15643	MEDIUM-GRAINED OLIVINE-NORMATIVE MARE BASALT	ST. 9A	17.90 g

INTRODUCTION: 15643 is a medium-grained, olivine-bearing mare basalt which is vuggy but not vesicular (Fig. 1). Yellow-green olivines are conspicuous macroscopically but do not form vesicles. In chemistry, the sample is a magnesian member of the Apollo 15 olivine-normative mare basalt group. The sample is very dusty on one side and showed a possible soil line. It had no zap pits. 15643 was collected as part of the rake sample at Station 9A.

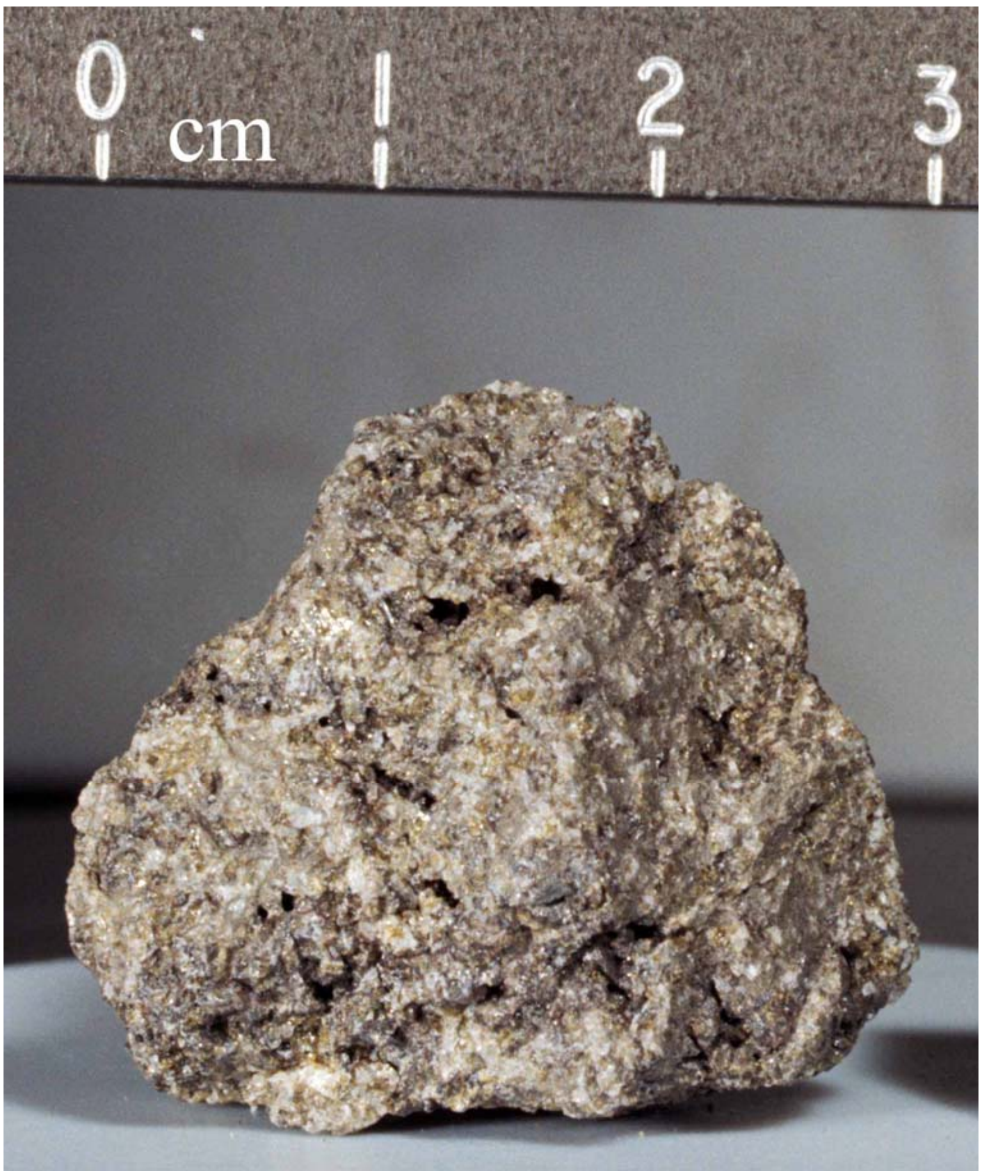

Figure 1. Pre-chip view of 15643. S-71-49783

PETROLOGY: 15643 is a medium-grained, olivine-bearing mare basalt (Fig. 2). Many grains are about 1 mm across, but a few pigeonites are bigger, and some plagioclases which ophitically enclose small pyroxenes and olivines are almost 2 mm across. Some of the larger olivines contain crystallized silicate liquid inclusions. According to Dowty et al. (1973b), the sample is similar to 15641, and has some variolitic areas. Dowty et al. (1973a,b) reported a mode of 60% pyroxene, 21% plagioclase, 13% olivine, 4% opaques, 0.5% silica (actually cristobalite) and 1.5% miscellaneous. Dowty et al. (1973c) tabulated microprobe analyses of pyroxenes, olivines, plagioclases, Si-K glass, and Fe-metal, and Nehru et al. (1973) tabulated analyses of spinel group minerals and ilmenite. Nehru et al. (1974) included 15643 in their general discussion but provided no specific data or comment. The metal grains contain 1.3 to 4.2% Co and 2.4 to 2.8% Ni. The ilmenites contain 0.64 to 0.99% MgO. The chemistry of minerals (Fig. 3) is typical of Apollo 15 olivine-normative mare basalts.

CHEMISTRY: Bulk rock chemical analyses are listed in Table 1 and the rare earths shown in Figure 4. A defocussed beam microprobe analysis listed in Table 2 is consistent. The sample appears to be a member, and an Mg-rich one, of the Apollo 15 olivine-normative mare basalt suite. Laul et al. (1972a) noted the positive Eu anomaly, low Sm/Eu, and low rare-earths and stated that 15643 was probably derived by a higher degree of partial melting, involving larger degrees of plagioclase melting in the source, than other samples such as 15555. This concept cannot be considered tenable. Laul and

Fig. 2a

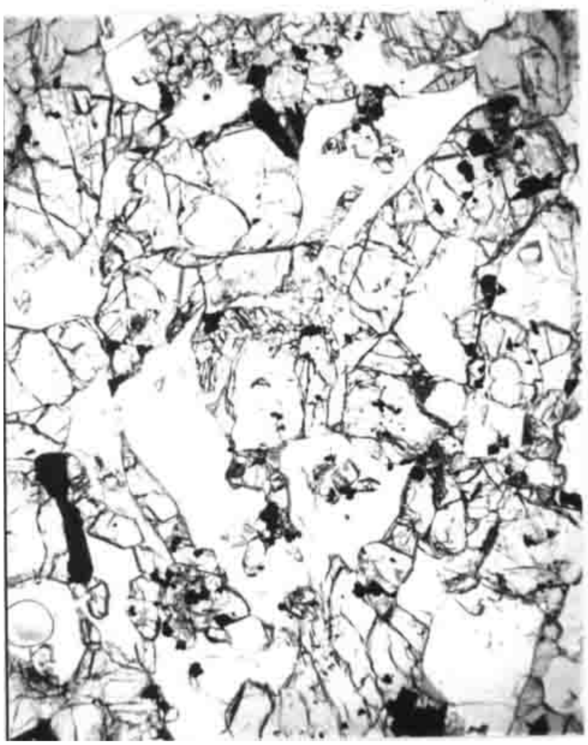

Fig. 2b

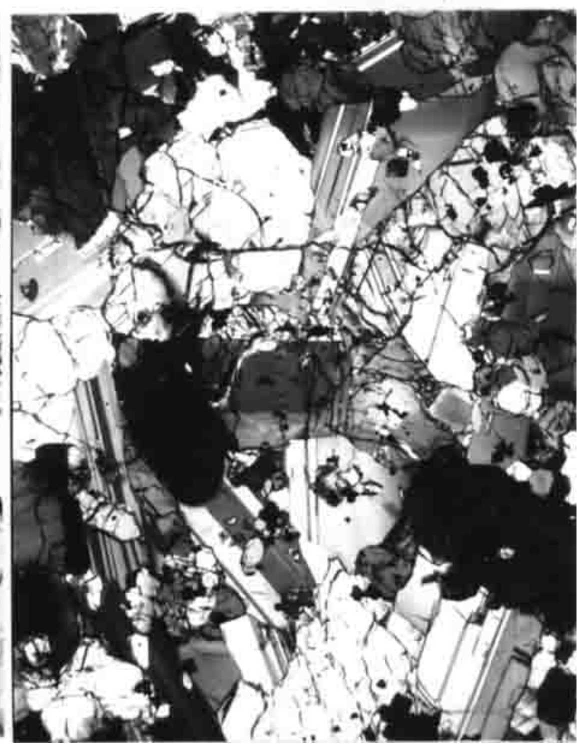

Figure 2. Photomicrographs of 15643,14.
Widths about 3 mm. a) transmitted light; b) crossed polarizers.

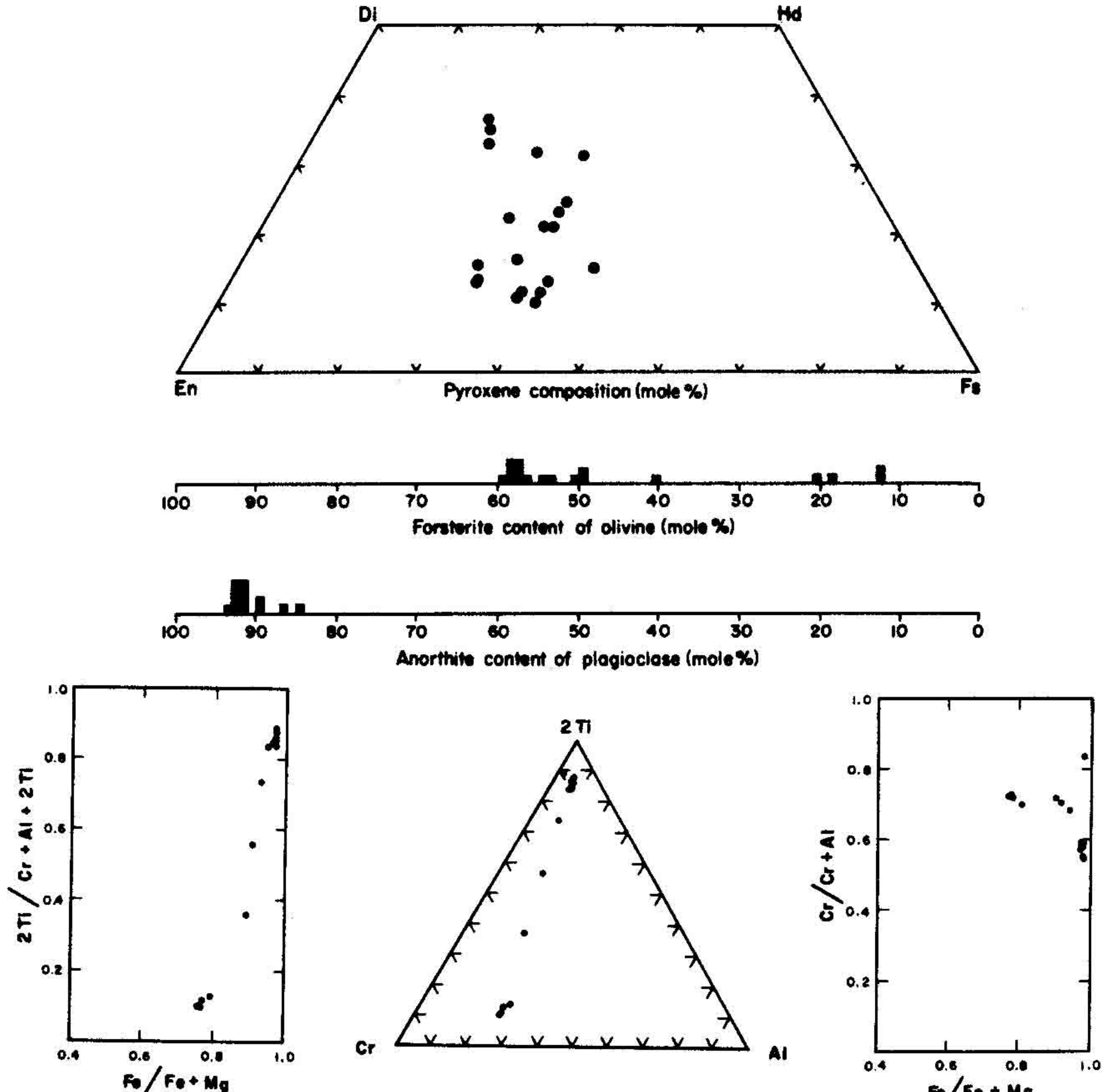

Figure 3. Chemistry of minerals in 15643
(Dowty et al., 1973b).

Schmitt (1973), using the same data, suggested that the sample occluded very little, if any, late magma. Such would be consistent with the very low TiO_2 (Dowty et al., 1973a, referring to this feature erroneously ascribed it to 15641 instead of 15643). Of note is the very small sample size (49 mg) used by Laul and Schmitt (1973) in this analysis. Ma et al. (1978) also referred to the Laul and Schmitt (1973) data and stated that 15643 was not related to other olivine-normative mare basalts by fractionation or filter-pressing. Cuttitta et al. (1973) and Christian et al. (1972) also analyzed for, and found no, Fe_2O_3, and found an "excess reducing capacity" (ΔRC) of +0.12.

TABLE 15643-1. Bulk rock chemical analyses

		,5	,3
wt%	SiO2	44.80	
	TiO2	2.01	1.1
	Al2O3	9.08	10.0
	FeO	21.28	23.1
	MgO	12.20	13
	CaO	9.48	9.0
	Na2O	0.27	0.271
	K2O	0.05	0.018
	P2O5	0.09	
(ppm)	Sc	32	30
	V	15	150
	Cr	3355	3040
	Mn	2170	1990
	Co	74	57
	Ni	145	
	Rb	<1	
	Sr	140	
	Y	23	
	Zr	59	<170
	Nb	<10	
	Hf		1.1
	Ba	43	60
	Th		
	U		
	Pb		
	La	<10	2.4
	Ce		7.6
	Pr		
	Nd		
	Sm		1.8
	Eu		0.82
	Gd		
	Tb		0.3
	Dy		2.3
	Ho		
	Er		
	Tm		
	Yb	3.9	1.3
	Lu		0.20
	Li	4.7	
	Be	<1	
	B		
	C		
	N		
	S		
	F		
	Cl		
	Br		
	Cu	8.6	
	Zn		
(ppb)	I		
	At		
	Ga	4100	
	Ge		
	As		
	Se		
	Mo		
	Tc		
	Ru		
	Rh		
	Pd		
	Ag		
	Cd		
	In		
	Sn		
	Sb		
	Te		
	Cs		
	Ta		200
	W		
	Re		
	Os		
	Ir		
	Pt		
	Au		
	Hg		
	Tl		
	Bi		
		(1)	(2)

References and methods:

(1) Christian et al. (1972), Cuttitta et al. (1973); XRF, chemical, optical emiss. spec.
(2) Laul and Schmitt (1973); INAA

PROCESSING AND SUBDIVISIONS: Early chipping produced sets of chips ,1 through ,6. ,2 and ,3 were reprocessed in 1977 to produce thin sections ,14 and ,15 from ,2 and chemical analysis of ,3. ,0 is not 15.60 g.

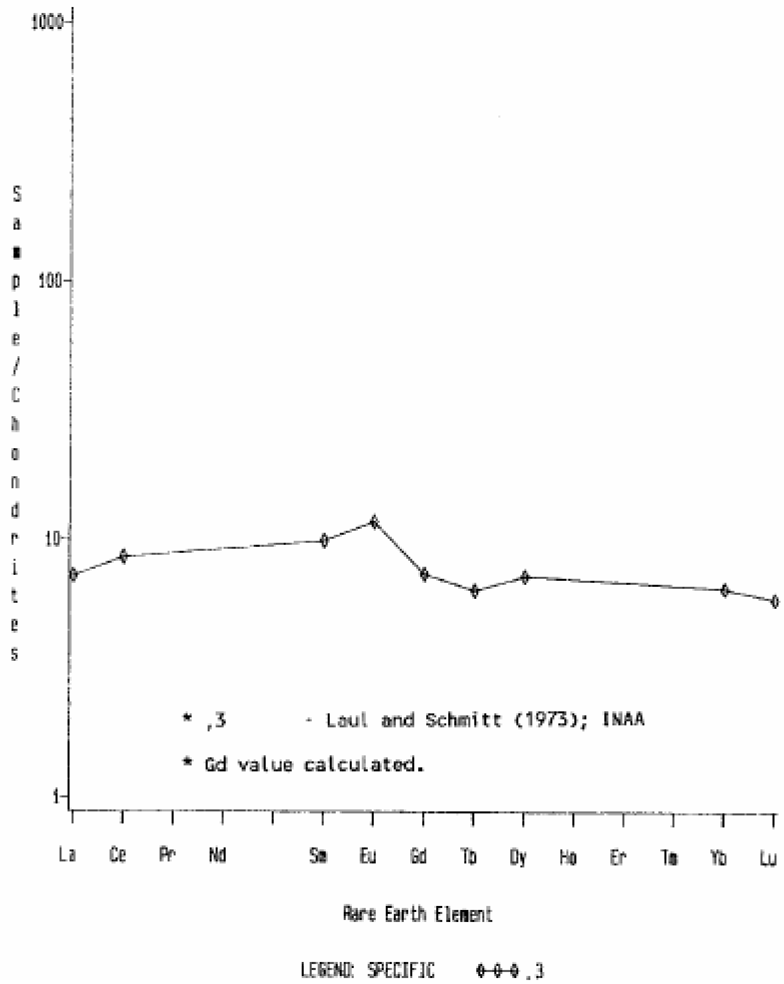

Figure 4. Rare earths in 15643.

TABLE 15643-2. Defocussed beam bulk rock chemical analysis (Dowty et al., 1973a,b)

Wt%	SiO2	45.4
	TiO2	1.87
	Al2O3	7.2
	FeO	23.7
	MgO	12.5
	CaO	8.6
	Na2O	0.25
	K2O	0.03
	P2O5	0.07
ppm	Cr	3150
	Mn	2095