

periphery and the centre of the dyke at the time of cooling and solidification. Harker¹ describes the basification of the Carrock Fell to the difference of temperature between the borders and the centre of the mass during solidification. Other interesting examples of this phenomenon are described by Pirsson.²

The absence of the basic upper contact zone in some of the Purcell sills is probably due to the high temperature of the intruding magma. In such cases, the initial temperature was so high that before it sank to a degree at which the basic constituents would tend to segregate towards the margin, an almost perfect separation of the granite (micropegmatite) took place. In this manner, no basic upper contact would be expected. The absence of this special layer also proves that differentiation according to gravity has played the leading role in the separation of the acid and basic material, and not differences in temperature between the contact and the interior. If such were the case, a symmetrical igneous body would result.

SUMMARY.

The Purcell sills represent intrusions from a single intercrustal reservoir of a series of magmas—acid magmas—which gave rise to composite sills whose rock types vary in the same sill, from a granite (micropegmatite) to a gabbro; and basic magmas which gave rise to simple sills of gabbro.

The reservoir may be assumed to have been stratified according to density, having a relatively acid portion collected in the irregularities and projections of the roof and grading downwards into more basic materials.

Crustal movements would furnish fissures which would tap this reservoir at various levels. In this way a separation of the acid and basic materials of the reservoir would occur, so that the acid and basic materials would rise through separate fissures and spread out between the strata as sills. Some exotic material was gathered up from the walls of the fissures through which they

¹ Harker, A., Q. J. G. S., vol. 50, 1894, p. 311; vol. 51, 1895, p. 125.

² Pirsson, L. V., 20th Ann. Rep., U. S. G. S., pt. 3, 1900, p. 563.

Pirsson, L. V., U. S. G. S. Bull. 237.

Weed and Pirsson, Amer. Jour. Sci., 4th ser., vol. 12, 1901, P. I.