15118 PORPHYRITIC RADIATE QUARTZ-NORMATIVE MARE BASALT ST. 2 27.6 g

INTRODUCTION: 15118 is a pyroxene-phyric mare basalt belonging to the quartz-normative group. It has large yellow-green phenocrysts in a much finer-grained but wholly crystalline groundmass. The sample is tough, has a few vugs, and has zap pits on at least 3/4 of the surface. It was collected as part of the rake sample 5 m east of the boulder at Station 2 (see Figure 15105-2).

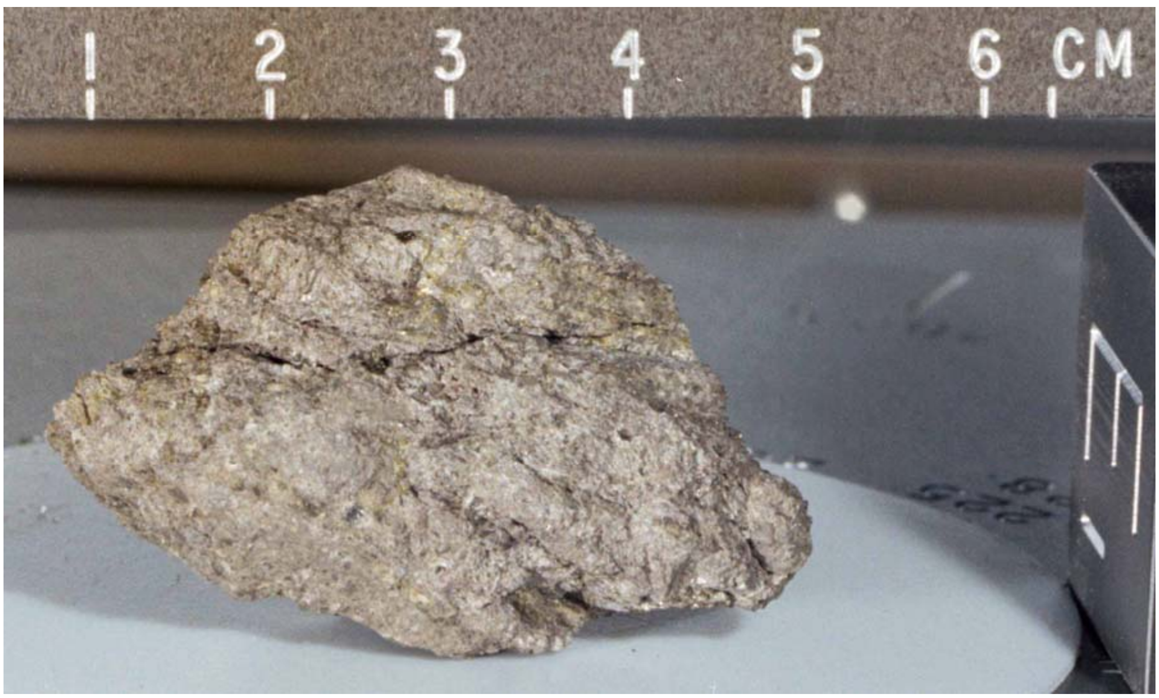

Figure 1. Pre-split view of 15118. S-71-48762

PETROLOGY: 15118 consists of pyroxene phenocrysts in a finer mass of plagioclase and pyroxene (Fig. 2). The phenocrysts are embayed or grew very irregularly, with spaces filled with the groundmass. The sample was described by Dowty et al. (1973a,b; 1974), and microprobe analyses of silicates and metals were tabulated by Dowty et al. (1973c). The opaque minerals were analyzed by Nehru et al. (1973, 1974). Dowty et al. (1973a,b) found a mode of 61% pyroxene, 29% plagioclase, 4% opaques, 3% silica, and 1% others. Mineral analyses are shown in Figure 3. The phenocrysts are skeletal and 1.0 to 3.0 mm wide, much larger than the groundmass pyroxenes: 0.6 x 0.2 to 0.4 mm wide. Dowty et al. (1974) provided pyroxene cell parameters and the $\Delta\beta$ for pigeonite-augite intergrowths; the value of 2.4 is consistent with slow cooling for the phenocrysts. The phenocrysts are zoned (Figs. 3, 4), with irregular shapes and zoning patterns. The groundmass is mainly subparallel stubby plagioclase laths which are enclosed in a mosaic of pyroxene grains; some plagioclase grains have pyroxene cores. Scarce metal contains 1.3 to 1.6% Co, 1.6 to 3.3% Ni. A K-rich phase is also present. Nehru et al.(1974) found that the chromite is exceptionally high in alumina (17.6 to 19.0%). Lofgren et al. (1975) used the Dowty et al.(1973a,b; 1974) description to estimate cooling rates of about <1°C/hour for the phenocrysts and 1 to 5°C/hour for the groundmass, by a comparison with textures produced in dynamic crystallization experiments on a synthetic composition.

CHEMISTRY: Chemical analyses are listed in Table 1 and the rare earths are plotted in Figure 5. Except FeO, the major elements are consistent among analyses and are of a quartz-normative basalt, as the low-Mg end of the spectrum. The defocussed beam analysis (Table 2) is also quite consistent. The rare-earths are less consistent; those of Wiesmann and Hubbard (1975) seem rather high, although the Mg/Fe of the sample is rather fractionated. The FeO abundance of Ma et al. (1976) is anomalously high for an Apollo 15 mare basalt. Some of the inconsistencies might result from irregular distribution of the large phenocrysts.

TRACKS AND EXPOSURE: Bhandari et al. (1972, 1973) measured track densities of 8-50 ($x10^6 cm^{-2}$) in a surface chip. The variation of track density with depth is shown as Figure 6. Bhandari et al. (1972, 1973) determined a "suntan" age of 1.3 m.y.

PROCESSINGAND SUBDIVISIONS: Chipping produced a few daughters, and ,0 is now 21.75 g. Thin sections ,6; ,9; and ,18 were made from ,1.

Figure 2. Photomicrograph of 15118,6, showing large irregular phenocryst (left) and contrasting groundmass (right). Crossed polarizers. Width about 2.5 mm.

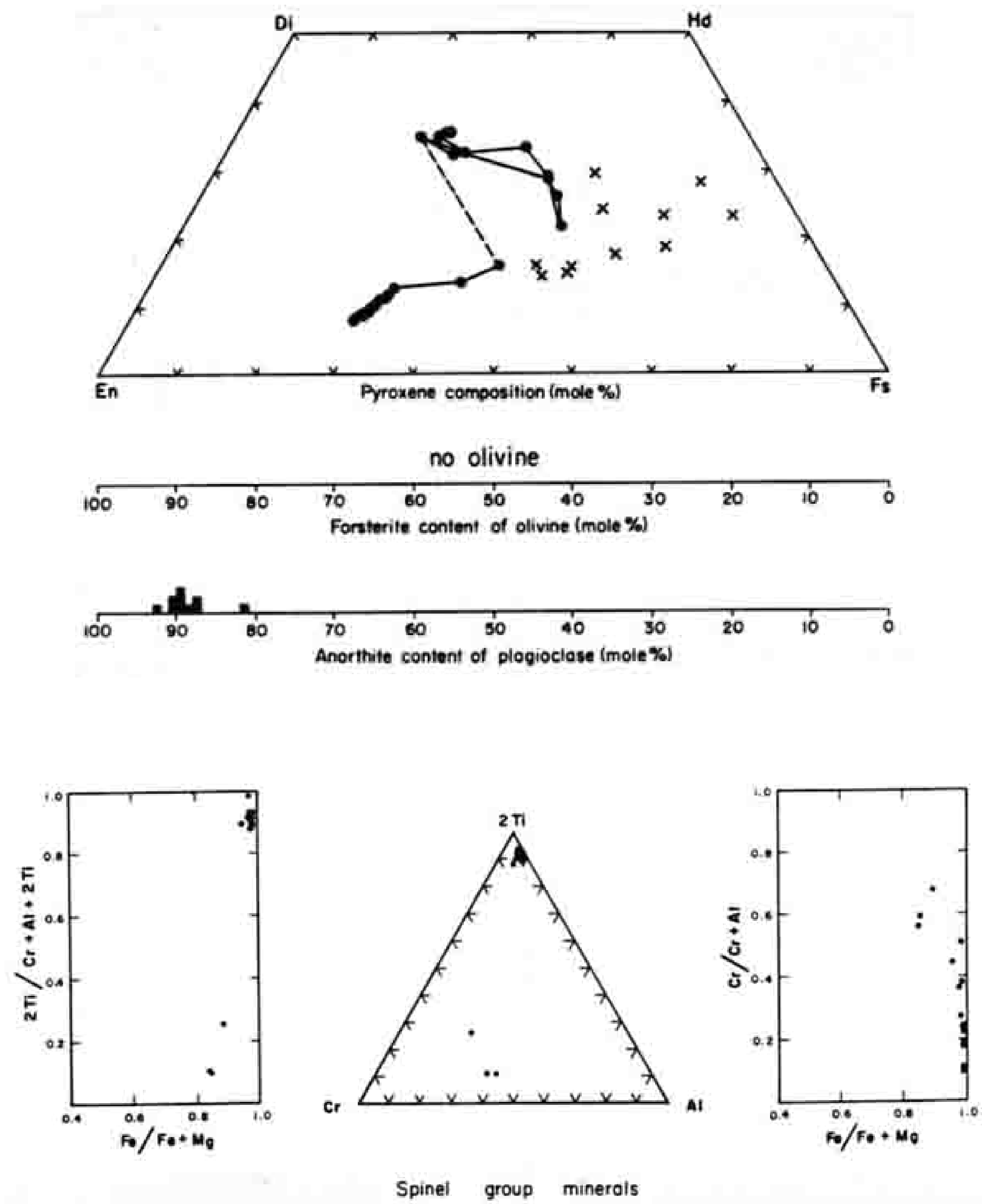

Figure 3. Mineral analyses. In pyroxene quadrilateral,
dots are phenocryst analyses, crosses are groundmass pyroxene analyses
(Dowty et al., 1973b).

Fig. 4a

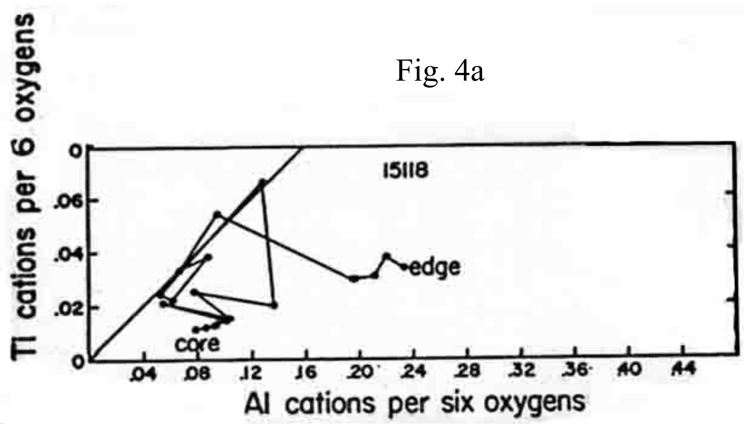

Fig. 4b

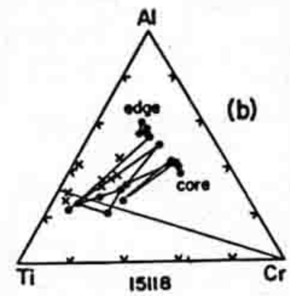

Figure 4. Zoning in pyroxenes. a) Ti-Al; b) Ti-Al-Cr
(Dowty et al., 1974).

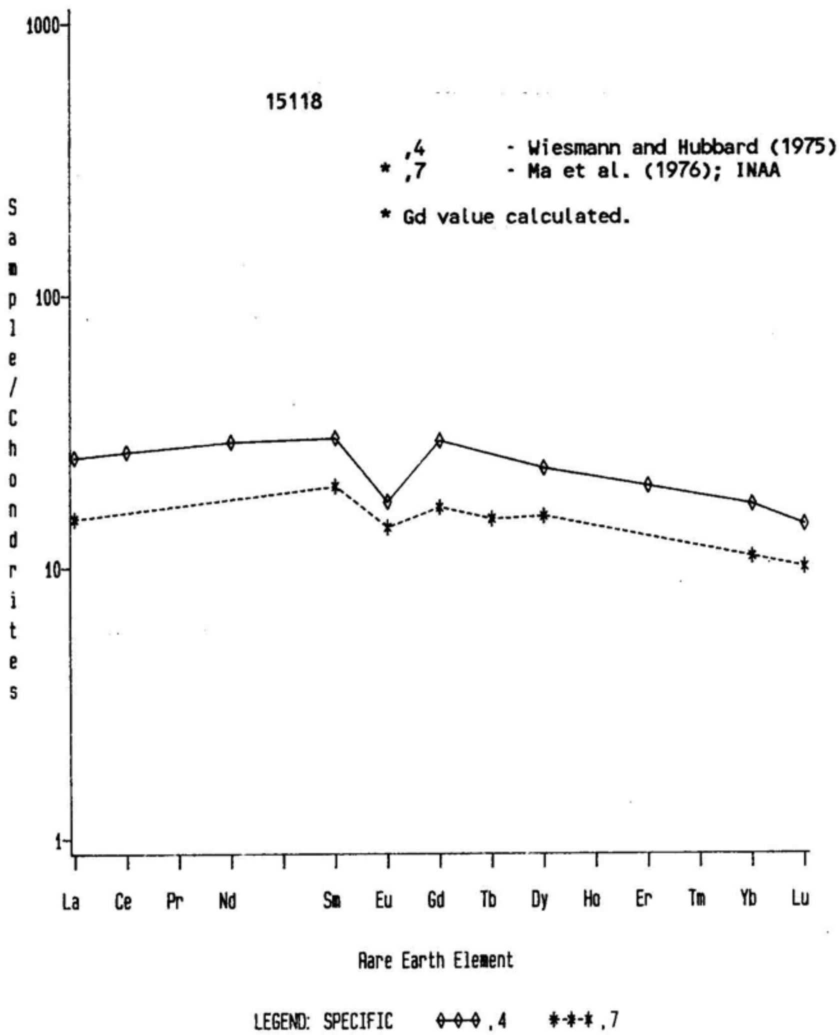

Figure 5. Rare earths in 15118.

TABLE 15118-1. Chemical analyses

		,4	,4	,7
Wt %	SiO2	47.6		
	TiO2	2.05	2.05	2.00
	Al2O3	10.72		10.6
	FeO	20.39		24.0
	MgO	6.49		7.7
	CaO	11.65		10.1
	Na2O	0.32	0.31	0.354
	K2O	0.06	0.076	0.065
	P2O5	0.10		
(ppm)	Sc			42
	V			204
	Cr		2266	3970
	Mn	2170		1970
	Co			44
	Ni			<66
	Rb		1.32	
	Sr		131	
	Y			
	Zr			
	Nb			
	Hf			3.1
	Ba		83.8	80(a)
	Th		0.79	
	U		0.21	
	Pb			
	La		8.39	5.0
	Ce		23.4	
	Pr			
	Nd		17.3	
	Sm		5.40	3.6
	Eu		1.20	0.97
	Gd		7.25	
	Tb			0.71
	Dy		7.33	4.9
	Ho			
	Er		3.99	
	Tm			
	Yb		3.40	2.2
	Lu		0.49	0.34
	Li		8.3	
	Be			
	B			
	C			
	N			
	S	700		
	F			
	Cl			
	Br			
	Cu			
	Zn			
(ppb)	I			
	At			
	Ga			
	Ge			
	As			
	Se			
	Mo			
	Tc			
	Ru			
	Rh			
	Pd			
	Ag			
	Cd			
	In			
	Sn			
	Sb			
	Te			
	Cs			
	Ta			
	W			450
	Re			
	Os			
	Ir			
	Pt			
	Au			
	Hg			
	Tl			
	Bi			
		(1)	(2)	(3)

References and methods:

(1) Rhodes and Hubbard (1973); XRF
(2) Wiesmann and Hubbard (1975); isotope dilution, atomic abs.
(3) Ma et al. (1976); INAA

Notes:

(a) ±35

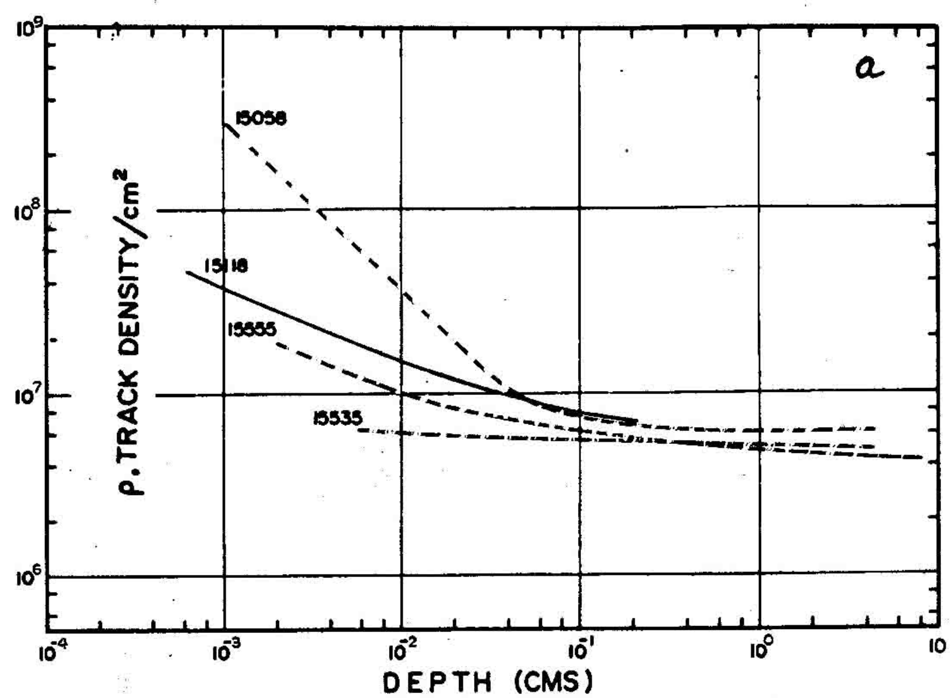

Figure 6. Track density vs. depth for 15118 (solid line)
and other Apollo 15 samples (dashed lines) (Bhandari et al., 1972).

TABLE 15118-2. Defocussed beam microprobe analyses
(Dowty et al., 1973a, b)

Wt %	SiO2	48.7
	TiO2	2.10
	Al2O3	9.7
	FeO	21.1
	MgO	7.0
	CaO	9.9
	Na2O	0.39
	K2O	0.08
	P2O5	0.09
ppm	Cr	1780
	Mn	2090