

being fucoids, which afford no clew to the geological age of their inclosing strata. That the older portions in the eastern Alps are Cretaceous, however, is indicated by the occurrence in them of occasional Inocerami, and by their interstratification with true Neocomian limestone (Aptychenkalk). The definite subdivisions of the Anglo-Parisian Upper Cretaceous rocks cannot be applied to the structure of the Alps, where the formations are of a massive and usually calcareous nature. In the Vorarlberg, they consist of massive limestones (Seewenkalk) and marls (Seewenmergel), with Ammonites Mantelli, Turritiles costatus, Inoceramus striatus, Holaster carinatus, etc. In the northeastern Alps, they present the remarkable facies of the Gosau beds, which consist of a variable and locally developed group of marine marls, sandstones, and limestones, with occasional intercalations of coal-bearing fresh-water beds. These strata rest unconformably on all rocks more ancient than themselves, even on older Cretaceous groups. They have yielded about 500 species of fossils, of which only about 120 are found outside the Alpine region, chiefly in Turonian, partly in Senonian strata. Much discussion and a copious literature has been devoted to the history of these deposits.¹⁷² The loosely imbedded shells suggested a Tertiary age for the strata; but their banks of corals, sheets of orbitolite- and hippurite-limestone and beds of marl with Ammonites, Inocerami and other truly Cretaceous forms, have left no doubt as to their really Upper Cretaceous age. Among their subdivisions, the zone of Hippurites cornu-vaccinum is recognizable. From some lacustrine beds of this age, near Wiener Neustadt, a large collection of reptilian remains has been obtained, including dinosaurs, chelonians, a crocodile, a lizard, and a pterodactyle—in all fourteen genera and eighteen species.¹⁷³ Probably more or less equivalent to the Gosau beds are the massive hippurite-limestones and certain marls, containing Belemnitella mucronata, Echinocorys vulgaris,

¹⁷² See among other memoirs, Sedgwick and Murchison, *Trans. Geol. Soc.* 2d ser. iii.; Reuss, *Denkschrift. Akad. Wien*, vii. 1; *Sitzb. Akad. Wien*, xi. 882; Stoliczka, *Sitzb. Akad. Wien*, xxviii. 482; lii. 1; Zekeli, *Abhandl. Geol. Reichsanst. Wien*, i. 1 (Gasteropods); F. von Hauer, *Sitzb. Akad. Wien*, liii. 300 (Cephalopods); "Palæont. Oesterreich," i. 7; "Geologie," p. 516; Zittel, *Denkschrift. Akad. Wien*, xxiv. 105; xxv. 77 (Bivalves); Bünze, *Abhandl. Geol. Reichsanst.* v. 1; Gümbel, "Geognostische Beschreib. Bayerisch. Alpen," 1861, p. 517 *et seq.* Redténbacher, *Abhandl. Geol. Reichsanst.* v. (Cephalopods).

¹⁷³ Seeley, *Q. J. Geol. Soc.* 1881, p. 620.