

according to age as pre-Tertiary (Palæovolcanic), and Tertiary and Post-Tertiary (Neovolcanic).

The second and third volumes of the text-book are devoted to an exhaustive description of the individual varieties of massive and schistose crystalline rocks and the sedimentary rocks.

Zirkel's text-book will always remain a fundamental work in petrography. While the macroscopic methods of the older teaching are still predominant in the first edition of the work, the second edition is at once a frank and full acknowledgment of the petrographical reform necessitated by microscopic and micro-chemical methods, and a convincing witness of the rapid and remarkable success which had crowned the labours of petrographers in the new field of research.

During the last few years the discrepancy between the views of Zirkel and Rosenbusch has increased. Rosenbusch, in the third edition of his *Physiographie der massigen Gesteine* (1896), and also in his *Elementen der Gesteinslehre* (1898), has adhered to the standpoint which he assumed in 1888, and has rejected Zirkel's objections. The differences between the two leading German petrographers refer in no sense, however, to the methods of investigation, but expressly concern the inductive conclusions at which they have arrived regarding the genesis of the eruptive rocks, and the best system of classification. The rapid progress of petrography is one of the greatest acquisitions made to science during the latter half of the nineteenth century, and has elevated petrography to the rank of a thoroughly established branch of natural philosophy.

As the microscope revealed more and more fully the fine structure and microscopic elements of rocks, the traditional conceptions of geologists regarding the origin of the rocks were gradually undermined. The old strife between Plutonists and Neptunists had collapsed when the Neptunists admitted the volcanic origin of basalt and the "trap" series of rocks. The handsome monograph published by C. C. von Leonhard in 1832 had conclusively proved the agreement of basalt with true volcanic rocks, both in the geological occurrence of the basalt and in the contact phenomena produced at its margins. Thanks to the observations of Humboldt, Buch, Poulett-Scrope and others, not only was the volcanic origin of basalt, trachyte, trap, porphyry, mela-