On an Analcite-basalt from Rathjordan, Co. Limerick.

(*With Plate VII, figs.* 2 *and* 3.).

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AMONGST the rock-specimens from Co. Limerick belonging to the Allport Collection in the British Museum, a specimen of basalt from Rathjordan, Co. Limerick, attracted attention by the fact that, in thin slices under the microscope, it showed small, round sections of isotropic material containing central and octagonally arranged, marginal inclusions, and thus resembling leucite.[1] The rock from Rathjordan has been described by Hull[2] and by Allport.[3] According to Allport the rock is a columnar, fine-grained, black basalt which occurs interbedded with ashes, and consists of 'innumerable small grains of augite and magnetite set in an amorphous glass, the whole forming a matrix in which serpentinous pseudomorphs of olivine and felspar are porphyritically imbedded'.

To this description it is only necessary to add, in the case of the Museum specimen, that augite also occurs as phenocrysts and, like the small, prismatic augites of the base, is of the purplish titaniferous variety, and that the supposed glassy matrix, which is clear and colourless, encloses minute needles (probably of apatite) and in many parts of the slide forms the minute, round sections, with inclusions, mentioned above. These sections, with their central and marginally arranged inclusions of the augite and magnetite of the base, strikingly resemble

[1] Similar characters were shown by thin slices of rocks from 'hill above Nicker, one mile south-west of Pallas Station, Co. Limerick', kindly placed at my disposal by Professor Grenville A. J. Cole and Professor H. J. Seymour.

[2] E. Hull, Geol. Mag., 1873, vol. x, p. 157 and Plate VIII, fig. 9.

[3] S. Allport, Quart. Journ. Geol. Soc., 1874, vol. xxx, p. 552.

small leucites such as occur in the leucite-basalts of the Bohemian Mittelgebirge. The rock itself is indeed very similar to these leucite-basalts (e. g. the rock from the Dobernberg, Tetschen, Mittelgebirge) in all respects, except that in the Bohemian rocks the olivine is for the most part unaltered. Two of the leucite-like sections are represented in Plate VII, figs. 2 and 3, highly magnified (in fig. 2 about 150 diameters, in fig. 3 about 300 diameters). In most of the round sections, such as that represented in fig. 3, the material containing the central and marginal inclusions is not distinguished in any other way from the rest of the isotropic matrix, but in a few, one of which is represented in fig. 2, this material is seen to be marked off from the surrounding isotropic base by a distinct octagonal outline.

In order to investigate more closely the nature of the isotropic material, an attempt was made to isolate some of it by powdering the rock (so that the particles passed through a sieve with 110 meshes to the inch) and separating the lighter portion by immersion in methylene iodide diluted with benzene. Only a very small amount of material was separated in this way; but under the microscope it showed several small flakes of the clear, isotropic material. When tested by the Becke method, most of the flakes appeared to have a refraction less than that of cedar-wood oil (1·505) and nearer to that of xylene (1·487). Examination of sections on the edge of an uncovered thin slice of the rock gave somewhat variable results; the first observations appeared to show that one section at least had a refraction near to that of benzene, but this was not confirmed by later observations, made on other sections, which agreed with those made on the thin flakes separated by heavy liquids. Further, the solution in hydrochloric acid of some of these flakes deposited on evaporation numerous cubes of salt and gave a strong sodium-line in the spectrum and no indication of a potassium-line. It appeared, therefore, that most, at any rate, of the isotropic material could be better referred to analcite than to leucite. In order to test this conclusion, a quantitative determination was made of the alkalis, and eventually of most of the other constituents of the rock. The result of that analysis is given under I: for comparison, under II is given the analysis of a leucite-basalt from the Dobernberg, Bohemian Mittelgebirge,[1] with which the Limerick rock presents such striking similarities; and under III the analysis of an analcite-basalt from Colorado described by Whitman Cross.[2]

[1] F. Pfohl in J. E. Hibsch, Min.-Petr. Mitt. (Tschermak), 1894, vol. xiv, p. 111.
[2] W. Cross, Journ. Geol. Chicago, 1897, vol. v, p. 689.

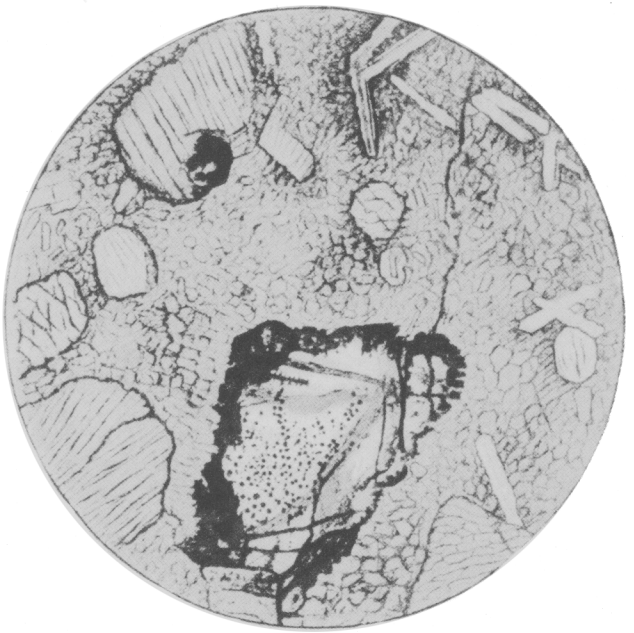
	I. (Rathjordan)	II. (Bohemia)	III. (Colorado)
SiO_2	40·81	44·16	45·59
TiO_2	3·86	2·06	1·32
Al_2O_3	13·08	12·96	12·98
Fe_2O_3	6·40	8·07	4·97
FeO	7·20	3·10	4·70
MnO	0·07	—	0·14
CaO	10·12	12·26	11·09
MgO	10·03	10·83	8·36
Na_2O	2·43	1·92	4·53
K_2O	0·31	0·72	1·04
P_2O_5	0·88	1·03	0·91
H_2O at 110° C. ...	0·82	0·46	0·51
H_2O above 110° C.	3·97	2·41	3·40
	99·98	99·98	99·54

The small fractional percentage of potash obtained in this analysis certainly tends to confirm the conclusion already drawn that most, at any rate, of the isotropic material consists of analcite and not of leucite. Analcite as a rock-forming mineral has been described in the teschenites of Moravia, in monchiquite-like rocks such as the one investigated by J. W. Evans from Mount Girnar, Junagarh, India,[1] and as a primary constituent in basalts from Montana [2] and Colorado.[3] In the rock from Colorado, described by Whitman Cross, no crystalline form was observed, but rings or wreaths of small inclusions were noticed in a few grains, so strongly suggesting leucite that the rock was at first considered to be a leucite-basalt. In the case of these basalts, argument for the primary nature of the analcite is drawn from the freshness of the other constituents. To the basalt from Rathjordan no such argument is applicable, for the rock is of Carboniferous age and has suffered much alteration. It is just conceivable that the rock was originally a leucite-basalt, and that the leucites have been for the most part subsequently altered to analcite, as is suggested by Rosenbusch for the above-mentioned analcite-basalt or monchiquite from Montana described by Lindgren. Judging from the low percentage of potash in the analysis (II) of the leucite-basalt from Bohemia, it seems probable that in this rock also a similar alteration of most of the leucitic material to analcite may have taken place.

[1] J. W. Evans, Quart. Journ. Geol. Soc., 1901, vol. lvii, p. 38.

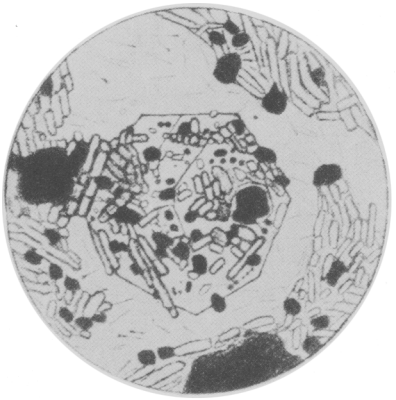
[2] W. Lindgren, Proc. Calif. Acad. Sci., 1890, ser. 2, vol. iii, p. 51.

[3] W. Cross, Journ. Geol. Chicago, 1897, vol. v, p. 684.

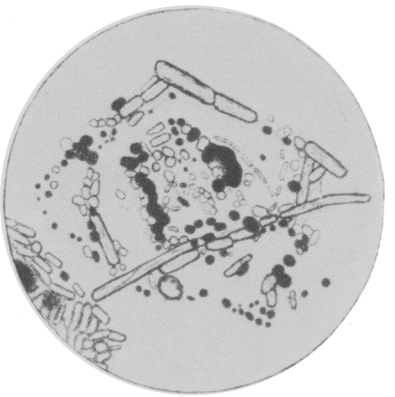


1.

G. T. PRIOR: METEORIC STONE FROM SIMONDIUM, CAPE COLONY.



2.



3.

G. T. PRIOR: ANALCITE-BASALT FROM RATHJORDAN, CO. LIMERICK.