15116 PORPHYRITIC SUBOPHITIC QUARTZ-NORMATIVE MARE BASALT ST. 2 7.2 g

INTRODUCTION: 15116 is a coarse pyroxene-phyric mare basalt (Fig. 1), one of the coarsest of the quartz-normative group. It has conspicuous, yellow-green pyroxene phenocrysts. The sample is tough, with a few vugs, and no zap pits. It was collected as part of the rake sample 5 m east of the boulder at Station 2 (see Fig. 15105-2).

PETROLOGY: 15116 was described and analyzed by Dowty et al. (1973a,b,c; 1974) as one of the coarsest of the quartz-normative Apollo 15 mare basalts, with a gabbroic texture (Fig. 2). A lack of phenocrysts in the thin sections was suspected of being a sampling problem by Dowty et al. (1973a,b) and portions of large phenocrysts do occur. Macroscopically phenocrysts are visible and up to 5 mm long. The sample comprises 60% pyroxene, 30% plagioclase, 5% opaque minerals, 4% silica, and 1% residual phases; olivine is absent. Tridymite is conspicuous, occurring in parallel arrangements (1 mm laths); it crystallized earlier than cristobalite, and is embedded in the margins of silicates. Metal occurs in two compositional groups. The groundmass pyroxenes are coarser than the phenocrysts in many other quartz-normative-basalts.

Microprobe analyses of minerals (Dowty et al., 1973a,b,c; 1974) and Nehru et al. (1973, 1974) are shown in Figure 3. The details of pyroxene zoning (Fig. 4) was described and discussed by Dowty et al. (1974). They also gave cell parameters for pyroxenes. The $\Delta\beta$ value for pigeonite-augite intergrowths (2.8) are very high, in accordance with slow cooling. Nehru et al. (1974) noted that the transition from chromite cores to ulvospinel rims was very sharp, but that the gap in compositions was narrower than in faster-cooled, finer-grained rocks. In a comparison of the textures (as described by Dowty et al., 1973a,b; 1974) with the products of dynamic experiments on a synthetic quartz-normative basalt composition, Lofgren et al. (1974) suggested that both phenocrysts are groundmass cooled at rates less than 1°C/hour.

CHEMISTRY: An analysis by Helmke et al. (1973) (Table 1, Fig. 5) clearly places 15116 in the quartz-normative mare basalt group. The defocussed beam microprobe analysis of Dowty et al. (1973a,b) (Table 2) is in reasonable agreement except for the low TiO_2.

PROCESSING AND SUBDIVISIONS: 15116 was split by chipping, with ,0 (4.79 g) and ,2 (1.52 g) the largest pieces remaining. Thin sections ,7 and ,10-,13 were cut from ,1 which was all but consumed in the process.

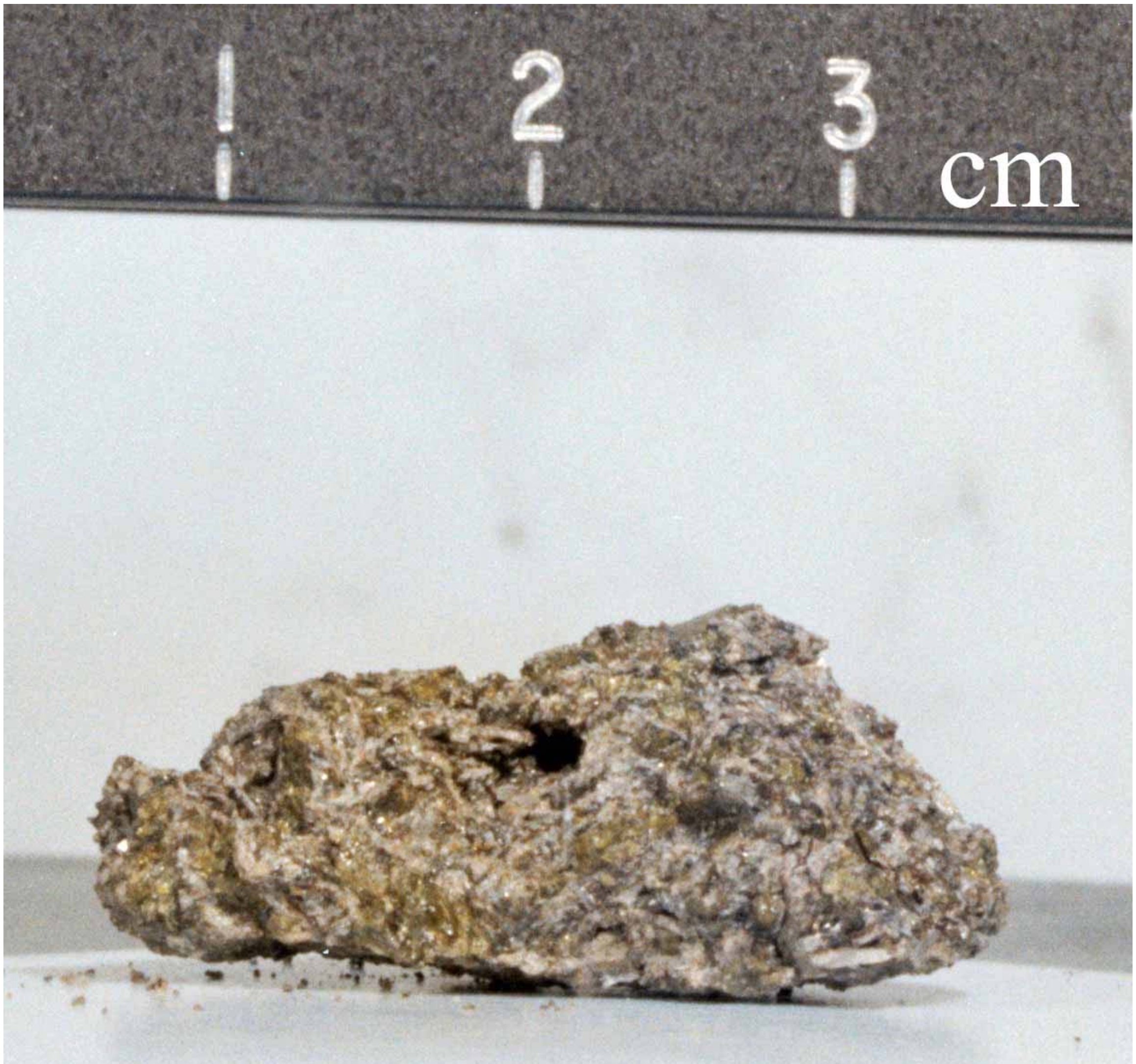

Figure 1. Macroscopic view of 15116, pre-split. S-71-48756

Figure 2. Photomicrograph of 15116,10.
Crossed polarizers. Width about 2 mm.

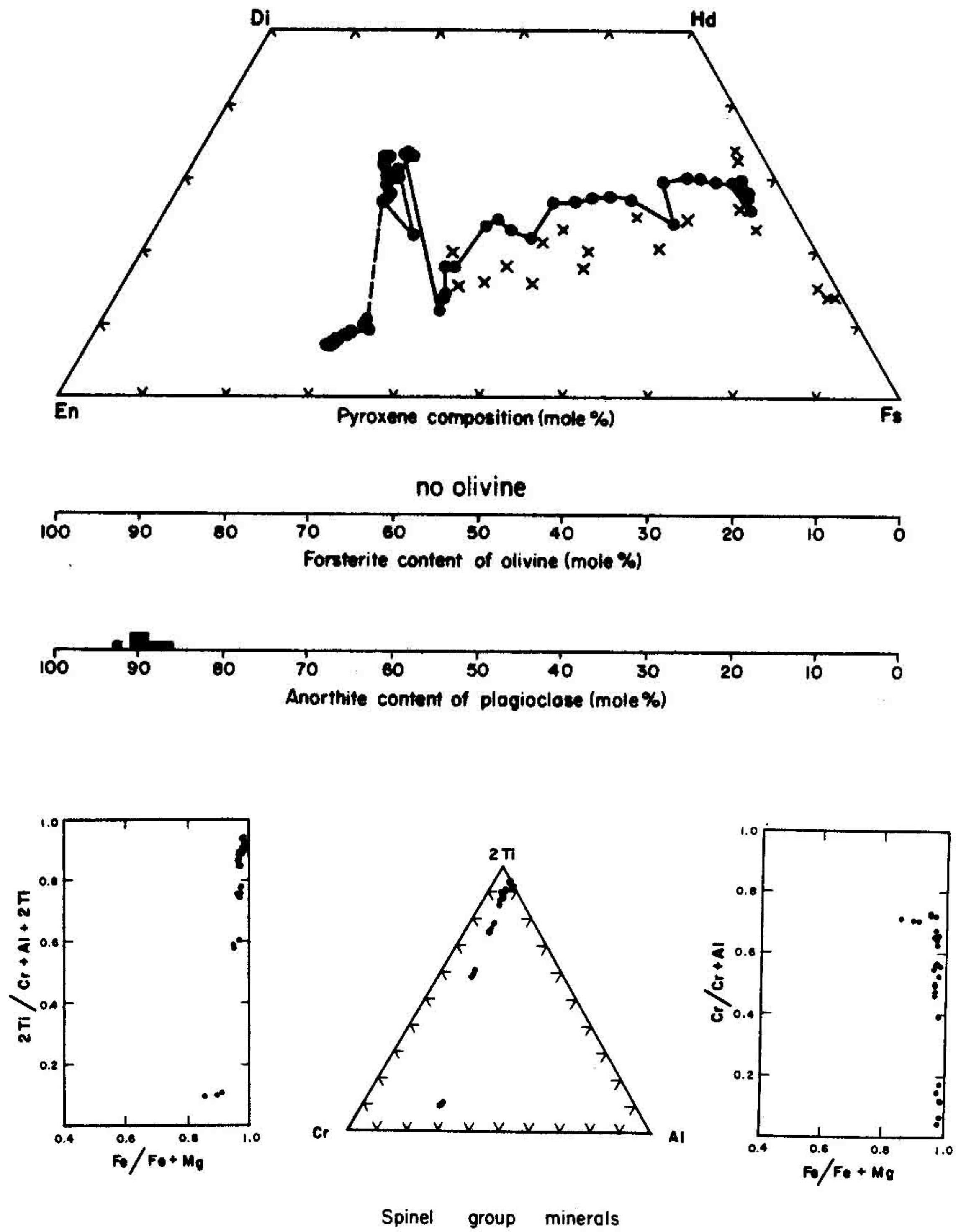

Figure 3. Silicate and opaque mineral analyses
(Dowty et al., 1973b).

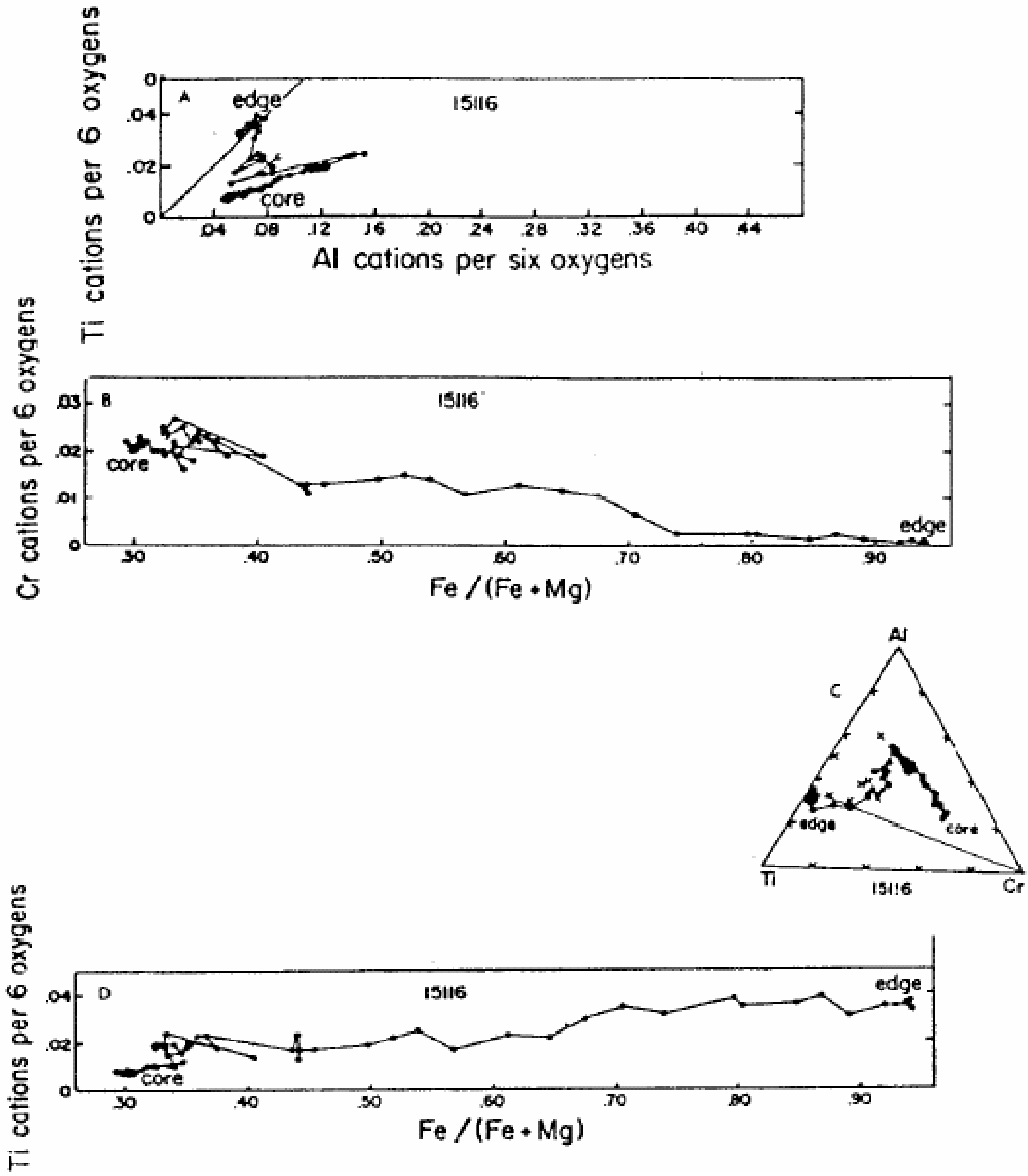

Figure 4. Zoning in pyroxenes,
a) Ti vs. Al; b) Cr vs. Fe/(Fe + Mg);
c) Ti-Al-Cr; d) Ti vs. Fe/(Fe + Mg)
(Dowty et al., 1974)

TABLE 15116-1. Chemical analysis

		,4
Wt %	SiO2	51.0
	TiO2	1.78
	Al2O3	9.94
	FeO	20.0
	MgO	7.87
	CaO	9.57
	Na2O	0.335
	K2O	0.060
	P2O5	
(ppm)	Sc	50.8
	V	
	Cr	2650
	Mn	2040
	Co	35
	Ni	
	Rb	1.0
	Sr	
	Y	
	Zr	
	Nb	
	Hf	2.4
	Ba	
	Th	
	U	
	Pb	
	La	5.73
	Ce	14.8
	Pr	
	Nd	12.0
	Sm	4.05
	Eu	1.10
	Gd	5.3
	Tb	0.88
	Dy	6.02
	Ho	1.23
	Er	3.4
	Tm	
	Yb	2.90
	Lu	0.396
	Li	
	Be	
	B	
	C	
	N	
	S	
	F	
	Cl	
	Br	
	Cu	
	Zn	<2.7
(ppb)	I	
	At	
	Ga	4100
	Ge	
	As	
	Se	
	Mo	
	Tc	
	Ru	
	Rh	
	Pd	
	Ag	
	Cd	
	In	
	Sn	
	Sb	
	Te	
	Cs	51
	Ta	
	W	
	Re	
	Os	
	Ir	
	Pt	
	Au	
	Hg	
	Tl	
	Bi	
		(1)

References and methods:

(1) Helmke and Haskin (1973); INAA

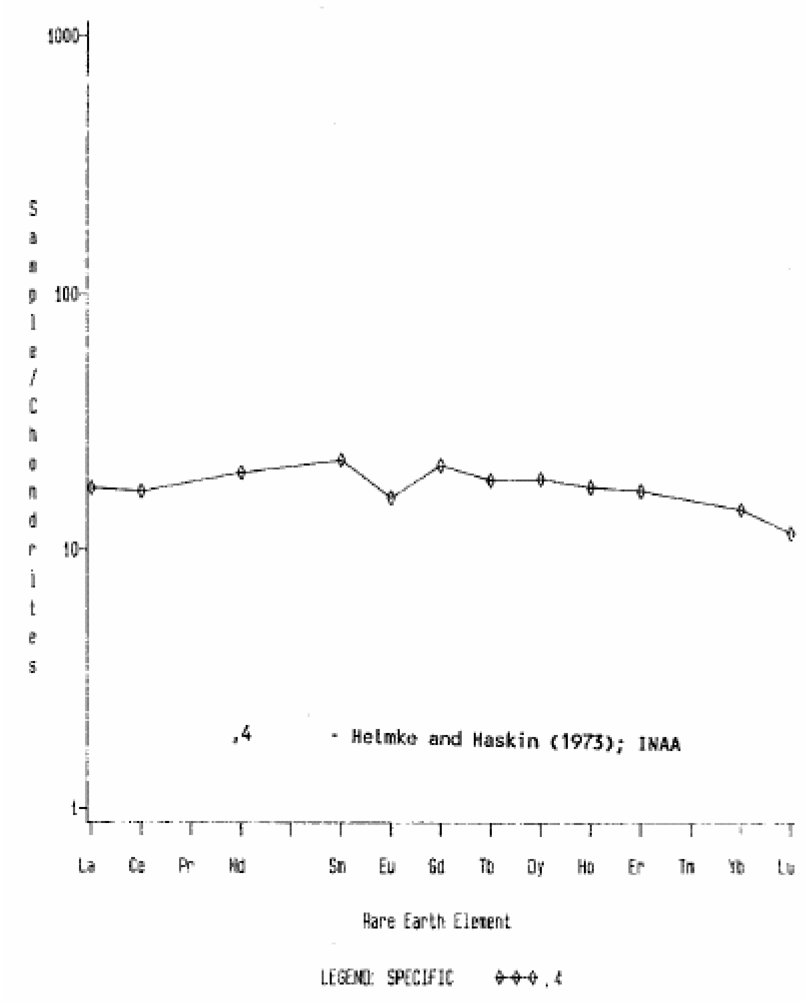

Figure 5. Rare earths in 15116.

TABLE 15116-2. Microprobe defocussed beam analysis
(Dowty et al., 1973a, b)

Wt %	SiO2	49.2
	TiO2	1.16
	Al2O3	10.2
	FeO	19.0
	MgO	7.3
	CaO	10.4
	Na2O	0.38
	K2O	0.02
	P2O5	0.04
ppm	Cr	2190
	Mn	1705