15666

Porphyritic Pigeonite Basalt

10.1 grams

Figure 1: Photo of 15666. Cube is 1 cm. S71-49757.

Mineralogical Mode

Olivine	2 %
Pyroxene	40
Plagioclase	
Opaques	5
Silica	
Meostasis	53

Dowty et al. 1973

Introduction

15666 was collected as part of the large rake sample from station 9a, on the rim of Hadley Rille. It is a pyroxene-phyric basalt with a variolitic groundmass (figure 2). It also includes some olivine.

Petrography

Dowty et al. (1973, 1974) and Nehru et al. (1974) studied the pyroxene phenocrysts (figure 3). They are euhedral, elongate and chemically zoned, with distinct boundaries. Vesicles and metallic iron grains are present. The groundmass is finely crystalline.

15666 was rapidly cooled. Using controlled experiments, Lofgren et al. (1974, 1975) and Grove and Walker (1977) determined the cooling rate and concluded that the rock formed about 15 cm from a "conductive boundary".

Chemistry

Ma et al. (1976) give an analysis.

Processing

There are two thin sections of 15666.

References for 15666

Butler P. (1971) Lunar Sample Catalog, Apollo 15. Curators' Office, MSC 03209

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Dowty E., Prinz M. and Keil K. (1973b) Composition, mineralogy, and petrology of 28 mare basalts from Apollo 15 rake samples. *Proc. 4th Lunar Sci. Conf.* 423-444.

Grove T.L. and Walker D. (1977) Cooling histories of Apollo 15 quartz-normative basalts. *Proc. 8th Lunar Sci. Conf.* 1501-1520.

Lofgren G.E., Donaldson C.H. and Usselman T.M. (1975) Geology, petrology and crystallization of Apollo 15 quartz-normative basalts. *Proc. 6th Lunar Sci. Conf.* 79-99.

LSPET (1972a) The Apollo 15 lunar samples: A preliminary description. *Science* **175**, 363-375.

LSPET (1972b) Preliminary examination of lunar samples. Apollo 15 Preliminary Science Report. NASA SP-289, 6-1—6-28.

Ma M.-S., Murali A.V. and Schmitt R.A. (1976) Chemical constraints for mare basalt genesis. *Proc. 7th Lunar Sci. Conf.* 1673-1695.

Nehru C.E., Prinz M., Dowty E. and Keil K. (1974) Spinel-group minerals and ilmenite in Apollo 15 rake samples. *Am. Mineral.* **59**, 1220-1235.

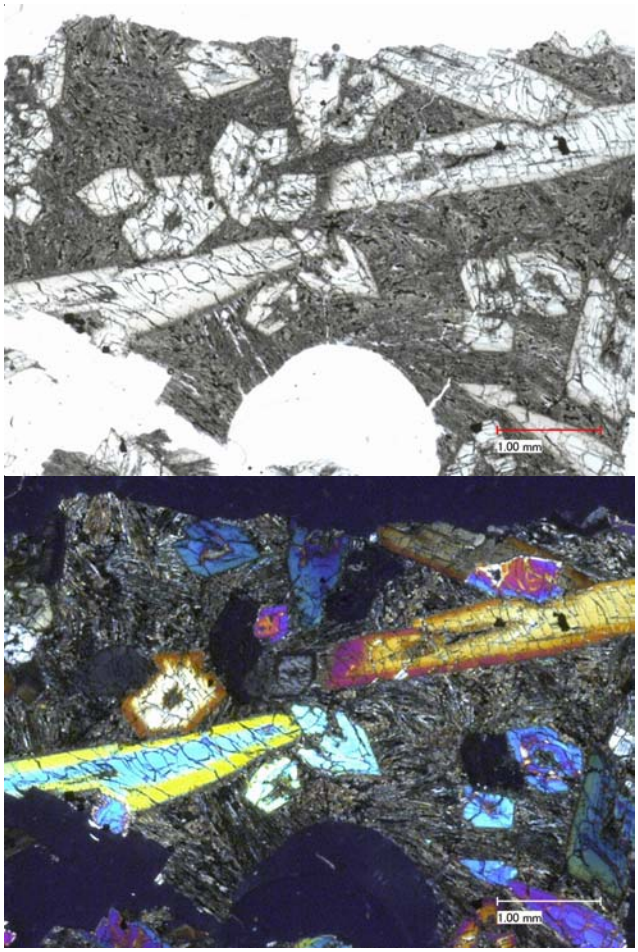

Figure 2: Photomicrographs of thin section 15666,8 by C Meyer @50x.

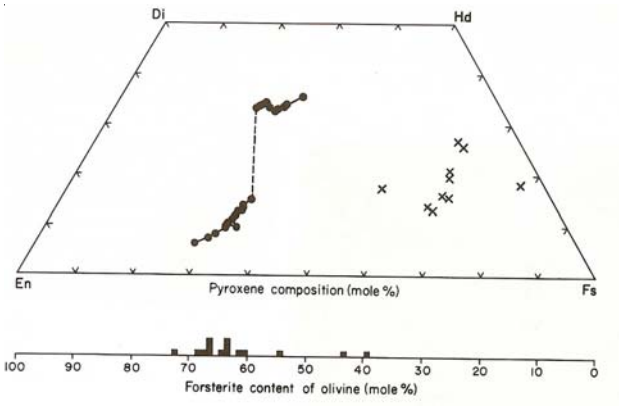

Figure3 : Pyroxene and olivine composition of 15666 (Dowty et al. 1973)

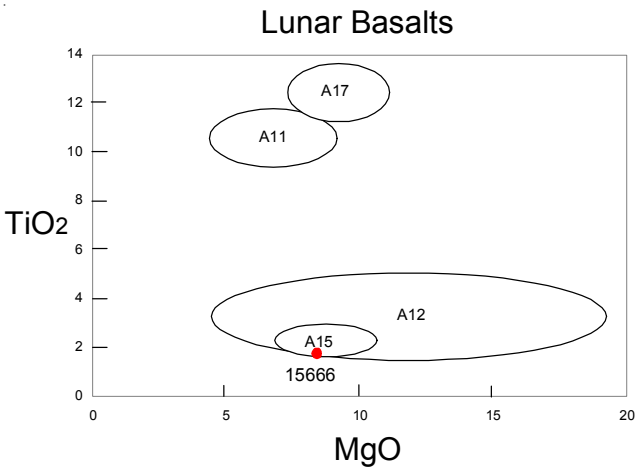

Figure 4: Chemical composition of 15666 compared with other Apollo basalts.

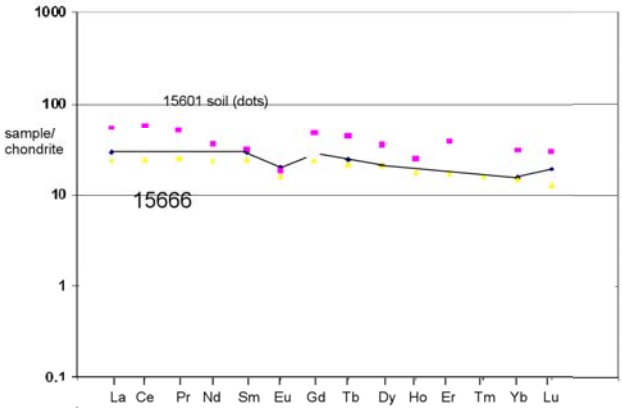

Figure 5: Normalized rare-earth-element diagram for 15666, with 15601 soil for comparison.

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Table 1. Chemical composition of 15666.

reference	Ma76		Dowty73	
weight				
SiO2 %			46.9	(b)
TiO2	2.3	(a)	1.97	(b)
Al2O3	10.3	(a)	9.2	(b)
FeO	21.3	(a)	21.3	(b)
MnO	0.265	(a)		(b)
MgO	7.2	(a)	9.5	(b)
CaO	10.2	(a)	9.7	(b)
Na2O	0.372	(a)	0.37	(b)
K2O	0.063	(a)	0.02	(b)
P2O5			0.08	(b)
S %				
sum				
Sc ppm	42	(a)		
V	176	(a)		
Cr	3320	(a)	3015	(b)
Co	37	(a)		
Ni	49	(a)		
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb				
Sr				
Y				
Zr				
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba	40	(a)		
La	6.8	(a)		
Ce				
Pr				
Nd				
Sm	4.3	(a)		
Eu	1.12	(a)		
Gd				
Tb	0.88	(a)		
Dy	5.1	(a)		
Ho				
Er				
Tm				
Yb	2.5	(a)		
Lu	0.47	(a)		
Hf	3.2	(a)		
Ta				
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm	0.41	(a)		
U ppm				

technique *(a) INAA, AA (b) broad-beam e-probe*