

next oldest constituent. In general, solidification begins with the crystallisation of the ores and accessory constituents, then follows the formation of the coloured silicates (olivine, mica, augite, hornblende, etc.), then that of the felspathic minerals, and finally that of free silica. In the rocks of eruptive flows the more basic constituents crystallise out before the less basic, so that at any period during the consolidation the sum of the constituents already crystallised out from the magma is more basic than the remaining portion of the magma. Mr. Teall assumes that in the rocks with a large or medium amount of silica, the dissolved constituents represent a so-called "eutectic" mixture, and as such can remain unchanged at a temperature which is below their melting-point. But if they do not occur in the definite eutectic relations, the overplus of substances continues to separate out until the eutectic mixture is attained.

In an important memoir (1887) on the crystallisation of igneous rocks, Lagorio classified the porphyritic flows according to the amount of silica in five grades, and gave the results of chemical analyses of the ground-mass. He arrived at the conclusion that the separation of the minerals in an eruptive magma depends almost entirely on the chemical composition of the magma, as well as on the affinities and internal movements within the mass; whereas pressure and high temperature exert only a subordinate influence.

Iddings in 1889, in a paper on the same subject, expressed views in many respects similar to those of Lagorio, but ascribed greater importance to the influences of pressure and temperature in regulating the rate and processes of cooling; he thinks the local conditions of pressure and temperature mainly determine the structural differences which often exist at different portions of a continuous mass of eruptive rock, and explain why a superficial portion may display porphyritic structure while the deep-seated portion is granite-grained.

There are abundant examples of transitional rock-varieties in eruptive bosses and sheets. As far back as 1852, Delesse showed that the Ballon d'Alsace in the Vosges mountains consists of hornblendic granite in its central portion and its summit, but towards its peripheral portions passes into syenite and finally into diorite. More recently, in 1887, similar facts were demonstrated by Barrois in his brilliant account of the eruptive rocks in Brittany. The researches of Barrois have