

porphyritic series by his careful microscopic investigation of the larger mineral constituents and the ground-mass characteristic of different varieties. Vogelsang's observations on the processes of the consolidation of rock-magma, on the microscopical structure of slags, on "fluidal" structure, on microlites, and on conditions of devitrification, are clear and accurate. His illustrations are throughout of high excellence; and his proof, given in collaboration with Geissler, that certain liquid inclusions in minerals and rocks consist of liquid carbonic acid, is a discovery that will ever remain associated with the name of this promising scientist, who unfortunately died before he reached his prime.

Special memoirs were contributed by Zirkel on phonolite, on glassy and partially glassy rocks, and on leucite rocks. A very important work was his *Untersuchung über die mikroskopische Zusammensetzung und Struktur der Basaltgesteine* (Bonn, 1870). In this work, Zirkel showed for the first time that the basalts and the lavas corresponding to them may be classified in three groups (felspar, nepheline, and leucite basalts), and that each of these three modifications can be identified by its constitution and structure, as well as by the ground-mass.

A few months before the appearance of Zirkel's work on basalt, Tschermak had published a short but valuable paper on the microscopic differentiation of the minerals belonging to the augite, hornblende, and biotite group, and thus removed one of the chief difficulties in the identification of rock-forming minerals.

The year 1873 was signalised by the almost simultaneous appearance of two works, in which the two most distinguished masters in the domain of microscopical research comprised the quintessence of their investigations. Under the title, *Die mikroskopische Beschaffenheit der Mineralien und Felsarten* (Leipzig, 1873), Zirkel gives an introductory code of instructions as to the use of the microscope, examination by means of polarised light, and the methods of producing faithful illustrations. He then describes the microscopical structure of rock-forming minerals with special respect to the various kinds of inclusions and the products of decomposition. The optical and physical characteristics of mineral sections are next described; and the results obtained in the earlier chapters on minerals are applied in the latter half of the work,