

An albitite from Ve Skerries, Shetland Isles.

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THE Ve Skerries form a small group of rocks situated just over three miles WNW. of Papa Stour on the west coast of the Shetland Isles. Owing to the notoriously troubled state of the surrounding waters a landing can only rarely be effected on them, and it is not, therefore, surprising that no account of their geology has yet appeared. Through the kindness of Mr. J. Glencorse Wakelin, Secretary to the Northern Lights Commissioners, the writer has been able to examine a large specimen of the constituent rock secured by Mr. Wakelin in 1930, and considered by him to be typical of the group. The results of this examination proved to be of considerable interest and are given below.

In the hand-specimen the rock is seen to be of even texture and medium grain. It is white in colour but is relieved by a few dark-green or black spots and by very thin veins of haematite. In appearance it is not unlike an aplogranite, but examination under a hand-lens reveals the absence of quartz, while much of the felspar is seen to be twinned on the albite-law.

Under the microscope it is at once apparent that acid plagioclase is the dominant mineral of the rock, the percentage being well over 90 in every section examined. It occurs as irregular crystals whose junctions interlock so intricately that in many cases small inclusions of acid plagioclase in large crystals of the same mineral may be observed. The crystals average about 1 mm. across and do not show much variation in size. They are all twinned on the albite-law with the lamellae usually thin and numerous; Carlsbad and pericline twinning are comparatively rare. The mineral is optically positive, the symmetrical extinction-angle measured on the albite lamellae is 14° , and the mean refractive index determined by the immersion method is 1.530 ± 0.002 . It is evident, therefore, that the plagioclase is an almost pure albite. The crystals are usually quite fresh, though slight turbidity may sometimes occur and the cleavage cracks

are often accentuated by the deposition of dark minerals. No signs of zoning were seen, nor was any felspar other than albite detected in the rock. Quartz is either very sparingly represented by small crystals or is completely absent.

The green spots visible in the hand-specimen prove under the microscope to be chlorite formed by the decomposition of a ferro-



FIG. 1. Albite, Ve Skerries, Shetland Isles.
Crossed nicols. $\times 100$.

A large crystal of albite showing well-marked lamellar twinning occupies the top of the field. The lower part of the field is made up of smaller crystals of albite showing only traces of twinning and having highly irregular boundaries.

magnesian mineral. This chlorite occurs in patches up to 0.8 mm. across, which, by their habit, probably represent aggregates of biotite flakes. It is green in colour, is distinctly pleochroic, and individual members of the aggregates show straight extinction. The proportion of the mineral does not exceed 2 %.

Magnetite occurs in slightly less amount, forming small crystals of irregular shape up to 0.4 mm. across. These are evidently of early crystallization and are sometimes associated with a little brownish-grey sphene which may possibly indicate that they are titaniferous.

Apatite is a sporadic accessory forming needles with a maximum diameter of 0.15 mm., while small crystals of zircon are exceedingly rare.

The rock is plainly an example of the rare alkaline type albitite and, as its texture is typically granitoid, it is probably plutonic. Except for occasional slight flexuring and rarer fractures in the albite lamellae there are no signs of crushing. Part of the specimen was analysed by Dr. Naima Sahlbom and the results are given below together with the norm, specific gravity, and analyses of similar rocks for comparative purposes.

	A.	B.	C.	D.	E.	Norm of A.
SiO ₂ ...	66.56	67.07	66.54	66.85	66.62	Quartz ... 2.0
TiO ₂ ...	0.16	0.23	—	—	—	Orthoclase ... 1.7
Al ₂ O ₃ ...	19.41	18.85	—	20.11	17.56	Albite ... 90.1
Fe ₂ O ₃ ...	1.53	0.91	—	—	—	Anorthite ... 2.5
FeO ...	0.22	n.d.	—	1.43	1.87	Corundum ... 0.6
MnO ...	trace	—	—	—	—	Enstatite ... 0.8
MgO ...	0.32	1.53	0.77	0.31	0.38	Ilmenite ... 0.3
CaO ...	0.68	1.09	0.43	1.03	0.73	Magnetite ... 0.2
Na ₂ O ...	10.64	10.84	10.28	9.70	10.09	Haematite ... 1.3
K ₂ O ...	0.34	0.48	0.89	0.44	1.83	Apatite ... 0.3
H ₂ O+ ...	0.20	n.d.	—	} 0.33	} 0.73	H ₂ O 0.3
H ₂ O- ...	0.14	—	—			
P ₂ O ₅ ...	0.16	—	—	—	—	
	100.36	101.00	—	100.20	99.81	
Sp. gr. ...	2.64	—	—	—	—	

A. Albitite, Ve Skerries, Shetland Isles. Analyst, N. Sahlbom.

B. Albitite, Koswinsky, Ural Mts. Analyst unknown. Bull. Soc. Franç. Min., 1910, vol. 33, p. 369.

C. Albitite, Plumas Co., Sierra Nevada, California. Partial analysis by W. F. Hillebrand. U.S. Geol. Survey, 14th Ann. Rep., 1894, pt. 2, p. 477.

D. Albite-porphry (matrix), Meall à Bràghaid, Sutherland. Analyst, M. F. Heddle. Min. Mag., 1884, vol. 5, p. 141.

E. Do., phenocryst. The same.

Age and Affinities.—Analyses A, B, and C bring out the close chemical resemblance of the Ve Skerries albitite to similar rocks from the Ural Mountains and the Sierra Nevada which occur as dikes intrusive into diorite and serpentine respectively. More important, however, is the equally strong resemblance of the Ve Skerries rock to the albite-porphry of Meall à Bràghaid in the Assynt district of Sutherland described by Heddle.¹

Unfortunately, no information is available as to the mode of occurrence of the Ve Skerries albitite, but it seems most probable that it is to be referred either to the igneous activity prevalent in the

¹ M. F. Heddle, Min. Mag., 1884, vol. 5, p. 141.

neighbouring portions of the Shetland Islands during Lower Old Red Sandstone times,¹ or to the earlier post-Cambrian activity represented by the alkaline plutonic masses of Assynt and Ben Loyal.² The Shetland rocks are certainly of calcic facies in the main, but Dr. F. C. Phillips³ has described riebeckite-bearing dikes cutting the granite of Ronas and referred by him to the latest phase of igneous activity in the district. He also demonstrates by a chemical analysis the alkaline character of the adjacent granite. Both these types, however, contain a large percentage of potash, and there is no record of any highly sodic rock in this district. The rhyolite of Papa Stour, only three miles distant from Ve Skerries, is an orthoclase-bearing type.

The Meall à Bràghaid rock described by Heddle is probably from the large sill intruded between the Torridonian and the basal Cambrian quartzite on that mountain. It is undoubtedly one of the minor intrusions associated with the plutonic activity of the Assynt district, and is actually less than a mile from the perthosite facies of the Loch Ailsh mass described by Dr. J. Phemister.⁴ Professor H. H. Read⁵ has recently shown that the Ben Loyal mass belongs to this period of activity, and although the Shetland Islands lie far to the north there is no reason why the Ve Skerries rock may not also be of the same age. The Assynt sill is certainly the only other example of albitite yet recorded in Britain, but when a systematic survey of the minor intrusions associated with this period of activity is undertaken, many more may be discovered.

The possibility of a Tertiary age for the Ve Skerries rock must not be excluded, and in this connexion the case of the highly sodic Rockall granite is, perhaps, suggestive,⁶ but the meagre available evidence seems to link it most closely with the post-Cambrian activity of Assynt.

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¹ T. M. Finlay, *Trans. Roy. Soc. Edinburgh*, 1930, vol. 56, pp. 676–693.

² *Mem. Geol. Survey, Central Sutherland*, 1931, p. 178.

³ F. C. Phillips, *Geol. Mag.*, 1926, vol. 63, pp. 72–77.

⁴ J. Phemister, *Mem. Geol. Survey, Strath Oykel and Lower Loch Shin*, 1926, p. 44.

⁵ H. H. Read, *Mem. Geol. Survey, Central Sutherland*, 1931, p. 178.

⁶ G. W. Tyrrell, *Geol. Mag.*, 1924, vol. 61, pp. 19–25.