

Senonien. This definition was unsatisfactory, since the French geologists assigned different limits for the Turonien and Senonien. Zittel pointed out, in a monograph on the bivalves of the Gosau strata, that the affinities were very marked with the faunas of Coquand's stages Provencien and Santonien, typically developed in Provence and the Pyrenees. The other subdivisions of the Cretaceous system also resemble the facies in the south of France, whereas the Carpathian development of the Cretaceous deposits, according to Hohenegger, Neumayr, Tietze, and other Austrian geologists, display many peculiarities, and have had to be sub-divided into a number of local groups and zones.

The faunal character of the Alpine Upper Cretaceous deposits shows a rapid variation from west to east; the Seewen limestones and marls with *Ammonites rhotomagensis*, *Holaster subglobosus*, and other Upper Cretaceous types in Switzerland, give place to the Foraminiferal limestones with *Orbitulina concava*, a characteristic Cenomanian type, in the Vorarlberg and Bavarian Alps; further east, the Upper Cretaceous deposits are represented by the Gosau strata, often distinguished as the Hippuritid or Rudistes facies, whose affinities with the Pyrenees and the Uchaux area in the western Alps is therefore a matter of special stratigraphical interest.

The occurrence of the Gosau deposits in separate crust-basins adjoining the leading east and west faults between the northern and central regions of the eastern Alps, has provided Alpine stratigraphers with some useful data regarding the regional crust-movements which are thought to have begun in the eastern Alps in Upper Cretaceous time, and to have continued intermittently during Tertiary epochs, culminating in the upheaval of the present Alpine chain.

I. *Tertiary System*.—The fundamental researches which were carried out in the beginning of the nineteenth century by Cuvier and Brongniart in the Paris basin, by D'Halley in Belgium, and by Webster, Buckland, and Lyell in England, afforded the basis of the more detailed examination of the fossil mollusca characteristic of the successive Tertiary horizons. Brocchi, Sowerby, Lamarck, Deshayes, and Bronn demonstrated the security of the palæontological method of subdivision with the most brilliant success, and upon their results Charles Lyell established his division of the Tertiary deposits