in the higher parts by the appearance of *Terebratulina diphyia*.

8. Corallian, divisible into (a) Argovian, or zone of sponges and *Amm. canaliculatus*; (b) Glyptician, or zone of *Glyptichus hieroglyphicus*, and (c) Diceratian, or zone of *Diceras arietinum*. The sub-stages *b* and *c* comprise the zone of *Amm. bimammatus*. In Normandy, the stage presents a lower assise (Trouville oolite, or zone of *Amm. Martelli*) composed of marly and oolitic limestone and black clays (*Echinobrissus scutatus*, *Trigonia major*, etc.), and an upper coral-rag with *Cidaris florigemma* and a dark marl with *Exogyra nana*; the whole passing laterally into clays (Havre). In the Ardennes, an argillaceous marl (with *Phasiacella striata*) represents the Argovian division, and is surmounted by a mass of coral limestone (400-420 feet). In Haute Marne, the Corallian beds attain a thickness of 330 feet, but are mainly formed of marls, the coral beds or reefs dwindling down in that direction. Southward, in Burgundy, massive limestones with corals reappear, with lithographic and oolitic limestones. To the east also, in the district of Besançon, the stage is represented by 130 to 200 feet of coral-limestone with compact and oolitic bands, and some-