

*On the occurrence of nacrite at Shap, Westmorland.*

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**D**URING a recent investigation of the hydrothermal mineralization associated with the Shap granite, nacrite was found in a quartz vein in the Shap Blue quarry. This quarry has been opened for roadstone in the metamorphosed Borrowdale lavas, 700 yards north of the granite contact on the west side of the Penrith-Kendal road, three miles south of Shap village. Further examination showed that nacrite often coats shear joints in fault breccias and shatter belts in the metamorphosed andesites. It is associated with chlorite, haematite, pyrite, and traces of erythrite, and often with later quartz, calcite, and baryte veins.

Nacrite from this locality occurs as microcrystalline aggregates on joint faces, usually only in thin layers but layers up to 5 mm. thick have been found. It varies in colour from a pale apple-green to white with sub-nacreous lustre and is recognized in the field by its colour, softness (hardness 1.5), and greasy feel. The refractive indices are  $\alpha$  1.559,  $\gamma$  1.567, birefringence 0.008 ( $\pm$ 0.002). The variations in colour are possibly due to chlorite impurities, since the colour is removed by warm dilute HCl, and whilst no chlorite lines occur on the X-ray powder films, nacrite treated with HCl gave a better, more clearly defined powder pattern. The X-ray powder data given in table I is comparable with other data in the literature.

TABLE I. X-ray powder data in kX units for nacrite from Shap.

<i>d.</i>	Int.	<i>d.</i>	Int.	<i>d.</i>	Int.	<i>d.</i>	Int.
7.15	s	2.413	s	1.484	m	1.040	w
4.42	vs	2.293	w	1.451	vw	0.961	vvw
4.06	m	2.128	mw	1.375	vw	0.894	vvw
3.58	s	1.907	m b	1.330	w b	0.859	vvw
3.36	w	1.862	vw	1.263	mw		
3.06	s	1.676	w b	1.230	w b		
2.58	m	1.630	w b	1.151	vvw		

Order of decreasing intensities: vs, s, m, mw, w, vw, vvw; b broad. 9 cm. diameter camera Cu-K $\alpha$  radiation ( $\lambda$  1.5374 kX). Impurity lines were also found on some films at 10.3, 4.81, and 3.26.

A bibliography given in a recent paper by von Knorring, Brindley, and Hunter (1952) lists the occurrences and gives X-ray data for the mineral species nacrite as redefined by Ross and Kerr (1931). The material described above appears to be identical with this species. Ross and Kerr suggested a pneumatolytic or hydrothermal origin for nacrite from Saxony and Colorado, whilst nacrite occurring in sphaeroiderites in the Kladno Coal Measures and Ordovician slates in Bohemia is thought to be hydrothermal (Kasper, 1933; Ulrich, 1935). The present occurrence most closely resembles that at Groby, Leicestershire (Claringbull, 1952), where fine-grained aggregates of nacrite occur in belts of shearing in syenite. The Shap mineral is clearly associated with the hydrothermal effects of the Shap granite, since it is found in fault breccias which have been proved to have formed after the metasomatism of the country-rocks, but which themselves are filled with minerals of the Shap granite genesis. However, nacrite is confined to shear joints and does not occur in tension joints so that it appears to be associated with the period of shearing.

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