71556 – 29.1 grams
71557 - 40.35 grams
71509 – 1.7 grams
71549 – 7.9 grams
Ilmenite Basalt

Figure 1: Photo of 71556. Cm scale. S73-33453

Introduction

These small samples are plagioclase-poikilitic ilmenite basalts (Warner et al. 1978).

71525 - 71596 etc. are rake samples collected as part of a comprehensive sample at station 1, taken near Steno Crater, Apollo 17. They include numerous small ilmenite basalts.

Petrography

71556, 71557, 71549 and 71509 are coarse-grained basalts where large plates of plagioclase poikilitically enclose crystals of pyroxene, olivine and ilmenite (figures 6 and 7). Some areas have subophitic texture with intergrown plagioclase and pyroxene. Olivine grains are found in groups. Tranquilityite, armalcolite, Cr-spinel, rutile, zirconolite, baddelyite, sphene and silica are reported (Warner et al. 1978).

The pyroxene compositional zoning is similar in these coarse-grain basalts (figures 4a, b, c, d).

Mineralogical Mode

	71556	71557	71549	71509
Olivine	0.6	0.9	0.9	1.8
Pyroxene	47	48.7	50.2	46.8
Plagioclase	36.3	31	30	32.3
Opaques	13.9	16.6	16.5	16.8
Silica	2.1	2.1	1.9	1
Meostasis	1.1	0.8	0.5	1.3

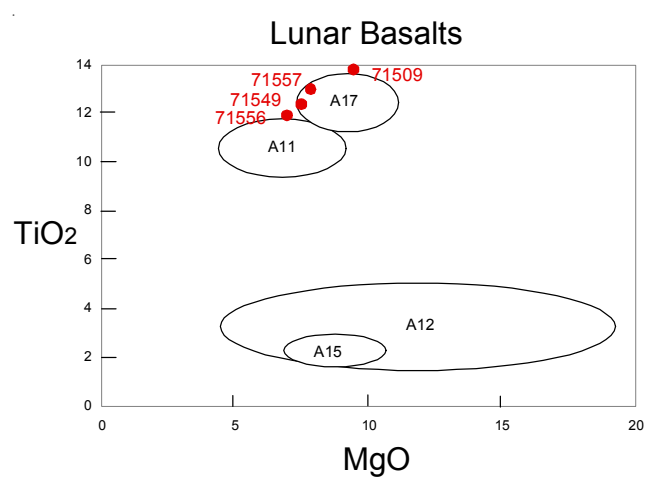


Figure 2: Composition of 71556 and related rocks.

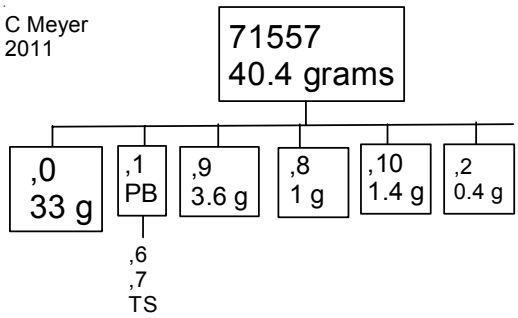
Figure 3: Photo of 71557. S73-31810

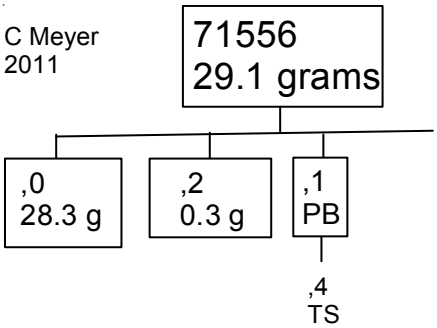
Chemistry

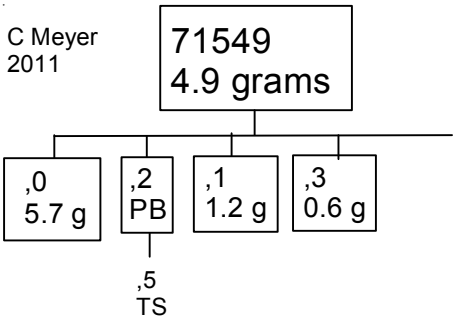
Warner et al. (1975) and Murali et al. (1977) reported chemical analyses (table 1 – 4)(figures 2 and 5).

Radiogenic age dating

None







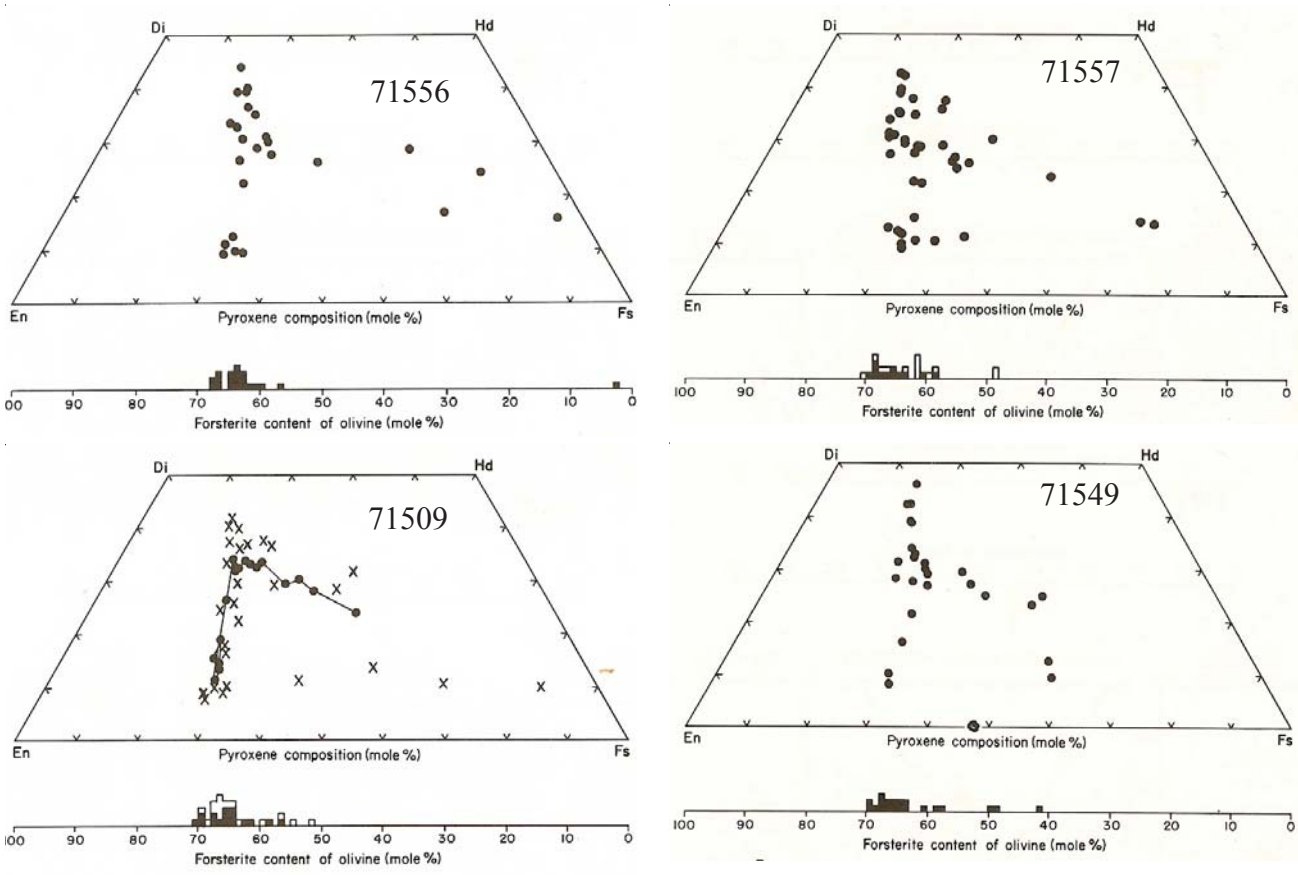
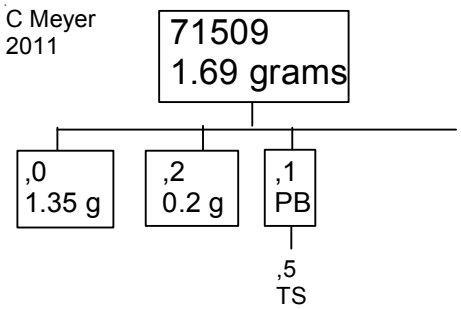


Figure 4: Composition of pyroxene and olivine in 71556 and reatled samples.



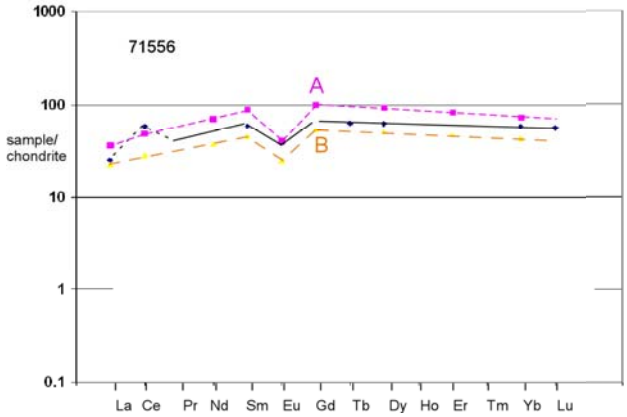
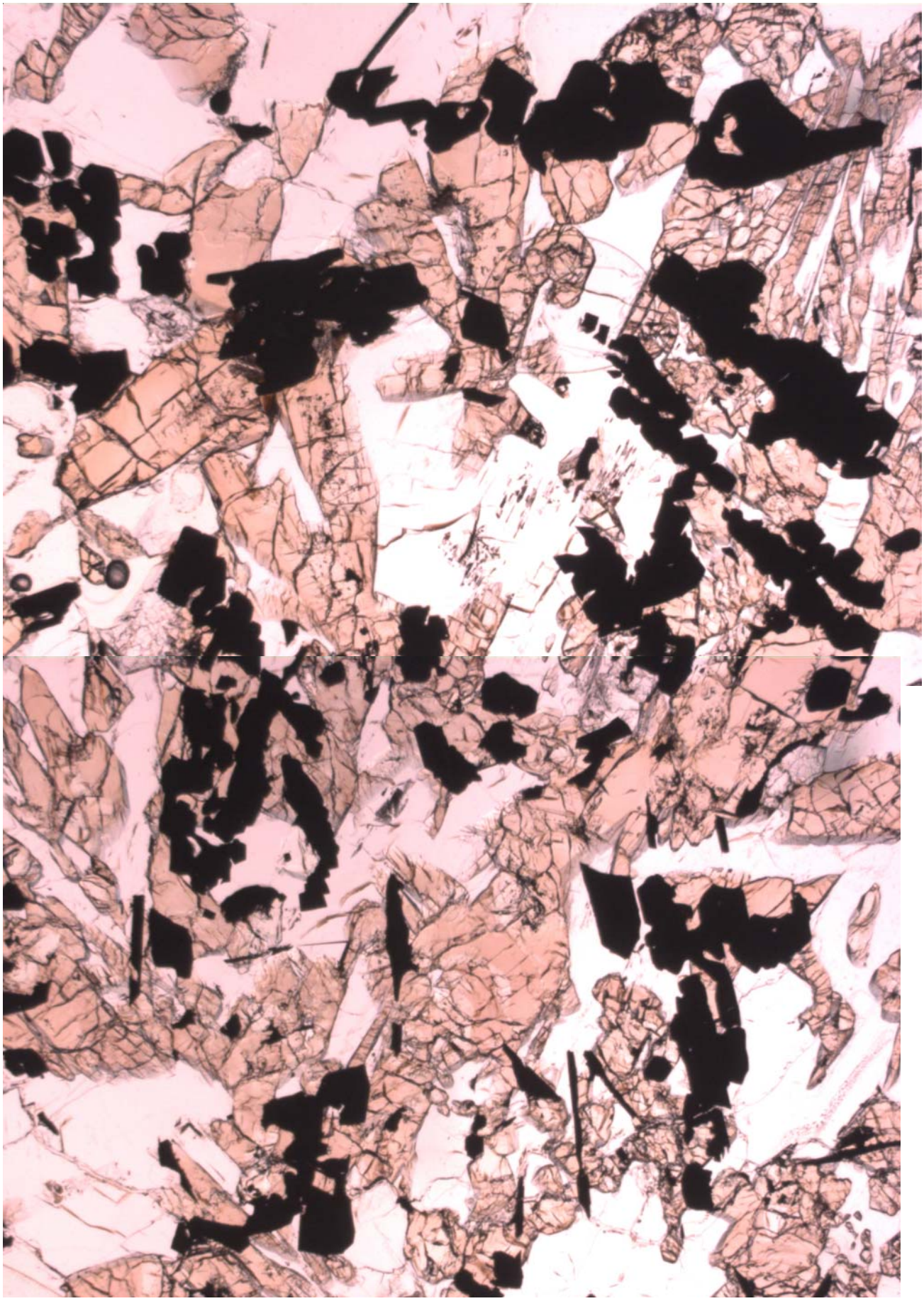


Figure 5: Normalized rare-earth-element diagram for 71556 and type A and B basalts.



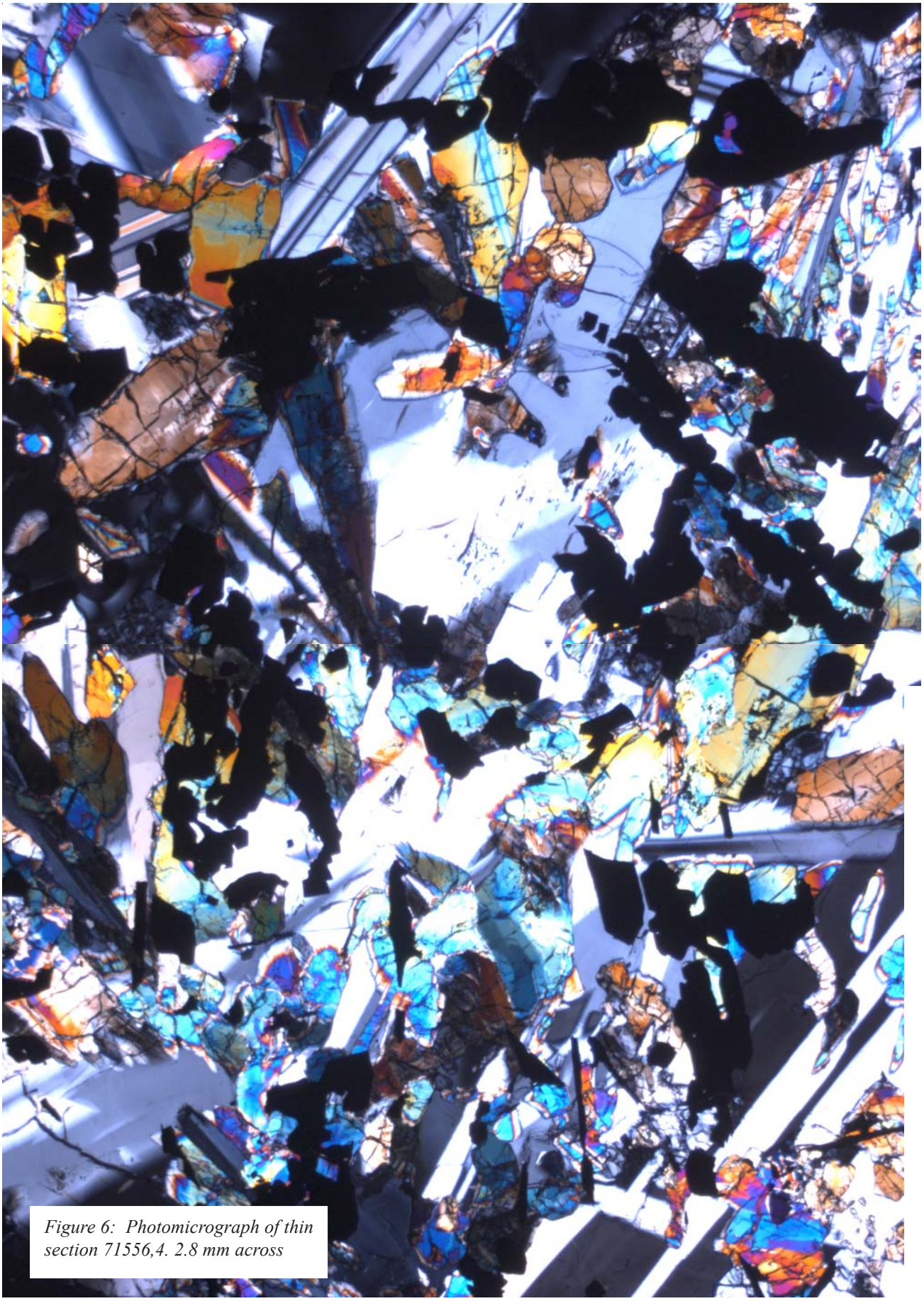
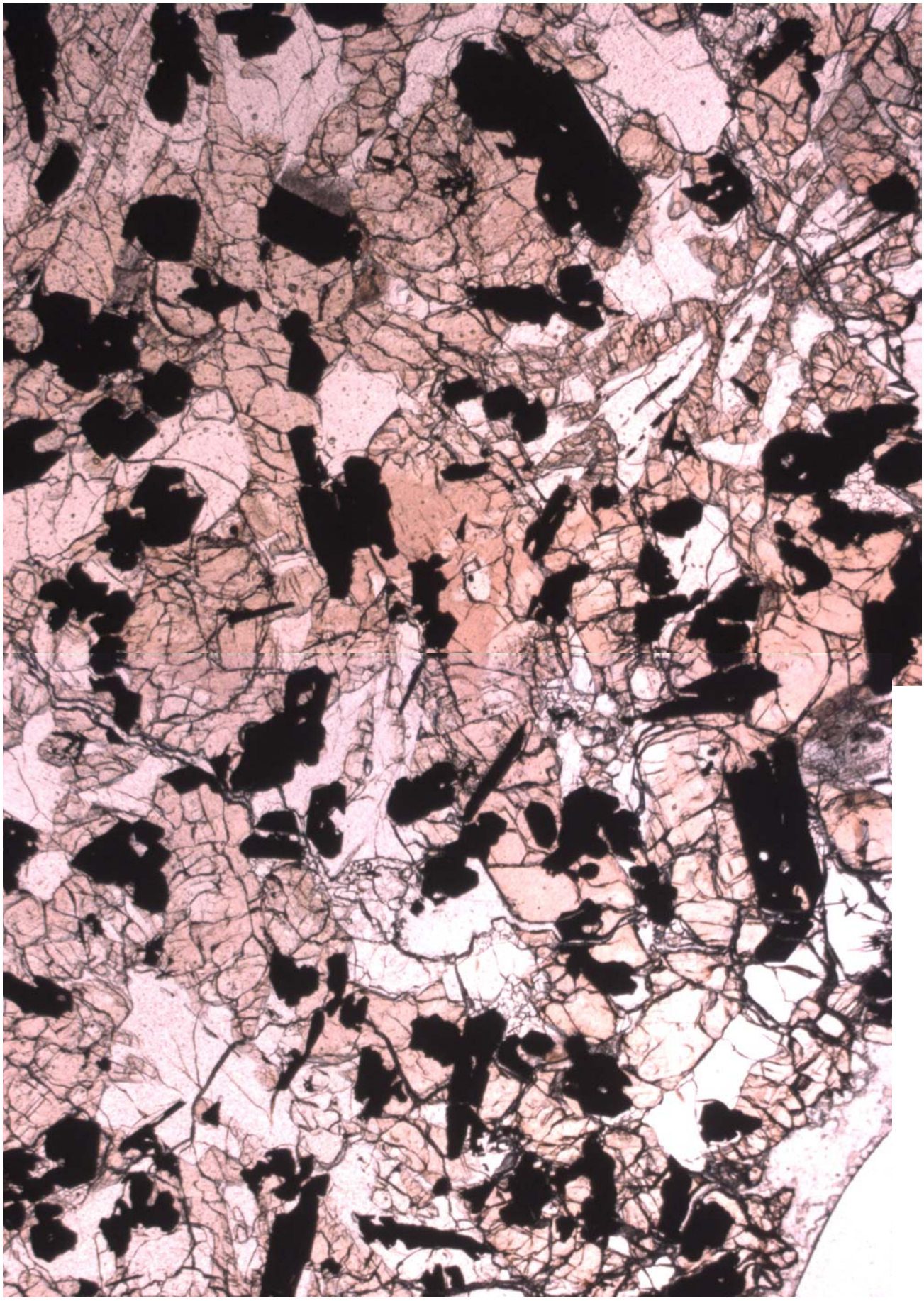


Figure 6: Photomicrograph of thin section 71556,4. 2.8 mm across



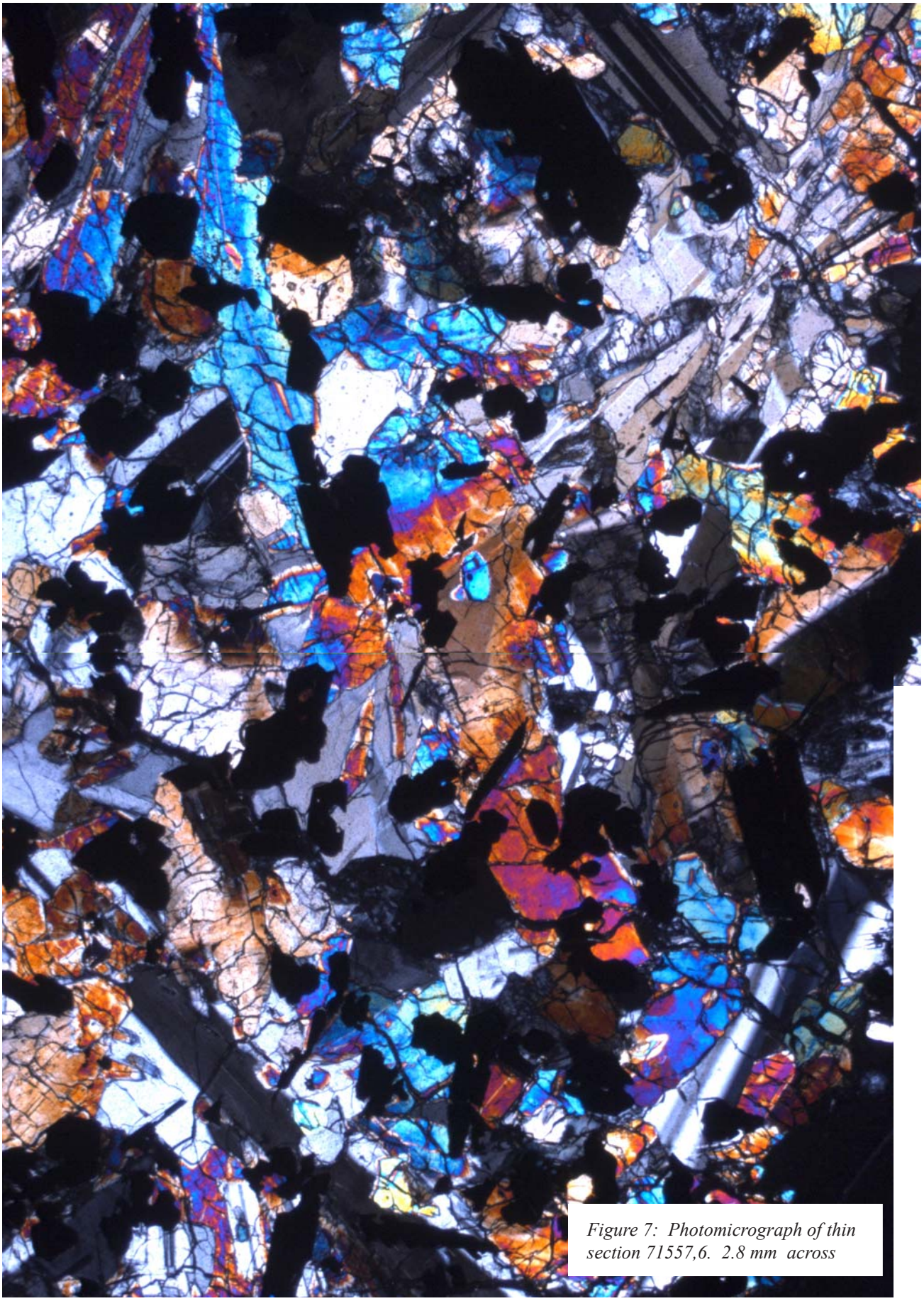


Figure 7: Photomicrograph of thin section 71557,6. 2.8 mm across

Table 1. Chemical composition of 71556.

reference	Murali77	
weight	Warner78	
SiO2 %		
TiO2	11.7	(a)
Al2O3	10	(a)
FeO	19.9	(a)
MnO	0.24	(a)
MgO	7.5	(a)
CaO	10.5	(a)
Na2O	0.45	(a)
K2O	0.056	(a)
P2O5		
S %		
sum		
Sc ppm	70	(a)
V	74	(a)
Cr	2429	(a)
Co	17	(a)
Ni		
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		
La	5.8	(a)
Ce	35	(a)
Pr		
Nd		
Sm	8.6	(a)
Eu	2.11	(a)
Gd		
Tb	2.3	(a)
Dy	15	(a)
Ho		
Er		
Tm		
Yb	9.4	(a)
Lu	1.37	(a)
Hf	8.3	(a)
Ta	1.7	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		
technique:	*(a) INAA*	

Table 2. Chemical composition of 71557.

reference	Warner 78	
weight	Warner75	
SiO2 %		
TiO2	13	(a)
Al2O3	9.3	(a)
FeO	19.1	(a)
MnO	0.235	(a)
MgO	8.5	(a)
CaO	10.5	(a)
Na2O	0.41	(a)
K2O	0.057	(a)
P2O5		
S %		
sum		
Sc ppm	80	(a)
V	120	(a)
Cr	3476	(a)
Co	19.3	(a)
Ni		
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		
La	4.8	(a)
Ce	24	(a)
Pr		
Nd		
Sm	7.5	(a)
Eu	1.72	(a)
Gd		
Tb	1.8	(a)
Dy	13	(a)
Ho		
Er		
Tm		
Yb	7.2	(a)
Lu	1.1	(a)
Hf	6.8	(a)
Ta	1.7	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		
technique:	*(a) INAA*	

Table 3. Chemical composition of 71549.

reference	Murali77	
weight		
SiO2 %		
TiO2	12.2	(a)
Al2O3	8.3	(a)
FeO	20.2	(a)
MnO	0.239	(a)
MgO	8.1	(a)
CaO	10	(a)
Na2O	0.4	(a)
K2O	0.061	(a)
P2O5		
S %		
sum		
Sc ppm	81	(a)
V	108	(a)
Cr	3236	(a)
Co	19	(a)
Ni		
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		
La	5.5	(a)
Ce	40	(a)
Pr		
Nd		
Sm	8.2	(a)
Eu	1.95	(a)
Gd		
Tb	2.2	(a)
Dy	14	(a)
Ho		
Er		
Tm		
Yb	8	(a)
Lu	1.23	(a)
Hf	9	(a)
Ta	0.92	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		
technique:	*(a) INAA*	

Table 4. Chemical composition of 71509.

reference	Warner75	
weight		
SiO2 %		
TiO2	13.7	(a)
Al2O3	7.3	(a)
FeO	20.6	(a)
MnO	0.258	(a)
MgO	10.1	(a)
CaO	9.6	(a)
Na2O	0.314	(a)
K2O	0.054	(a)
P2O5		
S %		
sum		
Sc ppm	95	(a)
V	160	(a)
Cr	4427	(a)
Co	25	(a)
Ni		
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		(a)
La	5.3	(a)
Ce		
Pr		
Nd		
Sm	8.5	(a)
Eu	1.62	(a)
Gd		
Tb		
Dy	15	(a)
Ho		
Er		
Tm		
Yb	9.3	(a)
Lu	1.2	(a)
Hf		
Ta		
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		
technique:	*(a) INAA*	

Table 5: Armalcolite in 71509, 71557.
(Warner et al. 1976)

TiO2	71.8	72.1	72.2	72.2	72.4	71.7	71.5	71.5	70.6
Al2O3	1.88	1.59	1.42	1.33	2.15	2.05	1.75	2.25	1.75
Cr2O3	1.88	1.85	1.72	1.84	1.76	1.78	1.77	1.67	1.43
FeO	15.9	16	17.3	18.1	15.7	15.9	15.9	16.4	17.8
MgO	6.8	6.7	7	6.5	7.2	7	7	6.9	6.2
CaO	0.3	0.39	0.55	0.3	0.63	0.68	0.34	0.5	0.74
ZrO2					0.03		0.08	0.08	0.08
V2O3					0.23	0.23	0.21	0.23	0.19

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