15485 and 15486

Vitrophyryic Pigeonite Basalt

104.9 and 46.8 grams

Introduction

Samples 15485 and 15486 were collected from the side of the boulder at Dune Crater, along with 15499, which was from the top (see figures 2 and 3 in section on 15499). The boulder had obvious bands of vesicularity (Swann et al. 1971, Albee et al. 1972).

Figure 1: Photo of 15486. Cube is 1 inch. NASA S71-44255.

15485 and 15486 are samples of vitrophyric pigeonite basalt, a rapidly cooled variety of quartz-normative basalt found to be rather common at the Apollo 15 site. They are very vesicular with porphyritic, diktytaxitic texture (figure 3). The age of this boulder is 3.4 b.y. and it has an exposure age of 114 m.y. (determined on 15499).

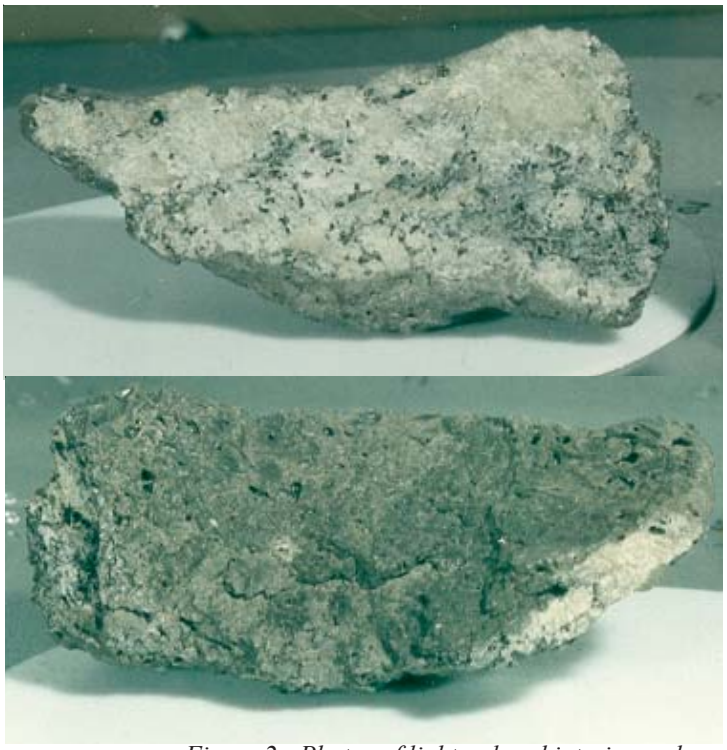

Figure 2: Photos of light-colored interior and dark-colored exterior of 15486 showing an apparently "weathered" patina on exterior. NASA S71-44250 and 44252. Sample is about 5 cm long.

Petrography

Albee et al. (1972) described 15486 as a "porphyritic, clinopyroxene vitrophyre composed of elongate pyroxene prisms in a matrix of opaque devitrified glass with 3% globulose vugs." Pyroxene crystals are highly zoned (figure 8).

Chemistry

The chemical composition of 15485, 15486 was determined by Duncan et al. (1976), Cuttita et al. (1973), Helmke et al. (1973) and O'Kelly et al. (1973)(figure 4 and 5).

Mineralogical Mode for 15486

	Sample Catalog Butler 1971	Albee et al. 1972	norm. matrix
Olivine			
Pyroxene	50	53	35
Plagioclase			53
Silica			7
Opaques		0.2	4
Groundmass	45	44	
Vugs		3	

Processing

A slab was cut from the center of 15485 (figure 9).

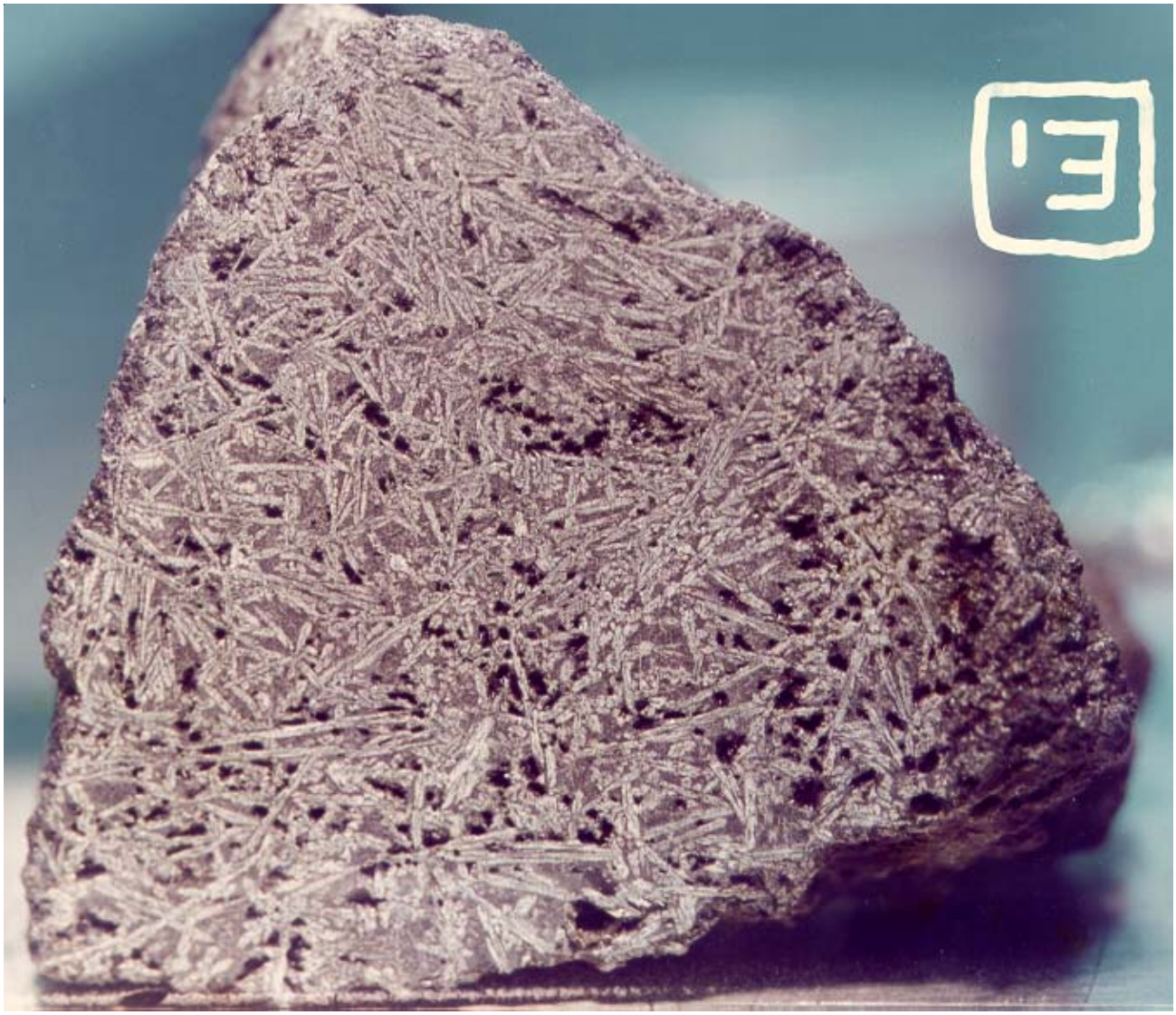

Figure 3: Photo of sawn surface of 15485 showing radomly oriented pyroxene needles in glassy matrix (with abundant pore space). Sample is about 3 cm across in this view. NASA S74-32562.

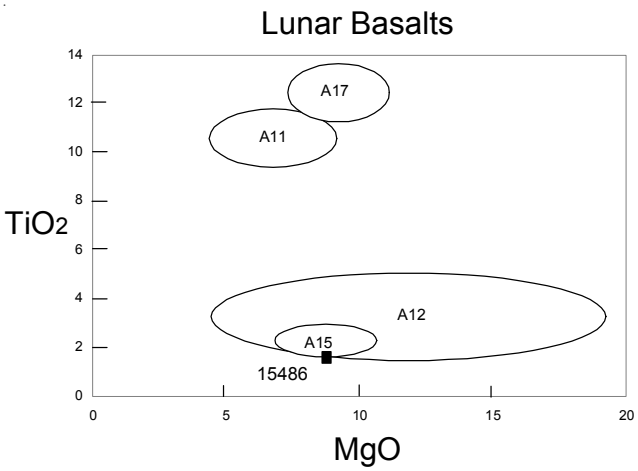

Figure 4: Chemical composition of 15485 and 15486 compared with that of other lunar basalts.

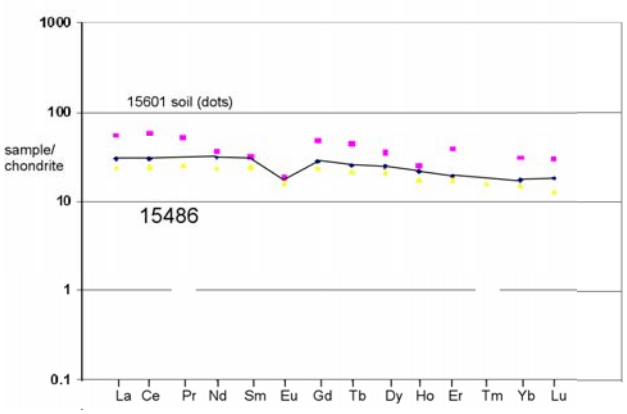

Figure 5: Normalized rare-earth-element digram for 15486 compared with that of 15601.

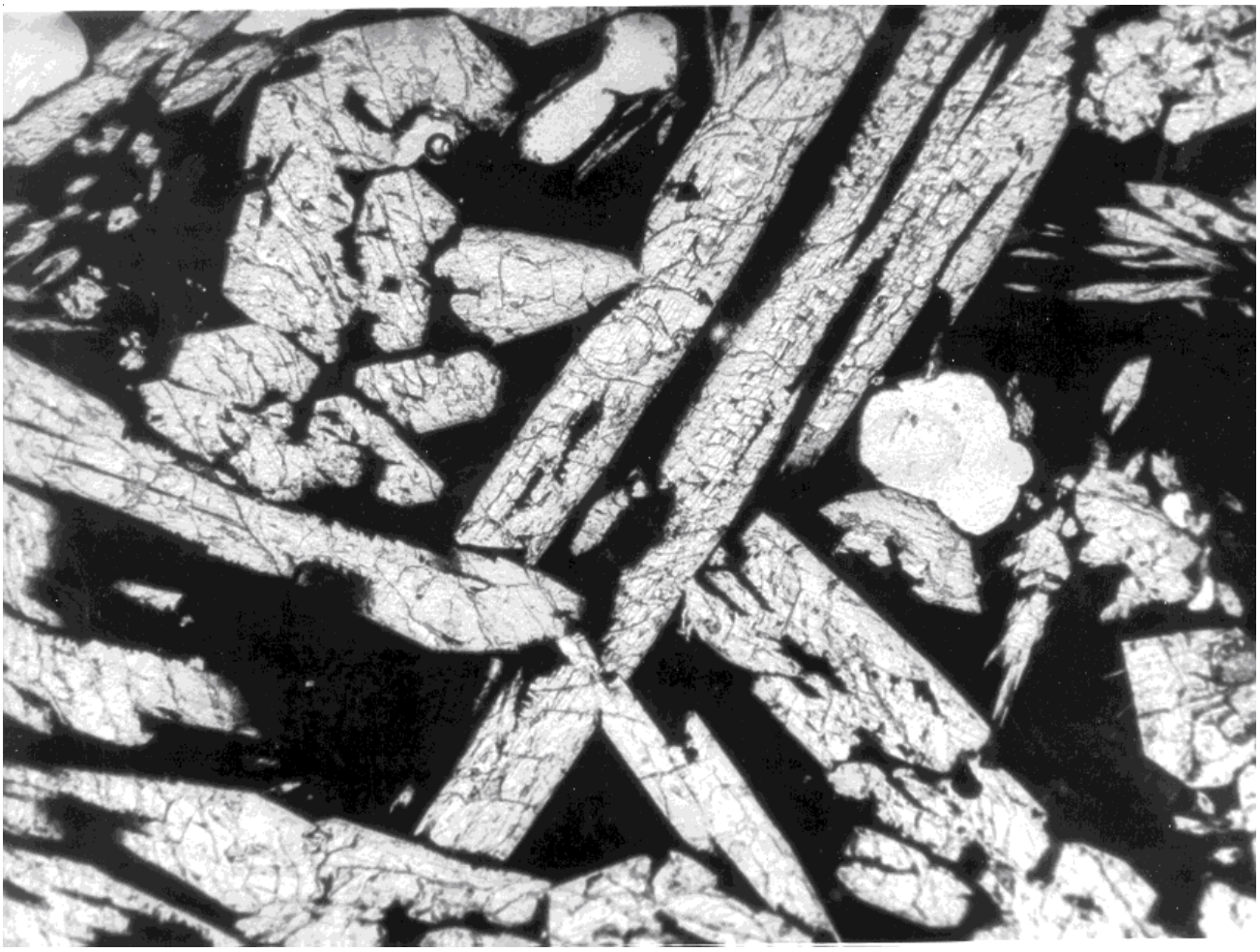

Figure 6: Photomicrograph of thin section of 15485 showing skelytal pyroxene crystals in devitrified black glass matrix. NASA S74-23055. Scale about 2 mm.

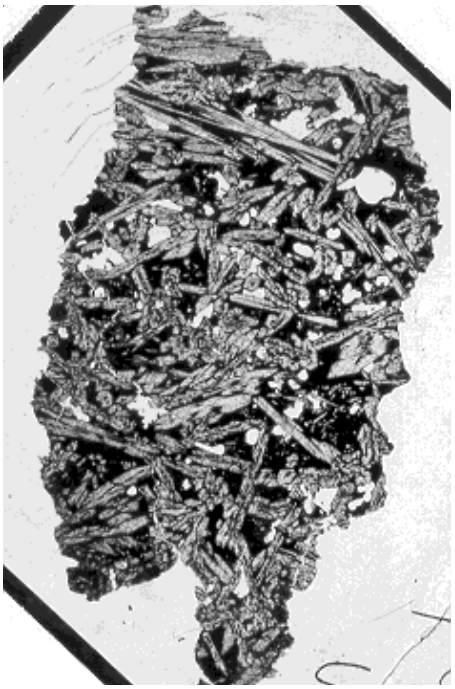

Figure 7: Thin section photomicrograph of 15486,22. Scale is about 1 x 2 cm.

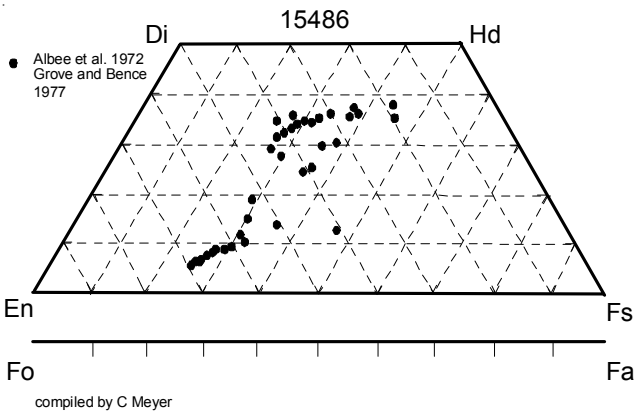

Figure 8: Pyroxene composition of 15486.

Table 1. Chemical composition of 15485.

reference	Duncan 76	
weight		
SiO2 %	47.39	(a)
TiO2	1.77	(a)
Al2O3	9.14	(a)
FeO	19.82	(a)
MnO	0.27	(a)
MgO	9.48	(a)
CaO	10.21	(a)
Na2O	0.28	(a)
K2O	0.03	(a)
P2O5	0.084	(a)
S %	0.06	(a)
sum		
Sc ppm		
V	177	(a)
Cr	3934	(a)
Co	42	(a)
Ni	22	(a)
Cu	4	(a)
Zn	<2	(a)
Ga		
Ge ppb		
As		
Se		
Rb	<1.4	(a)
Sr	104	(a)
Y	32.2	(a)
Zr	113	(a)
Nb	5.5	(a)
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba	71	(a)
La		
Ce		
Pr		
Nd		
Sm		
Eu		
Gd		
Tb		
Dy		
Ho		
Er		
Tm		
Yb		
Lu		
Hf		
Ta		
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) XRF, (b)

Table 2. Chemical composition of 15486.

reference	Cuttitta73		Helmke73		O'Kelley73	
weight						
SiO2 %	48.25	(a)				
TiO2	1.81	(a)				
Al2O3	10	(a)				
FeO	19.85	(a)				
MnO	0.29	(a)				
MgO	8.8	(a)				
CaO	10.25	(a)				
Na2O	0.37	(a)				
K2O	0.08	(a)			0.061	(d)
P2O5	0.13	(a)				
S %						
sum						
Sc ppm	54	(b)	44.2	(c)		
V						
Cr	3421	(b)				
Co	100	(b)	47	(c)		
Ni	62	(b)				
Cu	10	(b)				
Zn						
Ga	7.8	(b)				
Ge ppb						
As						
Se						
Rb	1.3	(b)				
Sr	135	(b)				
Y	36	(b)				
Zr	127	(b)				
Nb	10	(b)				
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb						
Cd ppb						
In ppb						
Sn ppb						
Sb ppb						
Te ppb						
Cs ppm						
Ba	74	(b)				
La			7.09	(c)		
Ce			18	(c)		
Pr						
Nd			14	(c)		
Sm			4.57	(c)		
Eu			0.977	(c)		
Gd			5.5	(c)		
Tb			0.92	(c)		
Dy			5.96	(c)		
Ho			1.2	(c)		
Er			3	(c)		
Tm						
Yb	4.4	(b)	2.79	(c)		
Lu			0.44	(c)		
Hf						
Ta						
W ppb						
Re ppb						
Os ppb						
Ir ppb						
Pt ppb						
Au ppb						
Th ppm					0.64	(d)
U ppm					0.15	(d)

technique: (a) XRF, (b) OES, (c) INAA, (d) radiation counting

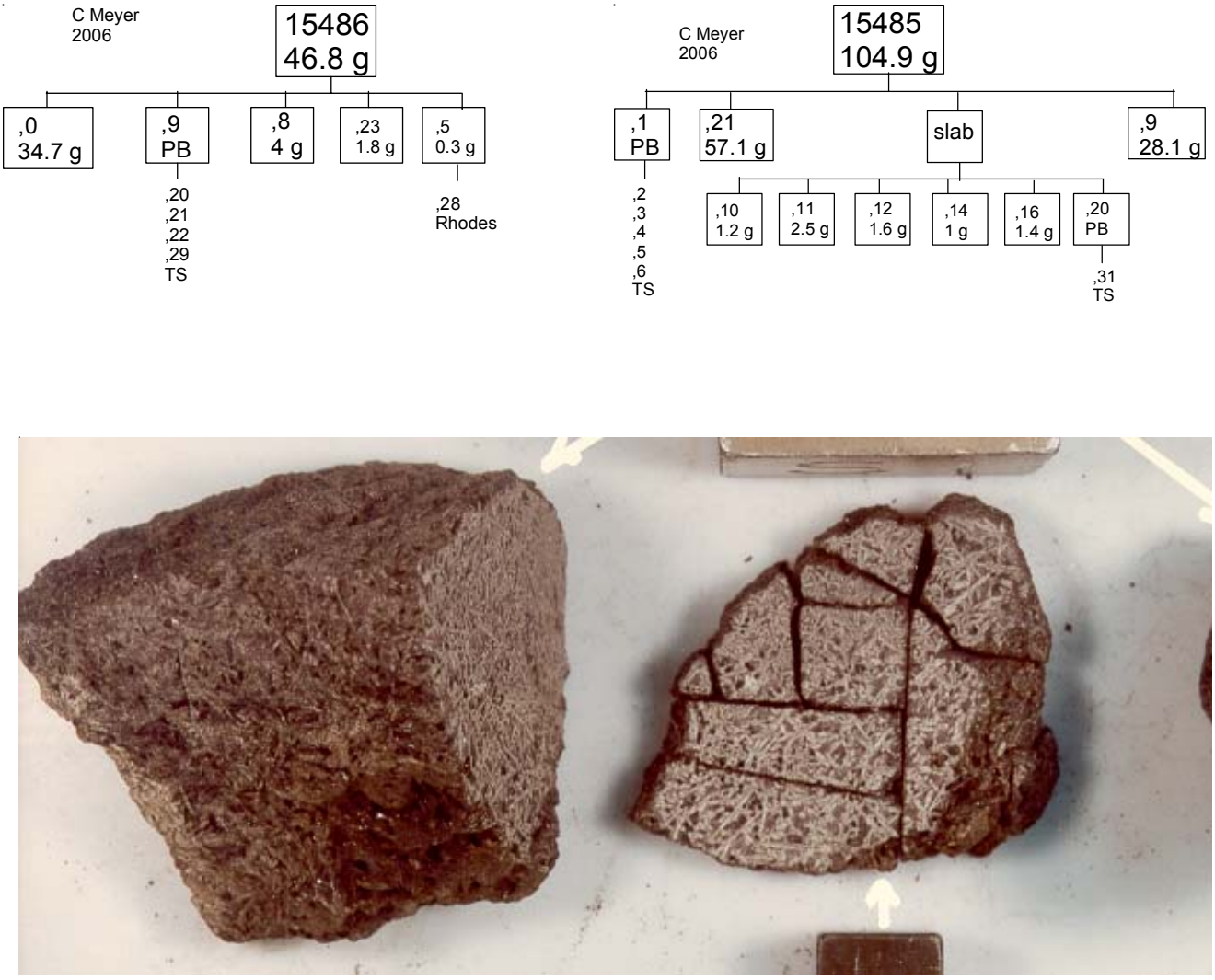

Figure 9: Slab cut from 15485. NASA S74-32793. Small cube is 1 cm.

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