65325 – 66.9 grams
65327 – 7 grams
Cataclastic Anorthosite

Figure 1: Photo of 65235. Scale in mm/cm. NASA S72-47662.

Introduction

Lunar sample 65325 and 65327 were collected with 65315 and returned with rake samples collected from station 5 near Stone Mountain – see section on 65315 . They are white rocks with a thin coat of black glass (figure 1 and 2). They have zap pits on the white surfaces where the black glass has apparently been eroded off. They are friable anorthosite very like 65315 from the same sample bag (and may have been part of it). The anorthosite is cataclastic but chemically pristine (i.e. low Ir, low KREEP).

Petrography

The interior of 65325 and 65327 is ~99% plagioclase (An_{97}) with ~ 1% orthopyroxene (Wo_2En_{63}), trace ilmenite and rust (Warren and Wasson 1978). The texture is that of a badly crushed rock with broken fragments of plagioclase (1.0 to 0.1 mm) arranged in a jumble (figure 3). Mineral compositions plot in the field of ferroan anorthosite (figure 5).

The glass coating attached to this sample has higher REE content than the glass attached to 65315 (figure 6).

Figure 2: Photo of 65327. Scale is marked in mm. S72-47678

Mineralogy

Olivine: none

Pyroxene: Warren and Wasson (1978) determined orthopyroxene was Wo_2En_{63}. Bersch et al. (1991) presented precise pyroxene analyses (figure 4).

Plagioclase: Warren and Wasson (1978) reported plagioclase was $An_{96\text{-}97}$.

Ilmenite: trace

Rust: Hunter and Taylor (1981) reported "rust".

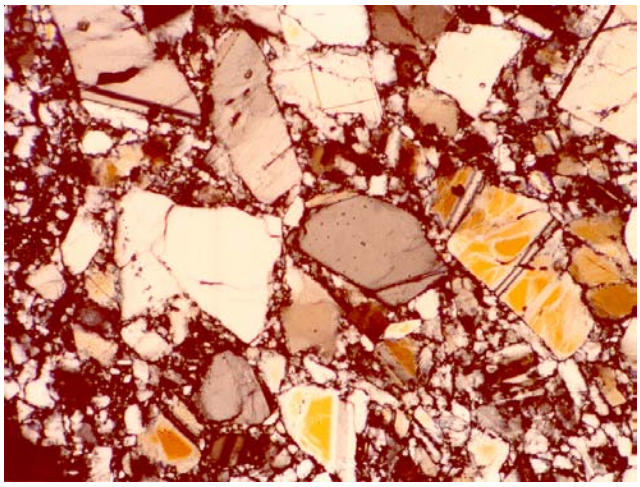

Figure 3: Photomicrograph of thin section 65325,6. Field of view is 1.3 mm. NASA S79-27681.

Chemistry

Warren and Wasson (1978) and Ebihara et al. (1992) determined the composition of 65325 (table 1). Morris et al. (1986) found the glass coating was high in KREEP (figure 6). Howevr, the interior anorthosite is pristine. Cirlin and Housley (1981) determined Cd and Zn contents.

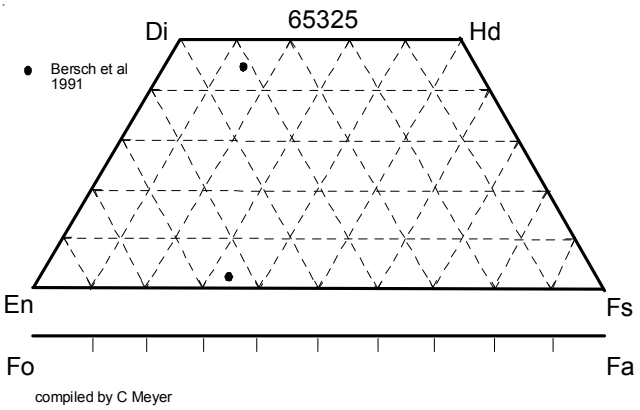

Figure 4: Pyroxene composition of 65325 (Bersch et al. 1991).

Other Studies

Cirlin and Housley (1981) showed that most of the Zn in 65235 was on the surface of the cracks (figure 7).

Processing

There are 4 thin sections of each sample.

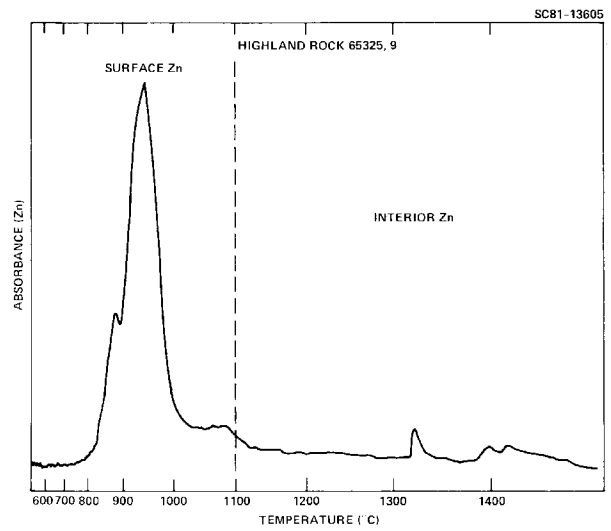

Figure 7: Thermal release profile of Zn in a pristine anorthostie 65325 showing that most of the Zn in this sample is on the surface of the cracks (from Cirlin and Housley 1981).

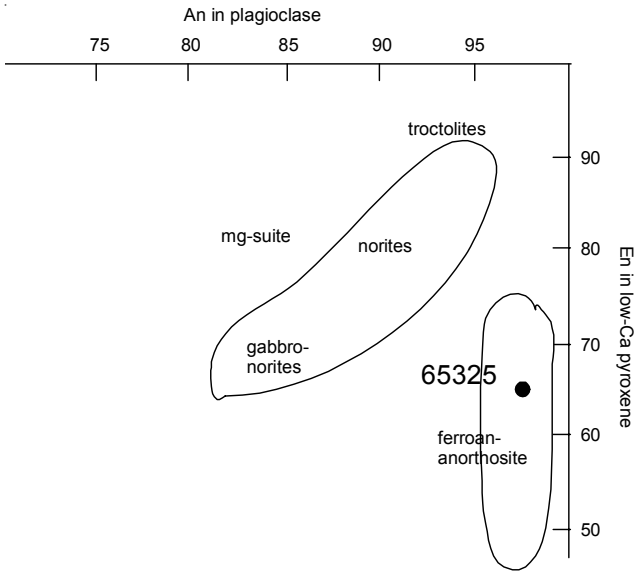

Figure 5: Plagioclase and pyroxene composition of 65325 (data from Warren and Wasson 1978).

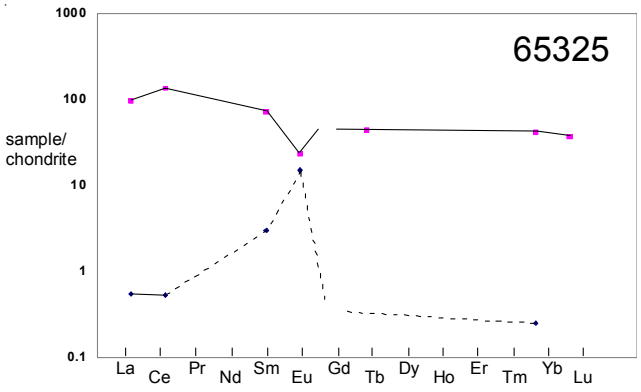

Figure 6: Normalized rare-earth-element composition diagram for 65325 and glass coating (data from Warren and Wasson 1978 and Morris et al. 1986).

Table 1. Chemical composition of 65325.

						glass		anor				
reference	Warren78			Ebihara92		Morris 86		See 86		Cirlin and Housley 1981		
weight						See 86						
SiO2 %		44.07	(b)			44.73	(c)	44.08	(e)			
TiO2						0.39	(c)	0.02	(e)			
Al2O3		35.1	(b)			26.51	(c)	35.15	(e)			
FeO	0.3	0.27	(b)			5.71	(c)	0.28	(e)			
MnO	0.008	0.008	(b)					0.01	(e)			
MgO		0.23	(b)			7.48	(c)	0.23	(e)			
CaO	19.6	19.7	(b)			14.82	(c)	19.6	(e)			
Na2O	0.39	0.38	(b)			0.35	(c)	0.34	(e)			
K2O						0.06	(c)	0.01	(e)			
P2O5												
S %												
sum												
Sc ppm	0.44	0.41	(b)			10.92	(b)					
V												
Cr	23.8	31.1	(b)			991	(b)					
Co	1.08	0.93	(b)			19	(b)					
Ni	<23	0.68	(b)	<2.22	(a)	364	(b)					
Cu												
Zn	24	20	(b)	19.7	(a)					1	1.3	<20 microns
Ga	4.49	4	(b)									
Ge ppb	16.1	39	(b)	10.8	(a)							
As												
Se				2.76	(a)							
Rb												
Sr												
Y												
Zr												
Nb												
Mo												
Ru												
Rh												
Pd ppb				<0.61	(a)							
Ag ppb				0.508	(a)							
Cd ppb	39	32	(b)	2.73	(a)					2.5		(d)
In ppb	<70	72	(b)	78	(a)							
Sn ppb												
Sb ppb				0.437	(a)							
Te ppb				1.27	(a)							
Cs ppm				0.001	(a)							
Ba						273	(b)					
La	0.11	0.13	(b)			22.6	(b)					
Ce		0.32	(b)			81.1	(b)					
Pr												
Nd												
Sm	0.4	0.44	(b)			10.75	(b)					
Eu	0.78	0.83	(b)			1.32	(b)					
Gd												
Tb						1.61	(b)					
Dy												
Ho												
Er												
Tm												
Yb		0.04	(b)			6.78	(b)					
Lu						0.89	(b)					
Hf						6.94	(b)					
Ta						0.8	(b)					
W ppb												
Re ppb		0.015	(b)									
Os ppb												
Ir ppb	0.12	0.0076	(b)	0.017	(a)							
Pt ppb				<0.27	(a)							
Au ppb	0.052	0.021	(b)	<0.01	(a)							
Th ppm						4.09	(b)					
U ppm				1E-03	(a)	1.08	(b)					

technique: (a) RNAA, (b) INAA, (c) emp, (d) FLAA, (e) DBA

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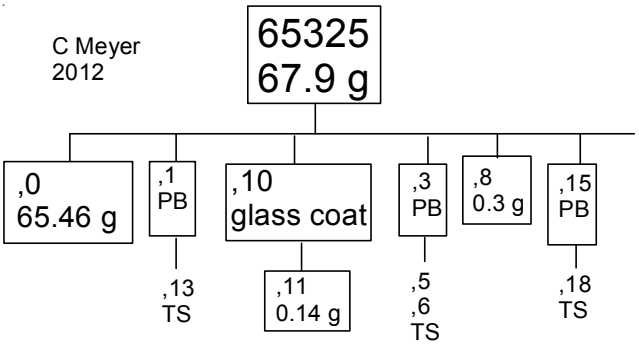

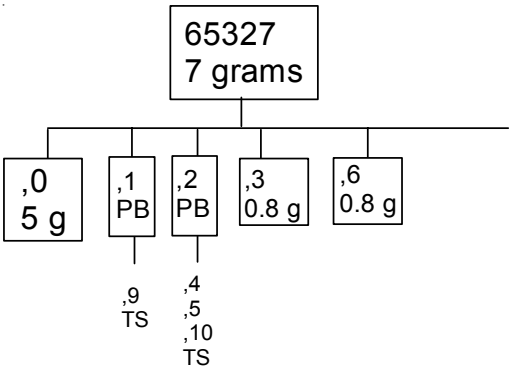

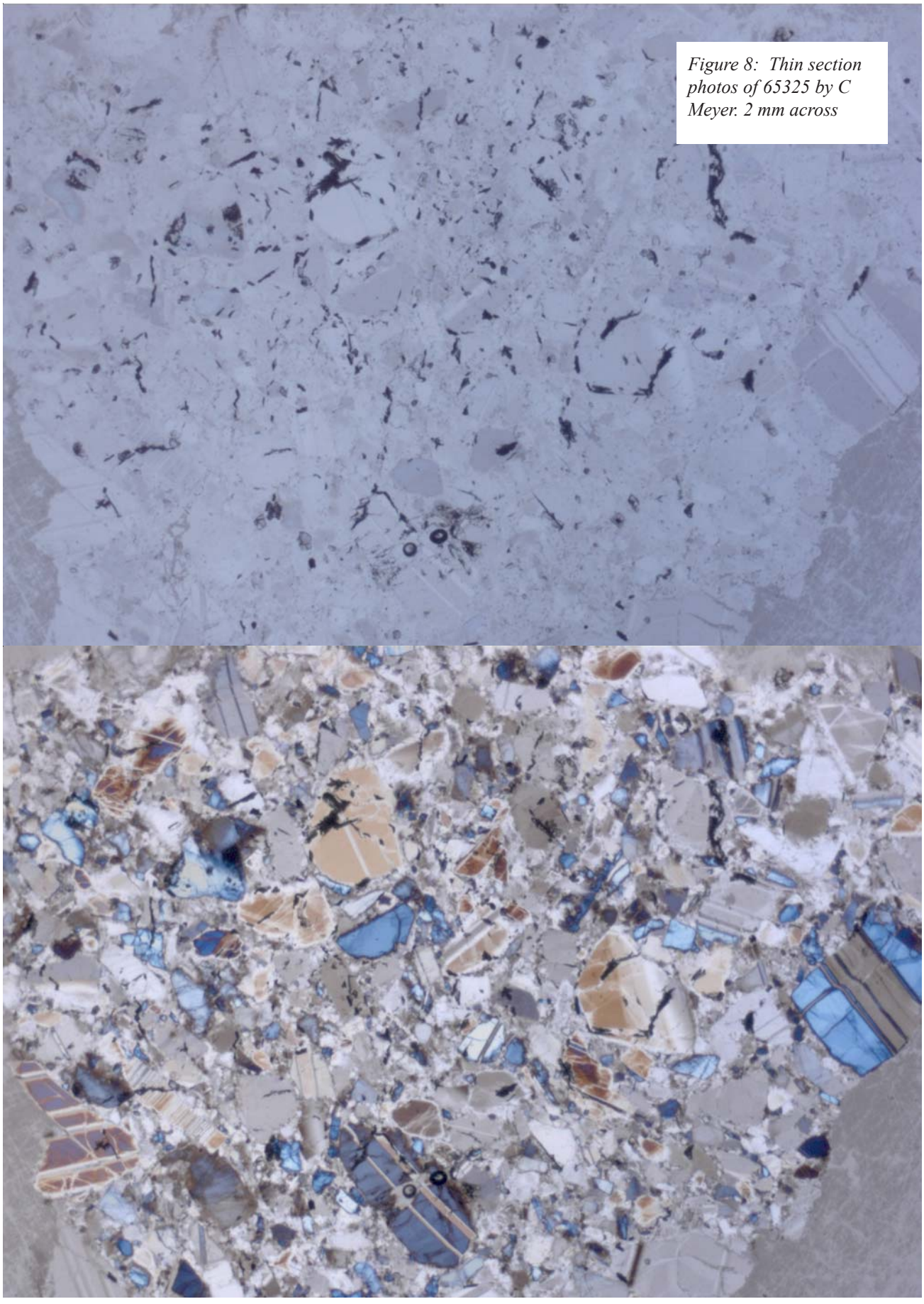

Figure 8: Thin section photos of 65325 by C Meyer. 2 mm across

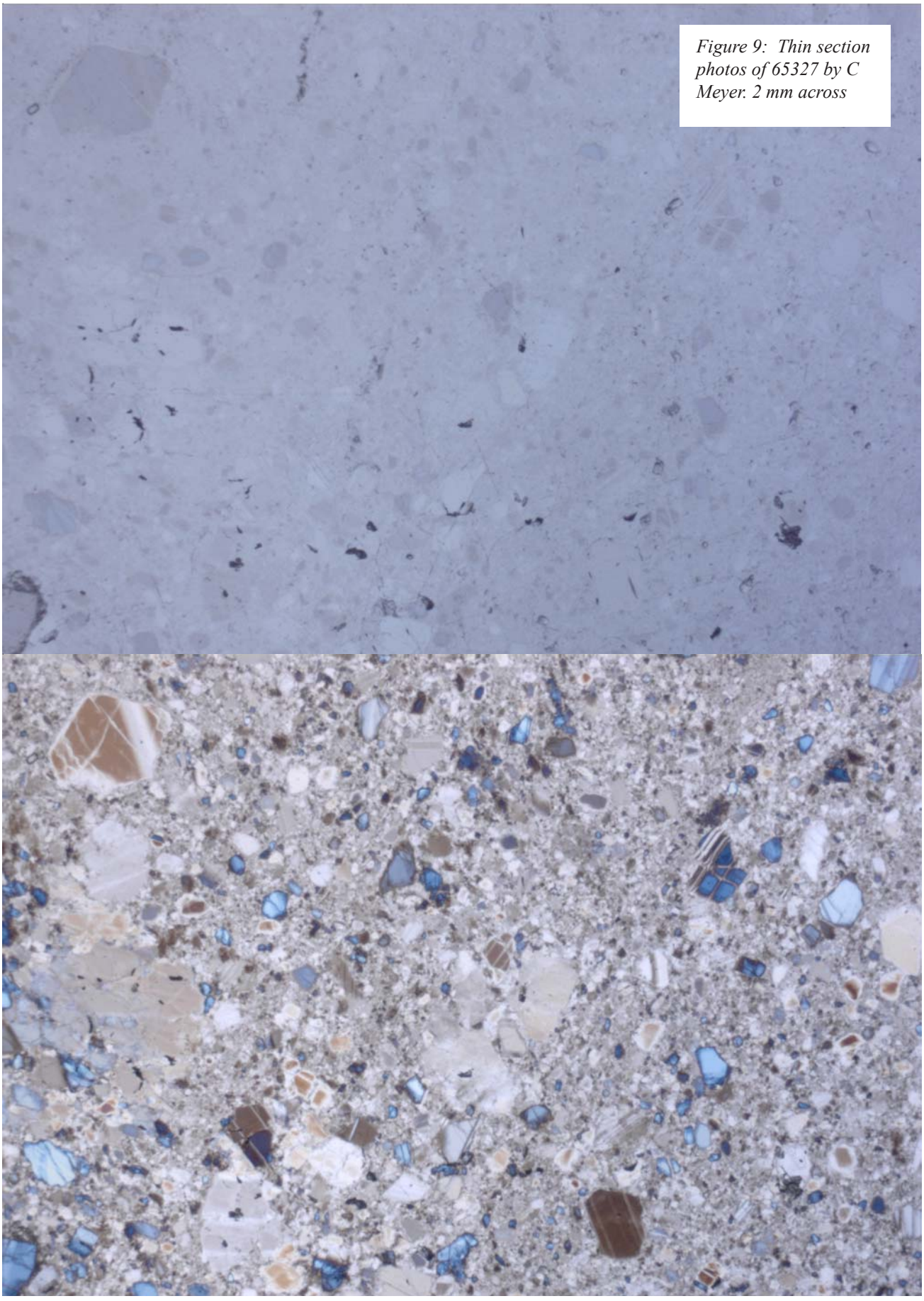

Figure 9: Thin section photos of 65327 by C Meyer. 2 mm across