

15665 FINE-GRAINED OLIVINE-NORMATIVE ST. 9A 10.20 g
MARE BASALT

INTRODUCTION: 15665 is a fine-grained, olivine-porphyrific mare basalt which is vesicular (Fig. 1). The olivines are small but visible macroscopically. In chemistry, the sample is an average Apollo 15 olivine-normative mare basalt. Vesicles total about 15% of the sample; crystals do not project into them. A few vugs do have projecting crystals. Most surfaces have no zap pits but a few are present. 15665 was collected as part of the rake sample from Station 9A.

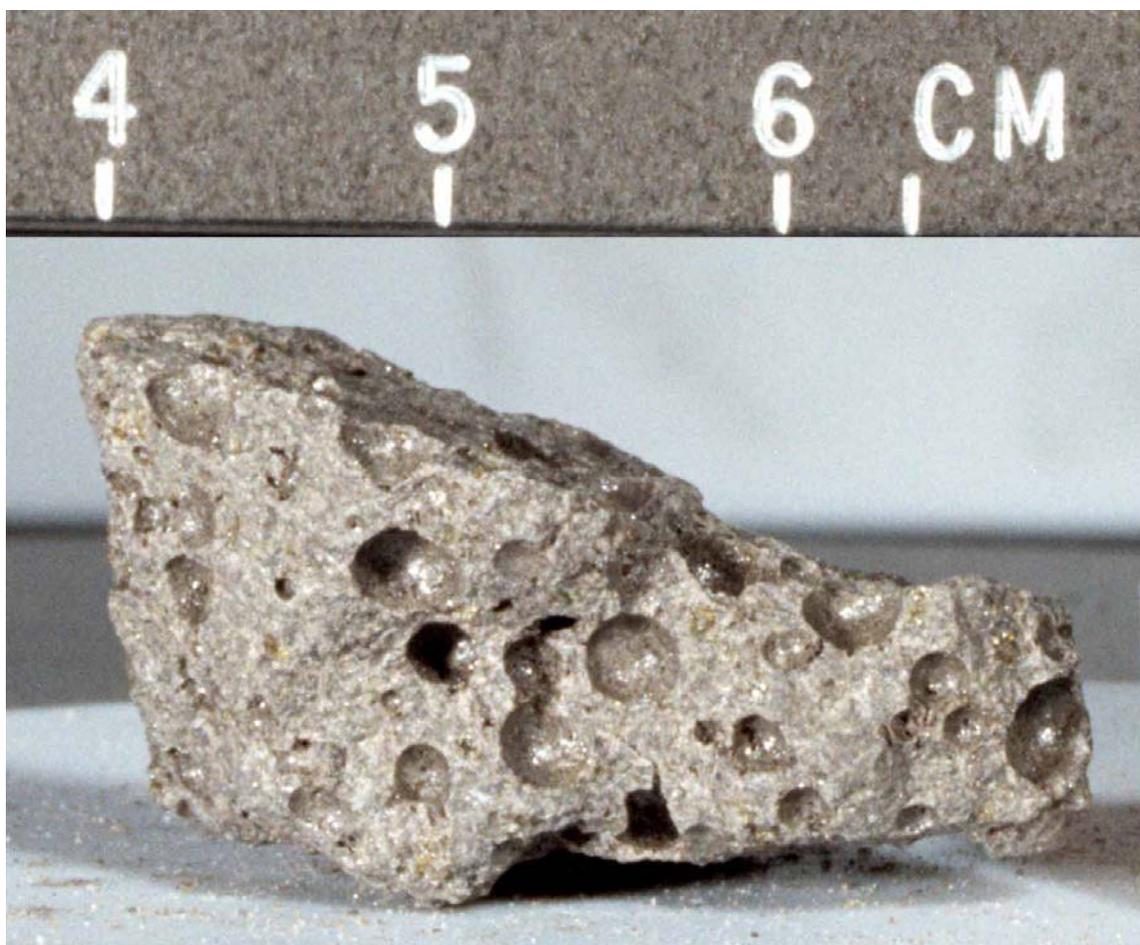


Figure 1. Pre-chip view of 15665. S-71-49740

PETROLOGY: 15665 is a fine-grained, vesicular basalt which is olivine phyric (Fig. 2). The texture, grain size, mode, and mineral chemistry are very similar to 15669. The olivines are up to about 1 mm in maximum dimension and show intense resorption and corrosion. The groundmass consists of small, granular pyroxenes and small plagioclase

laths which are less than 0.5 mm long. Many chromites occur, some up to a few hundred microns across and euhedral, and sharp boundaries to thin rims of ulvospinel are common. Residues are very fine-grained and cristobalite appears to be rare. Dowty et al. (1973b) noted that most of the ilmenite is platy and skeletal. Dowty et al. (1973a, b) reported a mode of 56% pyroxene, 25% plagioclase, 8% olivine, 8% opaque minerals, 3% miscellaneous, and no silica. Dowty et al. (1973c) tabulated microprobe analyses of pyroxenes, olivines, plagioclases, and metal grains) and Nehru et al. (1973) tabulated microprobe analyses of spinel group minerals and ilmenites. Nehru et al. (1974) remarked on the sharp chromite-ulvospinel boundaries. The metal grains contain 1.4 to 1.7% Co and 4.0 to 5.9% Ni; residual glass contains 2% K_2O and 60% SiO_2 ; and ilmenite contains 0.16% to 0.88% MgO. The mineral chemistry (Fig. 3) is typical of Apollo 15 olivine-normative mare basalts except that the rapid cooling has prevented the crystallization of fayalite.

CHEMISTRY: Helmke et al. (1973) reported a bulk rock chemical analysis (Table 1, Fig. 4). The analysis shows 15665 to be an average member of the Apollo 15 olivine-normative mare basalt group. The defocussed beam microprobe bulk analysis of Dowty et al. (1973a, b) is low in MgO and is (abnormally) only slightly olivine-normative; probably the sporadic distribution of olivine phenocrysts has led to their under representation in the microprobe analysis.

Fig. 2a

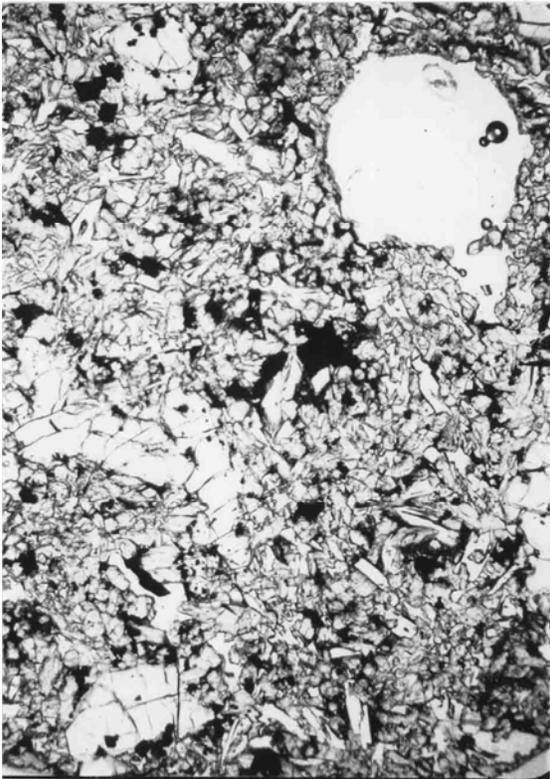


Fig. 2b



Figure 2. Photomicrographs of 15665,8. Widths about 3 mm. a) transmitted light; b) crossed polarizers.

PROCESSING AND SUBDIVISIONS: A large chip (,1) was removed and subdivided into ,1 through ,4. ,2 was largely used to make thin sections ,13 and ,14, and ,3 was used for chemistry. In 1975, ,0 was re-chipped to produce ,6, which was partly used to make thin sections ,8 and ,12. ,0 is now 7.84 g.

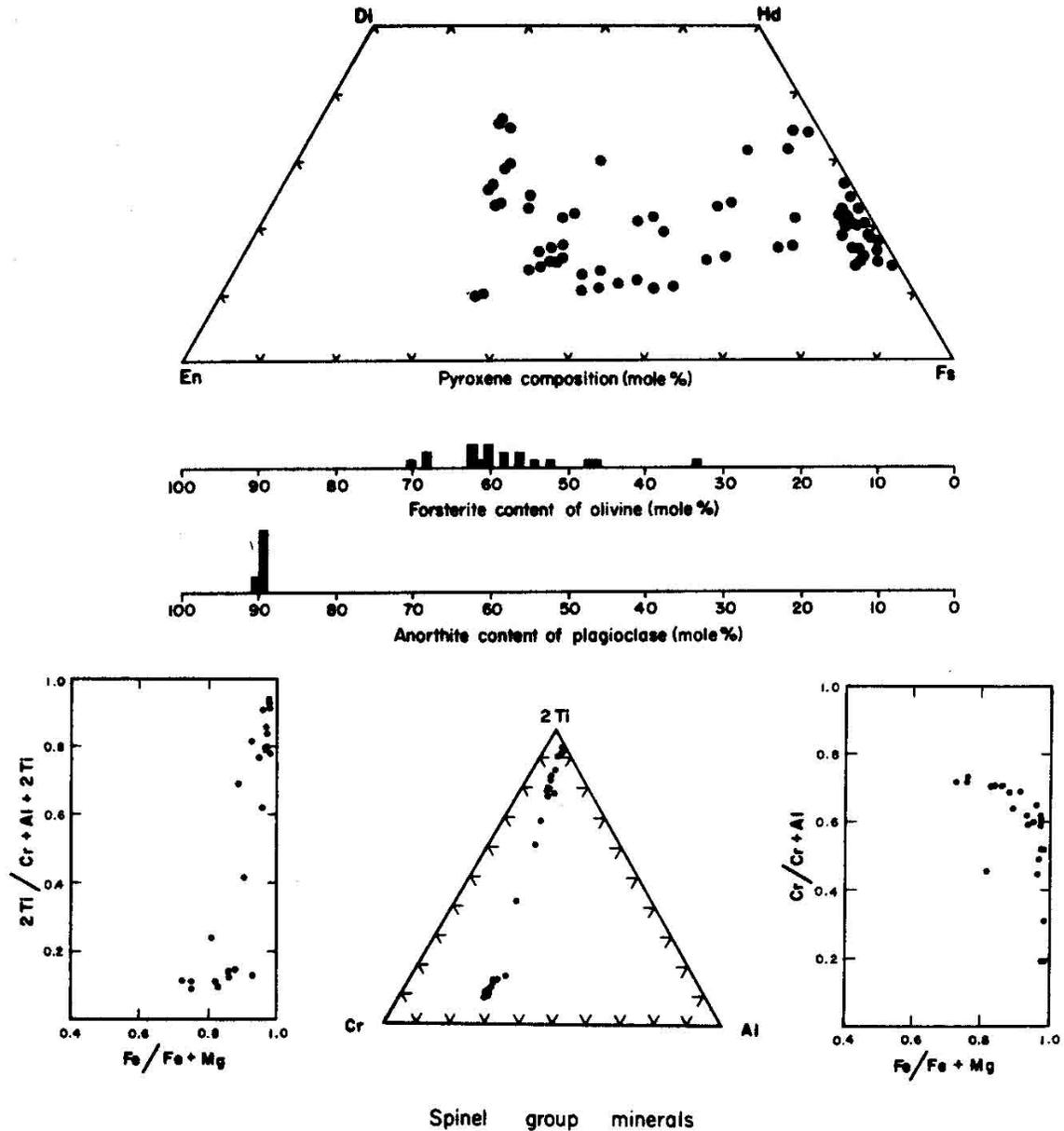


Figure 3. Compositions of minerals in 15665 (Dowty et al., 1973b).

TABLE 15665-1. Bulk rock chemical analysis

		,3
Wt %	SiO ₂	44.4
	TiO ₂	2.64
	Al ₂ O ₃	8.25
	FeO	23.4
	MgO	10.3
	CaO	9.42
	Na ₂ O	0.298
	K ₂ O	0.046
	P ₂ O ₅	
(ppm)	Sc	43.2
	V	
	Cr	3950
	Mn	2210
	Co	54
	Ni	
	Rb	1.1
	Sr	
	Y	
	Zr	
	Nb	
	Hf	2.2
	Ba	
	Th	
	U	
	Pb	
	La	4.87
	Ce	12.6
	Pr	
	Nd	10.2
	Sm	3.39
	Eu	0.84
	Gd	4.7
	Tb	0.75
	Dy	5.5
	Ho	1.0
	Er	3.1
	Tm	
	Yb	2.23
	Lu	0.309
	Li	
	Be	
B		
C		
N		
S		
F		
Cl		
Br		
Cu		
Zn	<2.5	
(ppb)	I	
	At	
	Ga	3100
	Ge	
	As	
	Se	
	Mo	
	Tc	
	Ru	
	Rh	
	Pd	
	Ag	
	Cd	
	In	
	Sn	
	Sb	
	Te	
	Cs	21
	Ta	
	W	
	Re	
	Os	
	Ir	
	Pt	
	Au	
	Hg	
	Tl	
Pb		

References and methods:

(1) Heikkinen et al. (1973); INAA, RUSA, NAS

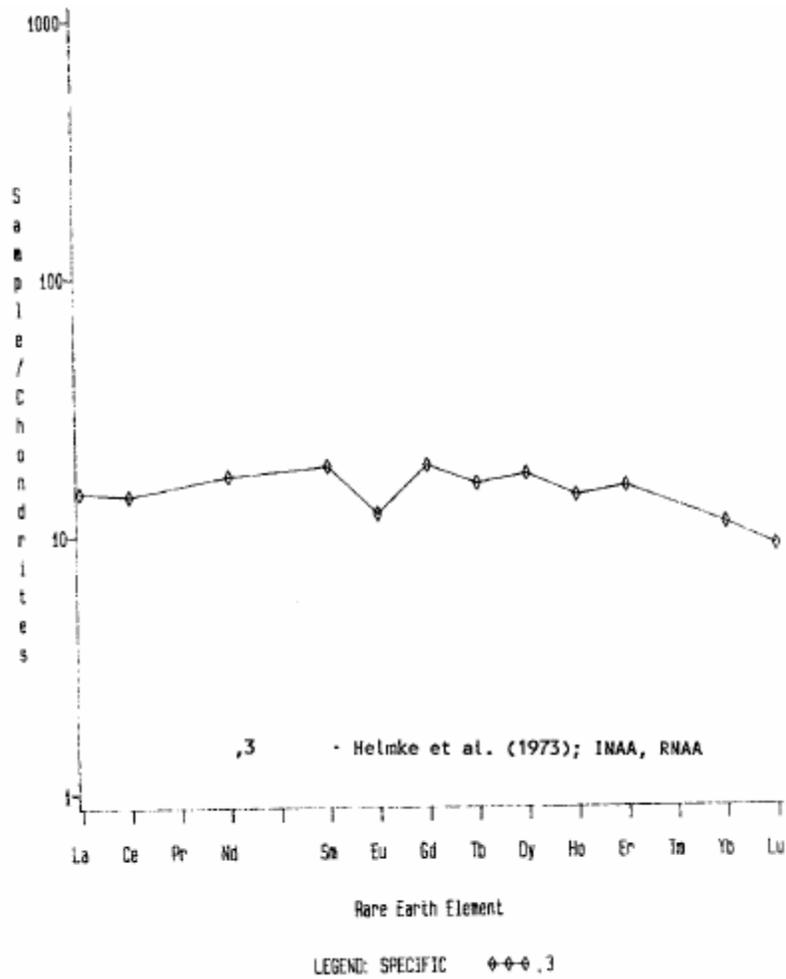


Figure 4. Rare earths in 15665.

TABLE 15665-2. Defocussed beam microprobe bulk analysis (Dowty et al., 1973a, b)

Wt %	SiO ₂	46.7
	TiO ₂	2.94
	Al ₂ O ₃	10.2
	FeO	21.7
	MgO	7.7
	CaO	10.6
	Na ₂ O	0.39
	K ₂ O	0.06
	P ₂ O ₅	0.09
ppm	Cr	4450
	Mn	2170