

ing casts of their soft parts, crabs with every part of the integument in place, and other denizens of the water, there lie the relics of a terrestrial fauna washed or blown into the neighboring shallow lagoons—dragon-flies with the lace-work of their wings, and other insects; the entire skeletons of Pterodactyle and Rhamphorhynchus, in one case with the wing membrane preserved (Figs. 399, 400, 401), and the remains of the earliest known bird, Archæopteryx (pp. 1474, 1475). The upper Jurassic series is well developed in Hanover, where it has been carefully studied by C. Struckmann. The Portland group has been shown by him to contain eighty-five species of fossils, one-half of which are lamellibranchs, and to include the characteristic ammonites *A. gigas*, *portlandicus*, *Gravesianus*, *giganteus*.<sup>86</sup> The German Purbeck group attains an enormous development in Westphalia (1650 feet), where, between limestones full of *Corbula*, *Paludina*, and *Cyclas*, pointing to fresh-water deposition, there occur beds of gypsum and rock-salt.

**Alps.**—The Jurassic system in the Alps is developed under a different aspect from its varied characters in central and western Europe. It there includes massive reddish limestones or marbles like those of the Trias of the same region. Indeed it would seem that the pelagic conditions under which the Triassic limestones were deposited had not entirely passed away when the Jurassic formations came to be laid down. The Lias is well represented in the Alps under several distinct types. At the western end of the chain in the region north and south of Briançon it consists of crystalline, often brecciated limestones, generally full of lamellibranchs, sometimes of corals. In Dauphiné it is made up of marly non-crystalline limestones distinguished by the number of their ammonites and belemnites, and sometimes reaching, according to Lory, a thickness of more than 6000 feet. Southward in Provence the limestones are especially rich in brachiopods and crinoids.<sup>87</sup> In the Tyrol and eastern Alps the Lias presents still other lithological and palæontological characters. A distinguishing feature is the prominence of red and variegated marbles, also the abundance of genera of ammonites which are for the most

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<sup>86</sup> "Der Obere Jura der Umgegend von Hanover," 1878; *Palæontolog. Abhand.* (Dames u. Kayser) I. i. 1882; *Zeitsch. Deutsch. Geol. Ges.* 1887, p. 32.

<sup>87</sup> Haug, "Les Chaines subalpines," *Bull. Carte Geol. France*, No. 21, 1891; Lory, *Bull. Soc. Geol. France* (3), ix.