

into the Eocene, Miocene, and Pliocene formations (*ante*, p. 431).

The systematic limit between the basement beds of the Eocene and the highest horizons of the Cretaceous system had been clearly defined for Northern Europe by Brongniart and D'Omalius d'Halloy, while Buckland had defined the limit between the upper horizons of the Pliocene and the lowest Diluvial or Pleistocene deposits. On the other hand, the difficulty of determining a definite limit between Eocene and Cretaceous deposits in Alpine areas has, except in a few localities, proved insuperable to the present day.

The characteristic South European and Alpine facies of the Eocene deposits is a massive Foraminiferal limestone, composed chiefly of the remains of Nummulites (*ante*, p. 244). But in the Alps, this eminently pelagic facies is often partially or wholly replaced by a very variable group of sandstones, marls, conglomerates, shales, and clays, which is termed "Flysch," and offers palæontological difficulties on account of the rare occurrence of distinctive fossil types, and of many stratigraphical difficulties bound up with the most obscure problems in the tectonic structure of the Alps.

In 1823, Brongniart had ascertained the Tertiary age of the Nummulite formations at Ronca, Castel-Gomberto, Monte Bolca, and other localities in the Vicentine Alps; and Münster had published a list of one hundred and seventy-two species from the famous locality of Kressenberg in the Bavarian Alps, forty-two of which agreed with typical Tertiary species of Germany, France, and England, while two species showed a certain resemblance to Cretaceous species, and only a single species (*Ostrea semiplana*) was actually a Cretaceous form. Count Münster therefore concluded that the Kressenberg strata were of Tertiary age. Murchison and Sedgwick in their memoir on the eastern Alps (1830) also regarded the Kressenberg strata as Tertiary, but expressed the opinion that the Nummulite rocks near Sonthofen in Bavaria were closely united with the Cretaceous series, as that fauna appeared to contain a fair admixture of Cretaceous and Tertiary types.

The same opinion was more forcibly expressed by Dufrenoy and Élie de Beaumont in several memoirs explanatory of the geological map of France (1830-38); these authors insisted that the fauna of the Nummulite and Flysch deposits in the south of France was a mixed Eocene-Cretaceous fauna closely