

occurrence. The diction is clear, the previous literature of petrography has been completely mastered, and its results are fully incorporated, the historical development of the different branches of the study being carefully indicated throughout the work. The lack of illustrations has been deplored by many, but the addition of plates would have rendered the work much more expensive.

The first volume begins with a detailed account of all methods of investigation applied in modern petrography. Rock-forming minerals are then described according to their morphological, optical, physical, and chemical properties so far as these are important for petrography. In discussing the structure of rocks, Zirkel frequently dissents from the terminology of Rosenbusch; at the same time he endeavours to establish the terms which had been applied in his own text-book.

The special petrographical part of the work starts with the treatment of the massive rocks formed by the cooling and consolidation of molten magmas. The geological occurrence, the composition, the macroscopical and microscopical features of their structure, are elucidated. The difficult questions concerning ground-masses are then brought forward, and finally the laboratory experiments are described by means of which chemists and geologists have tried to produce different kinds of massive rocks artificially.

Zirkel contests the principle of classification adopted by Rosenbusch, and adduces weighty arguments to show that the group of "intrusive" or "dyke" rocks is untenable. He adheres to the principle of mineralogical composition as the true basis of classification, and draws up a Classification Table on the same lines as he had followed in the first edition of his text-book. Zirkel's sub-divisions agree in many respects with those of Fouqué and Michel-Lévy. Taking the felspathic constituents as the chief standard, Zirkel distinguishes two felspar-bearing groups, a potash-felspar group, and a soda-lime felspar group; also a third group, free from felspar, and comprising the nepheline, leucite, melilite rocks.

Like Michel-Lévy, Zirkel distinguishes two leading types of structure: 1, uniformly granular; 2, porphyritic and glassy rocks. Deep-seated rocks of various geological ages belong to the granular or granitic type; while eruptive flows may be either porphyritic or glassy, and they may be sub-divided