

which is devoted to the mineral constitution and structural features of rock-varieties. The work is fully illustrated by woodcuts.

The other important work was that of Rosenbusch, entitled, *Die mikroskopische Physiographie der petrographisch wichtigen Mineralien* (Stuttgart, 1873). It contains an exhaustive statement of the practical methods according to which rocks may be identified by means of the morphological, physical, and chemical properties of their component minerals; this is followed by a full and methodical discussion of the microscopic characters of rock-forming minerals. The optical consideration of the phenomena of polarisation was elucidated so admirably by Rosenbusch, that his work created a secure basis for future petrographical researches. By the improvement of the microscope and the polarising apparatus, by the introduction of a rotating stage, and by other mechanical aids, it was now rendered possible to distinguish not only singly or doubly refracting bodies and uniaxial or biaxial minerals, but also to determine more accurately the specific optical properties of minerals belonging to the different systems of crystallisation. After the publication of this great work, Rosenbusch took rank along with Zirkel as one of the great pioneers in the microscopical investigation of rocks. In 1877, Rosenbusch published a second volume entitled *Die mikroskopische Physiographie der massigen Gesteine*.

Rosenbusch distinguished the massive rocks according to the feldspathic modifications:—1, Orthoclase rocks; 2, Orthoclase, nepheline, leucite rocks; 3, Plagioclase rocks; 4, Plagioclase, nepheline, leucite rocks; 5, Nepheline rocks; 6, Leucite rocks; 7, Non-feldspathic rocks or peridotites. Each of these groups was subject to further sub-division according to the particular rock-structure, or in the case of the feldspathic rocks according to the presence or absence of quartz. Like Zirkel, Rosenbusch gave due consideration to the geological age of the rocks, as the older and the younger representatives of each group were handled separately.

The optical method brought to such a high point by Rosenbusch was still further elaborated by Bertrand, Klein, and Lasaulx in memoirs which appeared in 1878. Schuster proved in the following year that the feldspars which had been recognised in such a masterly way by Tschermak from their composition to be isomorphous mixtures, represented a