68115

Glassy Polymict Breccia

1190 grams

Figure 1: Photo of 68115. Cube is 1 cm. S72-37360. Location of slab is approximate.

Figure 2: Photo of 68115, top. Cube is 1 cm. S72-37355

Introduction

68115 was chipped from a meter-sized boulder on the slope of Stone Mountain (figures 4 and 5). This boulder could be a "bomb" from South Ray Crater, because the exposure age is 2 m.y.

68115 has been bombarded by micrometeorites on all sides that were not freshly broken from the boulder – but no one appears to have studied the size distribution.

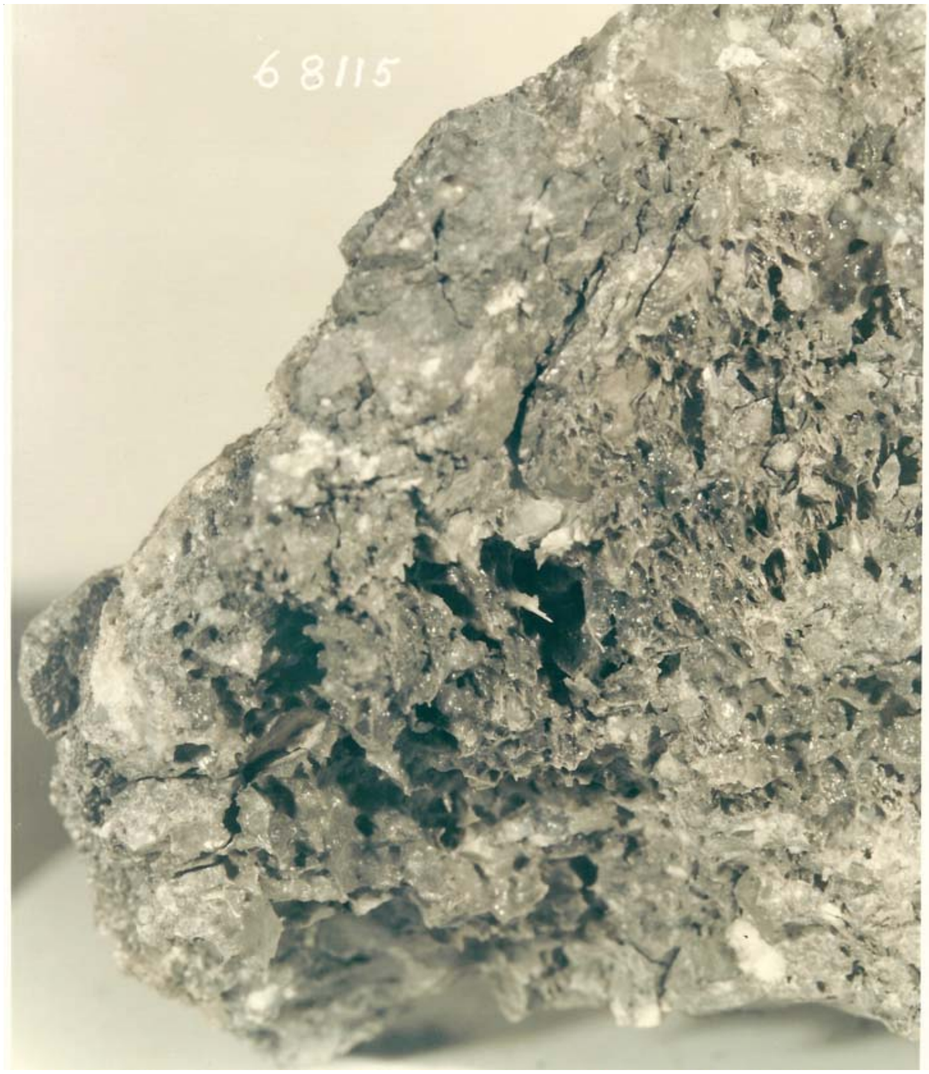


Figure 3: End of 68115,11 showing odd twisted glass structure. S72-37361

In general, 68115 has not been adequately described nor studied scientifically.

Petrography

68115 is a heterogeneous breccia which is welded together by flow-banded glass (Grieve et al. 1974; Ryder and Norman 1980). The sample appears to be made up of a wide variety of impact melts, with a variety of recrystallized textures. They generally include relict plagioclase clasts. The generally aluminous composition and frequent large plagioclase inclusions indicate that the precursor material was ferroan anorthosite (Ryder and Norman 1980).

There appears to be an orange stain on the surface (figure 1). It also has an unusual area of very vesicular melt on one end (figure 3).

Glass: Grieve et al. (1974) described and analyzed glass in 68115 (table 2). The rather fantastic, very vesicular, glass seen in figure 3 does not appear to have been studied.

Metal: Misra and Taylor (1975) found the metallic iron grains in 68115 to have Ni and Co contents in the range of meteoritic metal (figure 7). Hunter and Taylor (1981) reported minor rust but abundant schreibersite. Taylor et al. (1976) performed heating experiments to see if they could homogenize metal composition.

Chemistry

Taylor et al. (1974), Fruchter et al. (1974), Rancitelli et al. (1973) and Touboul et al. (2000) have analyzed portions of 68115, but they have not spelled out what

Figure 4: Location of 68115. AS16-108-17690

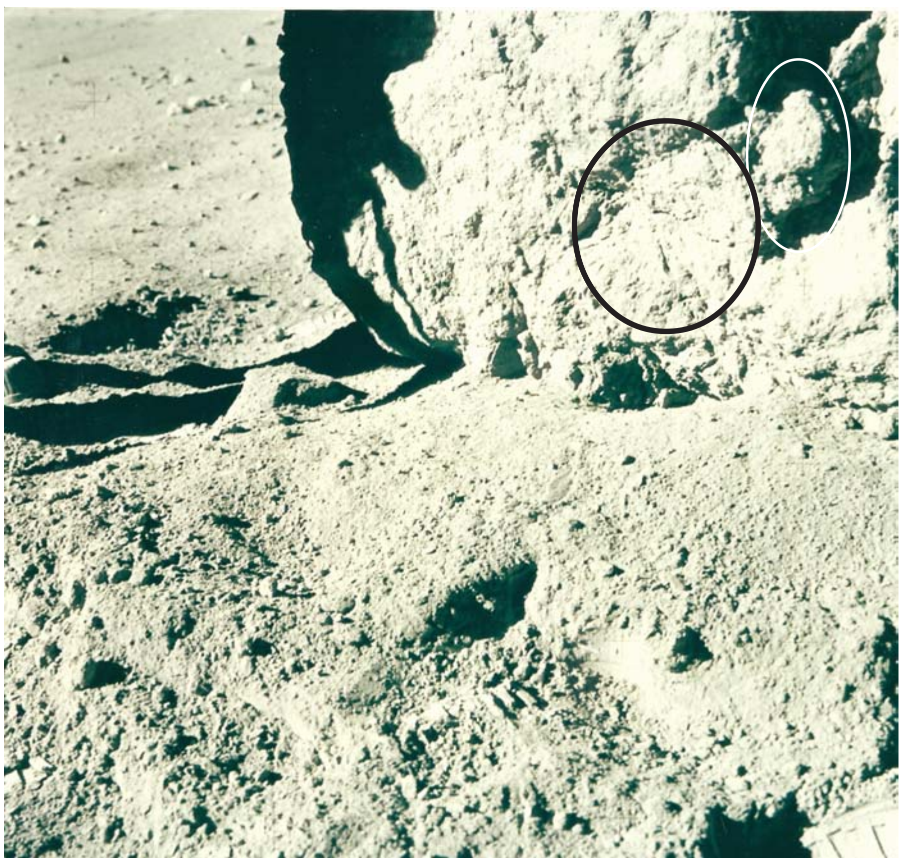
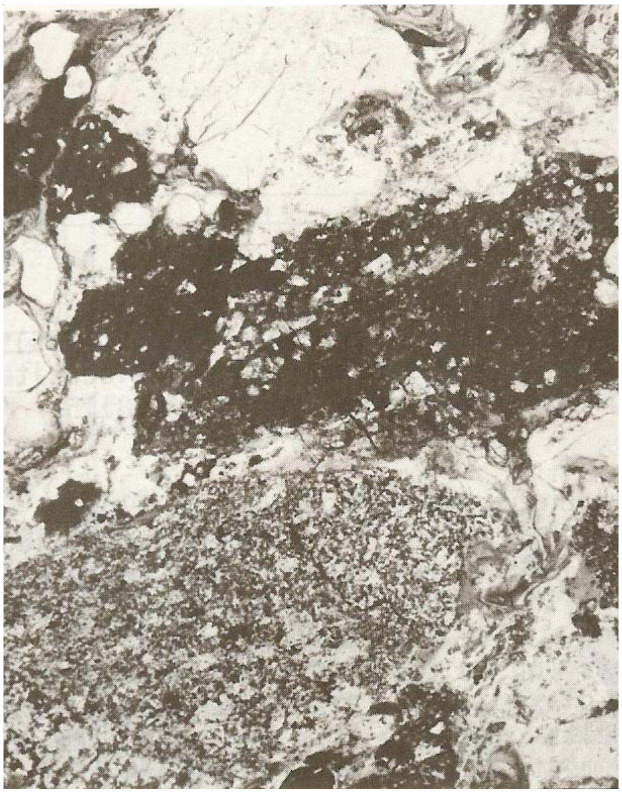


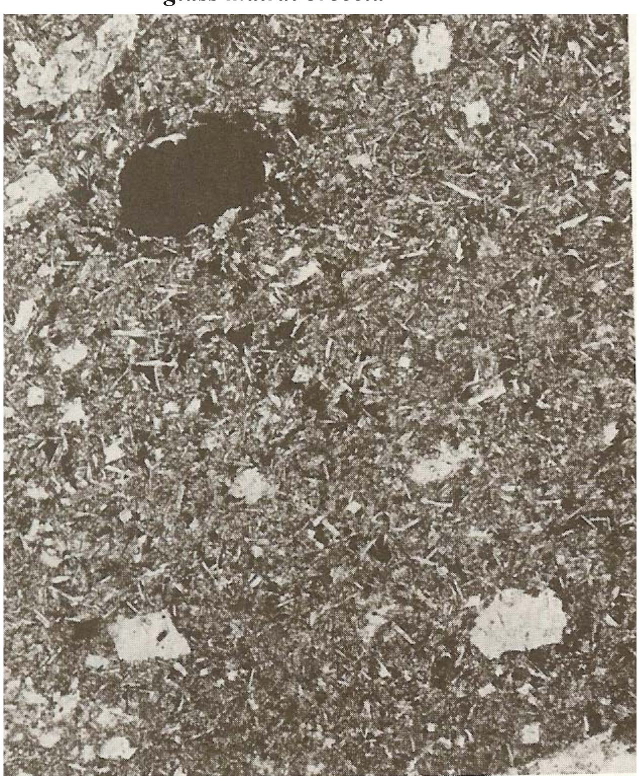
Figure 5: Sample 68115 is outlined by white line, while adjacent spall zone is outlined with black. AS16-107-17542

they have analyzed. The sample is clearly heterogeneous.

Kerridge et al. (1975) determined two different values for carbon in 68115 – 13 and 112 ppm carbon – presumably from two different lithologies. They also reported sulfur content.



glass matrix breccia



recrystalized breccia

glass matrix breccia

recrystalized breccia

Figure 6: Thin section photomicrographs of 68115 (from Ryder and Norman 1980). All are 2 mm across.

Radiogenic age dating

None

Cosmogenic isotopes and exposure ages

Drozd et al. (1974) determined exposure ages for 68115 of 2.08 m.y. by ^{81}Kr, 1.75 m.y. by ^{21}Ne and 2.18 m.y. by ^{38}Ar techniques. The case for this to represent the age of the cratering event at South Ray crater is made by Eugster (1999).

Rancitelli et al. (1973) determined the cosmic-ray-induced activity for ^{22}Na = 38 dpm/kg and ^{26}Al = 83 dpm/kg.

Other Studies

Bogard and Gibson (1975) studied the release of rare gases and carbon compounds (figure 10).

Processing

Slab A was cut from the middle of 68115, creating end pieces ,11 (64 g) and ,10 (760 grams). There are 8 thin sections.

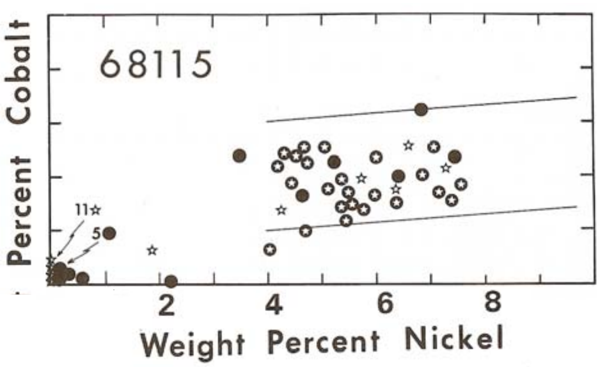


Figure 7 : Ni and Co in 68115, before and after heating experiments (Taylor et al. 1976).

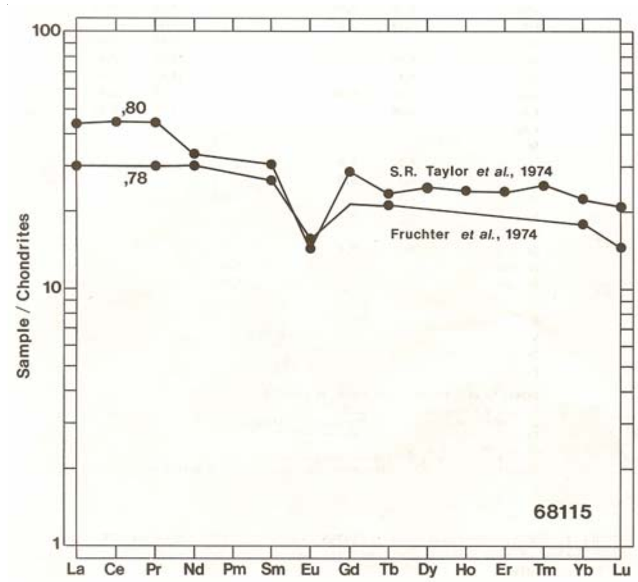


Figure 8: Normalized rare-earth-element diagram for 68115 (from Ryder and Norman 1980).

Table 2: Composition of glass in 68115.

	Grieve 1974			Taylor 1976
SiO2	44.53	48.23	44.23	(a)
TiO2	0.22	1.28	0.1	(a)
Al2O3	29.35	17.97	34.43	(a)
FeO	3.28	7.59	1.18	(a)
MnO		0.04	0.04	(a)
MgO	3.63	11.49	0.86	(a)
CaO	17.5	11.41	18.71	(a)
Na2O	0.68	0.65	0.47	(a)
K2O	0.12	0.5	0.06	(a)

Tech: (a) E-Probe

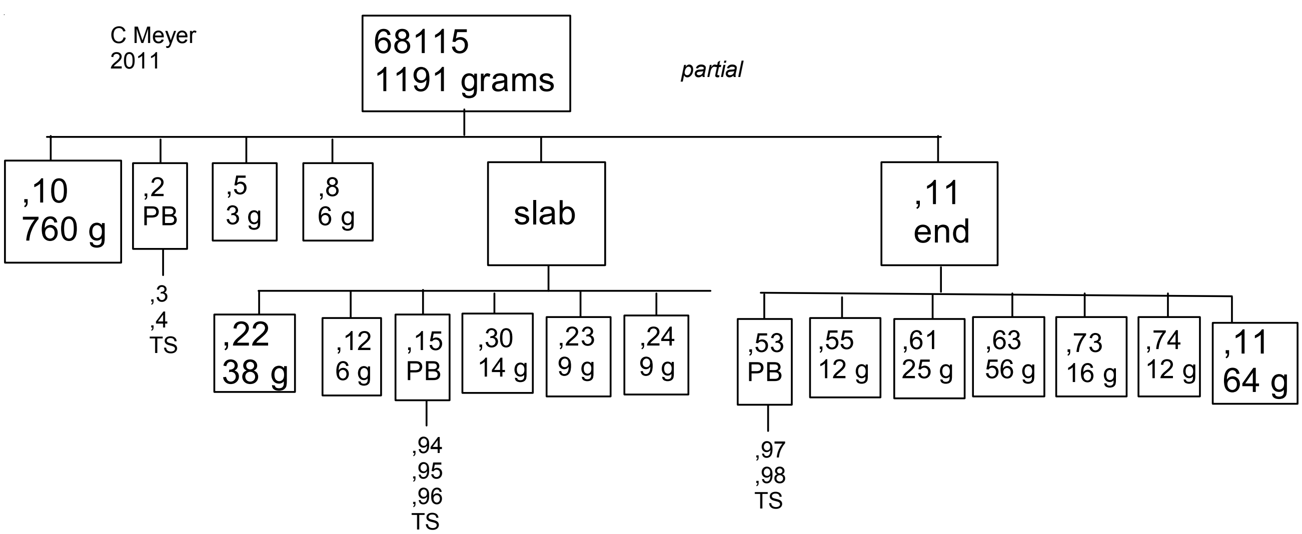


Table 1. Chemical composition of 68115.

reference	Taylor 74		Fruchter 74		Wolf79	
weight					Ganapathy74	
SiO2 %	44.8	(a)				
TiO2	0.34	(a)				
Al2O3	27.6	(a)	31.6	(b)		
FeO	5.1	(a)	3.2	(b)		
MnO						
MgO	5.79	(a)				
CaO	15.4	(a)				
Na2O	0.47	(a)	0.45	(b)		
K2O	0.06	(a)				
P2O5						
S %						
sum						
Sc ppm	9	(a)	5.2	(b)		
V	24	(a)				
Cr	660	(a)	630	(b)		
Co	105	(a)	19.4	(b)		
Ni	2000	(a)			< 7	(c)
Cu	17	(a)				
Zn					0.47	(c)
Ga						
Ge ppb					6.7	(c)
As						
Se					3.4	(c)
Rb	2.6	(a)			0.04	(c)
Sr						
Y	45	(a)				
Zr	191	(a)				
Nb	11.8	(a)				
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb					0.19	(c)
Cd ppb					*81*	(c)
In ppb						
Sn ppb						
Sb ppb					0.19	(c)
Te ppb					0.4	(c)
Cs ppm	0.13	(a)			0.003	(c)
Ba	173	(a)	120	(b)		
La	14.3	(a)	9.8	(b)		
Ce	38.8	(a)	26	(b)		
Pr	4.95	(a)				
Nd	20	(a)				
Sm	5.48	(a)	4.8	(b)		
Eu	0.99	(a)	1.1	(b)		
Gd	6.96	(a)				
Tb	1.09	(a)	1	(b)		
Dy	7.13	(a)				
Ho	1.71	(a)				
Er	4.9	(a)				
Tm	0.75	(a)				
Yb	4.53	(a)	3.6	(b)		
Lu	0.7	(a)	0.5	(b)		
Hf	4.12	(a)	3.4	(b)		
Ta			0.4	(b)		
W ppb						
Re ppb					0.005	(c)
Os ppb						
Ir ppb					0.04	(c)
Pt ppb						
Au ppb						
Th ppm	2.66	(a)	1.9	(b)		
U ppm	0.74	(a)			1.8	(c)

technique : (a) SSMS, (b) INAA, (c) RNAA

Figure 9: Photo of saw cut in 1973. Cube is 1 inch. S76-21697

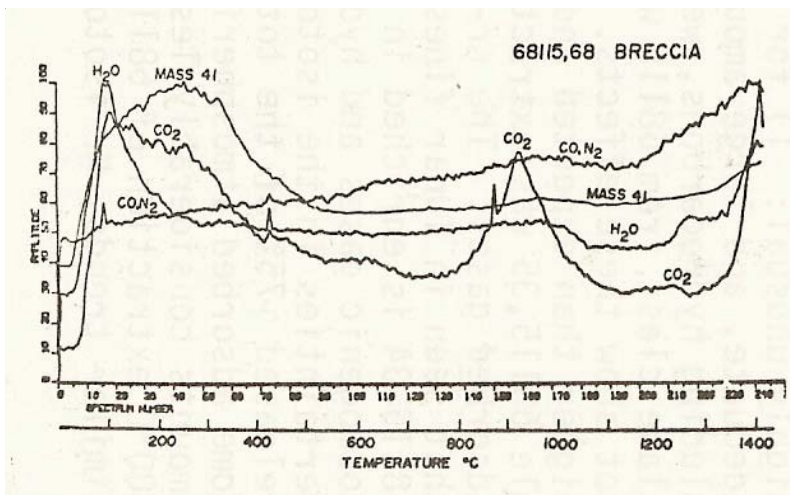


Figure 10: Gas release for 68115 (Bogard and Gibson 1975).

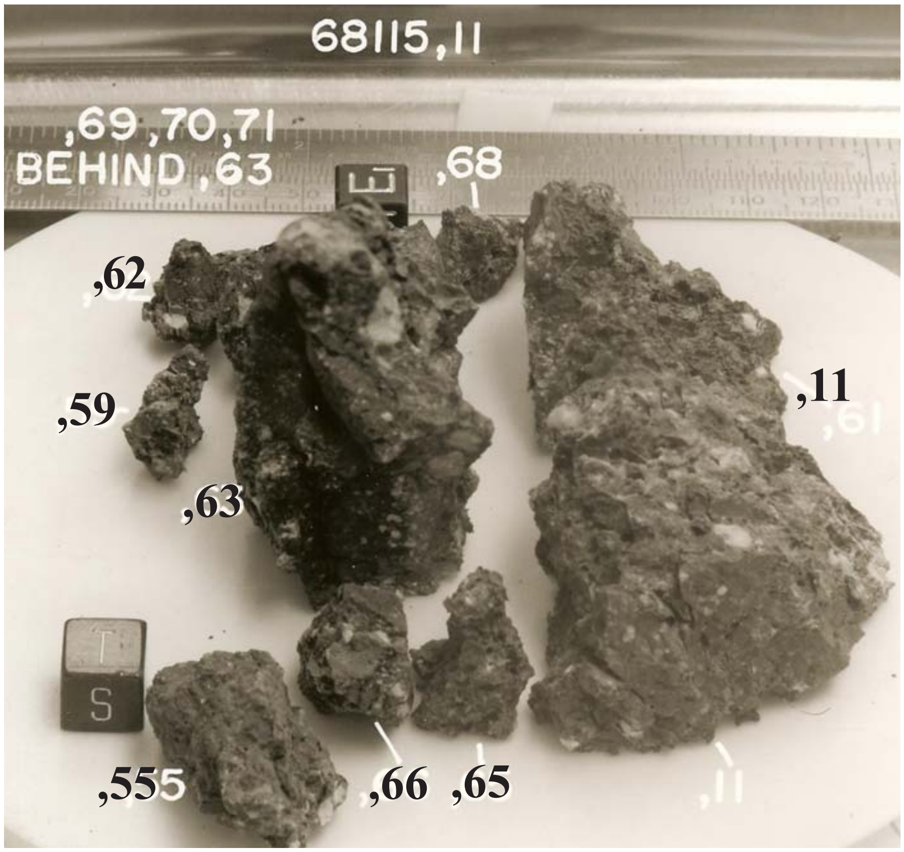


Figure 11: Photo of subdivision of end piece ,11. Cube is 1 cm. S73-22359

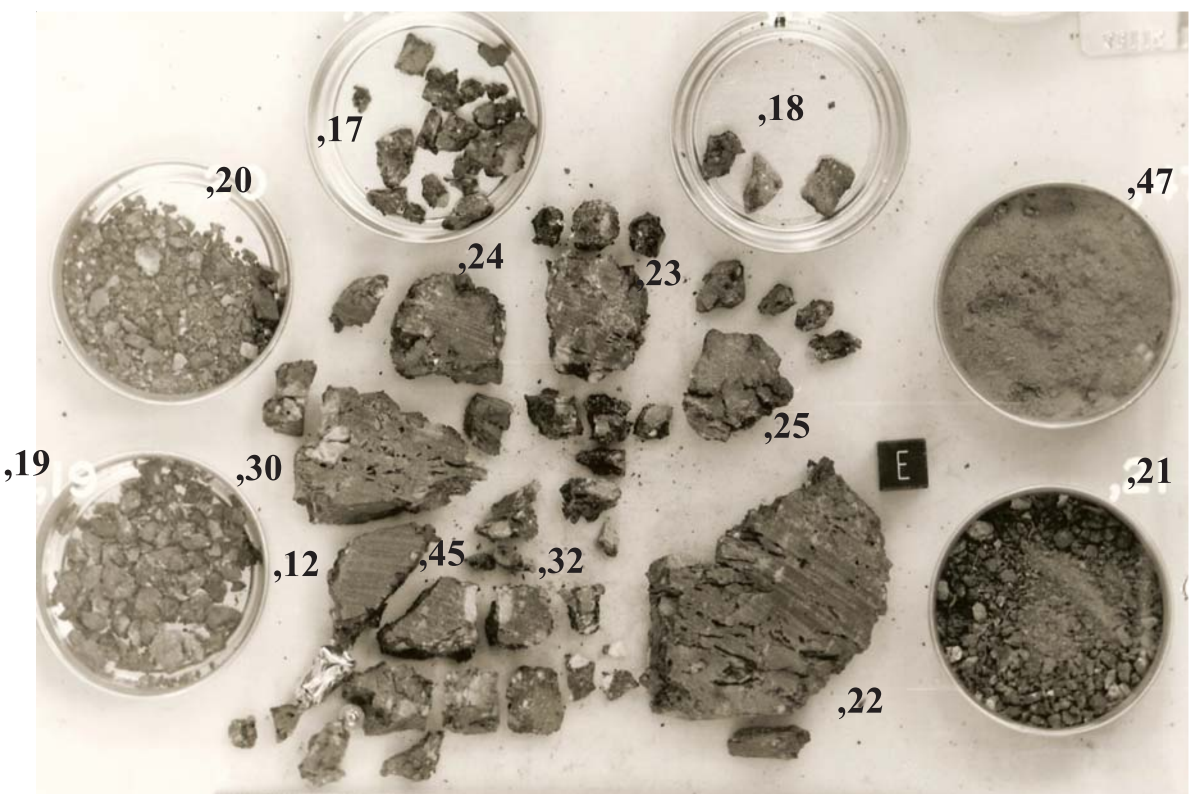


Figure 12: Subdivision of slab A (,12) cut from 68115. Cube is 1 cm. S73-22427

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