

of species, many of them peculiar, have been noticed (*Amm.* [*Phylloceras*] *ptychoicus*, *A. volanensis*, *A. hybonotus*, *A. transitorius*, *A. lithographicus*, *A. steraspis*). The presence of some of these in the Portlandian rocks of Germany serves to place all these Alpine limestones at the very top of the Jurassic system. About a dozen species of fossils pass up from them into the Cretaceous rocks. The shales or impure shaly limestones are sometimes full of the curious cephalopod-appendages known as *Aptychus* (*Aptychus*-beds). Some of the more massive limestones are true coral-reefs. Many of the limestone escarpments of the Alps (*Hochgebirgskalk*) are referable to the *Terebratula diphya* beds. In some places they are overlain by the *Diphyoides*-beds (with *Terebratula diphyoides*), elsewhere they pass insensibly upward into the so-called *Biancone*—a white compact siliceous limestone containing Cretaceous cephalopods. The *Diphyia*-limestone, with its peculiar fossils, appears to range from the Carpathians through the Alps and Apennines (where it occurs as a marble) into Sicily.<sup>90</sup>

**Sweden.**—The coal-bearing Rhætic series developed in Scania and referred to on p. 1442, is followed by a series of marine strata, in which a number of the ammonite-zones of the Lower and Middle Lias have been recognized as high as that of *Amm. margaritatus*.<sup>91</sup> Similar strata are found on the island of Bornholm. These Scandinavian deposits and those in the north of Scotland mark the northern and western limits of the Jurassic system in Europe.

**Russia.**—Jurassic formations spread over a larger area in Russia than in any other part of Europe, for they sweep northward over a vast breadth of territory to the White Sea, and extend eastward into Asia. Yet in this wide area it is only the upper half of the system which appears. The Lias and the stages below the Callovian are absent. The fauna of these Russian Jurassic formations is so peculiar, and for a long time yielded so few species found elsewhere in Europe,

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<sup>90</sup> In the voluminous literature of this subject the following works may be consulted: Oppel, *Z. Deutsch. Geol. Ges.* xvii. 1865, 535; Neumayr, *Abh. Geol. Reichsanstalt*, v.; Zittel, *Paläont. Mittheil. Mus. Bayer.*; Hébert, *Bull. Soc. Geol. France*, ii. (2) p. 148, xi. (3) p. 400; E. W. Benecke, "Trias und Jura in den Südalpen," 1866; "Geognostisch. Paläontologische Beiträge," 8vo, Munich, 1868; C. Moesch, "Jura in den Alpen, Ostschweiz," 1872; E. Fraas, "Scenerie der Alpen." See also the "Jura-studien," etc. of Neumayr, already cited, p. 1477, and the papers of Favre, Loriol, Renevier and others.

<sup>91</sup> J. C. Moberg, *Sverig. Geol. Undersökn.* Stockholm, 1888.