# **71577** - 234.7 grams
# **71578** – 353.9 grams
# Ilmenite Basalt

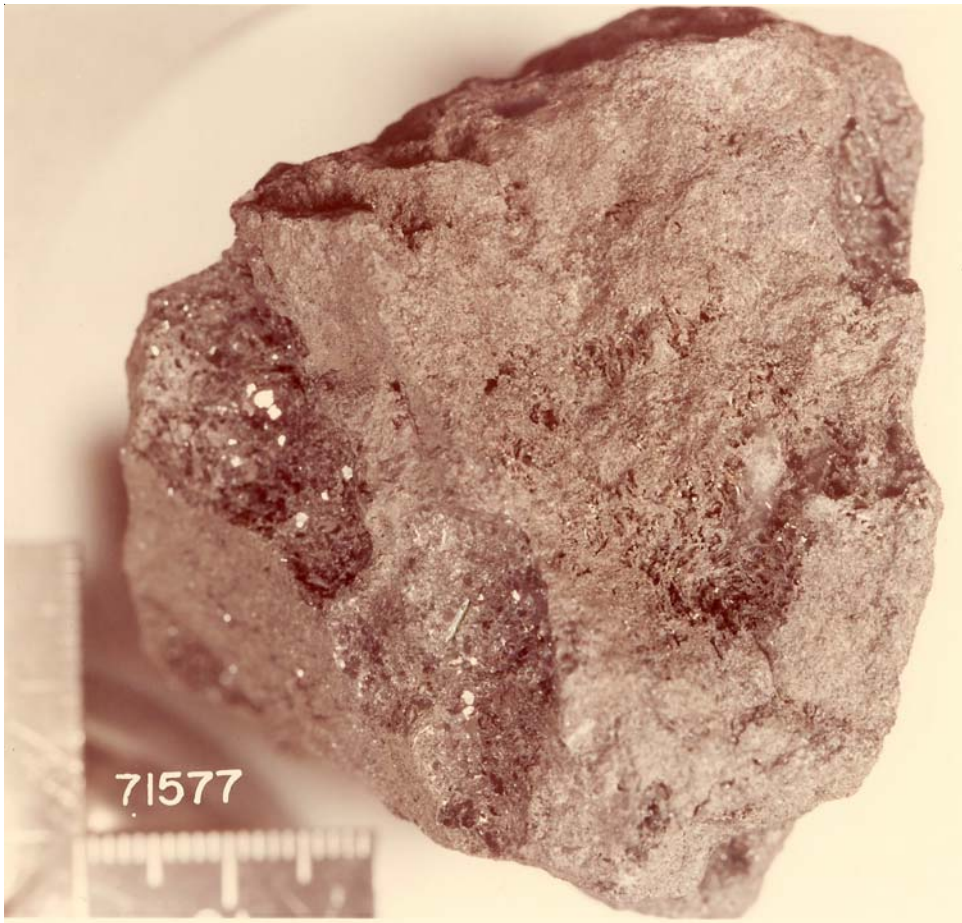



*Figure 1: Photo of 71577 with cm scale. S73-31342.*

## Introduction

Warner et al. (1978) termed 71577 and 71578 olivine-microporphritic ilmenite basalts - similar to 71569. These, rather large, basalt samples have not been carefully studied.

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

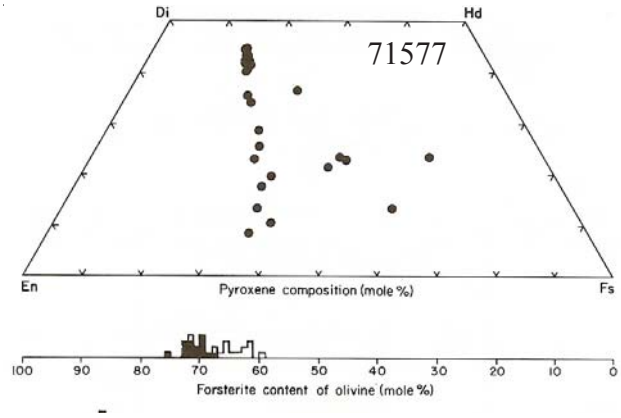



*Figure 2: Composition diagrams for pyroxene and olivine in 71577 (Warner et al. 1978).*

## Petrography

71577 and 71578 are fine-grained, ilmenite-rich basalts with minor vugs and vesicles (figures 1 and 3). The groundmass is variolitic with bow-tie intergrowths of plagioclase and pyroxene (see also description by Neal

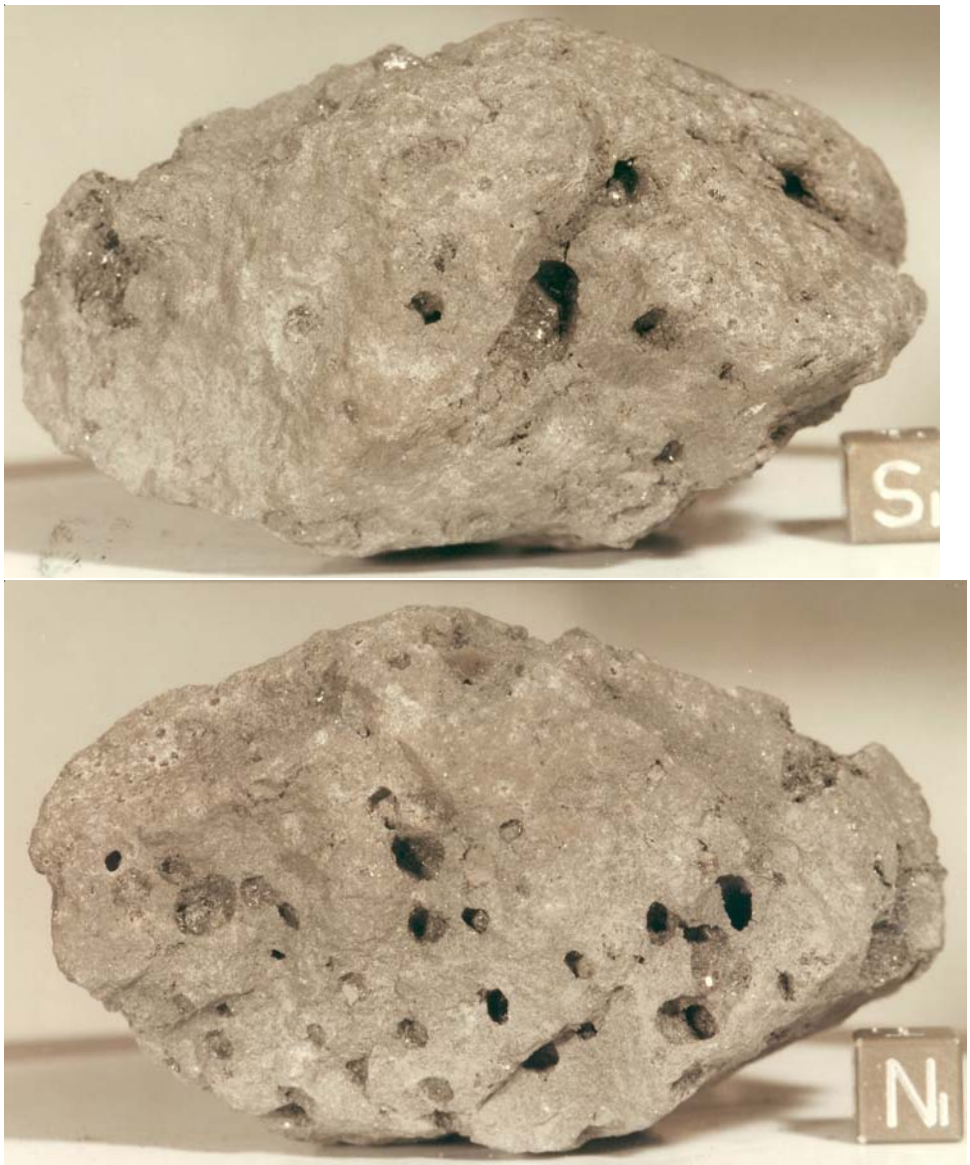


*Figure 3: Two sides of 71578. Cube is 1 cm. S73-16593 and S73-16592.*

## Mineralogical Mode

| | 71577 | 71578 |
|---|---|---|
| Olivine | 4.5 | 6 |
| Pyroxene | 45.9 | 44.9 |
| Plagioclase | 28.1 | 26.5 |
| Opaques | 15.2 | 16.6 |
| Silica | 5 | 4.7 |
| Meostasis | 1.2 | 0.9 |

and Taylor 1993). Olivine is skeletal, often partially resorbed. Ilmenite is irregular is shape, often acicular, and penetrating other minerals (figures 5 and 6).

There are few zap pits on one side of 71578.

The compositions of olivine, pyroxene, plagioclase, ilmenite, armalcolite and metallic iron were reported

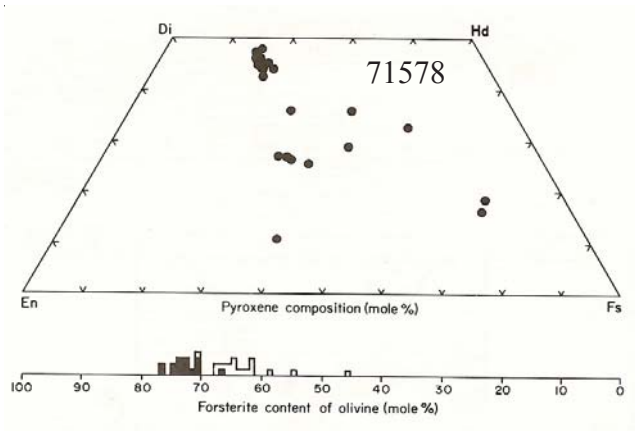
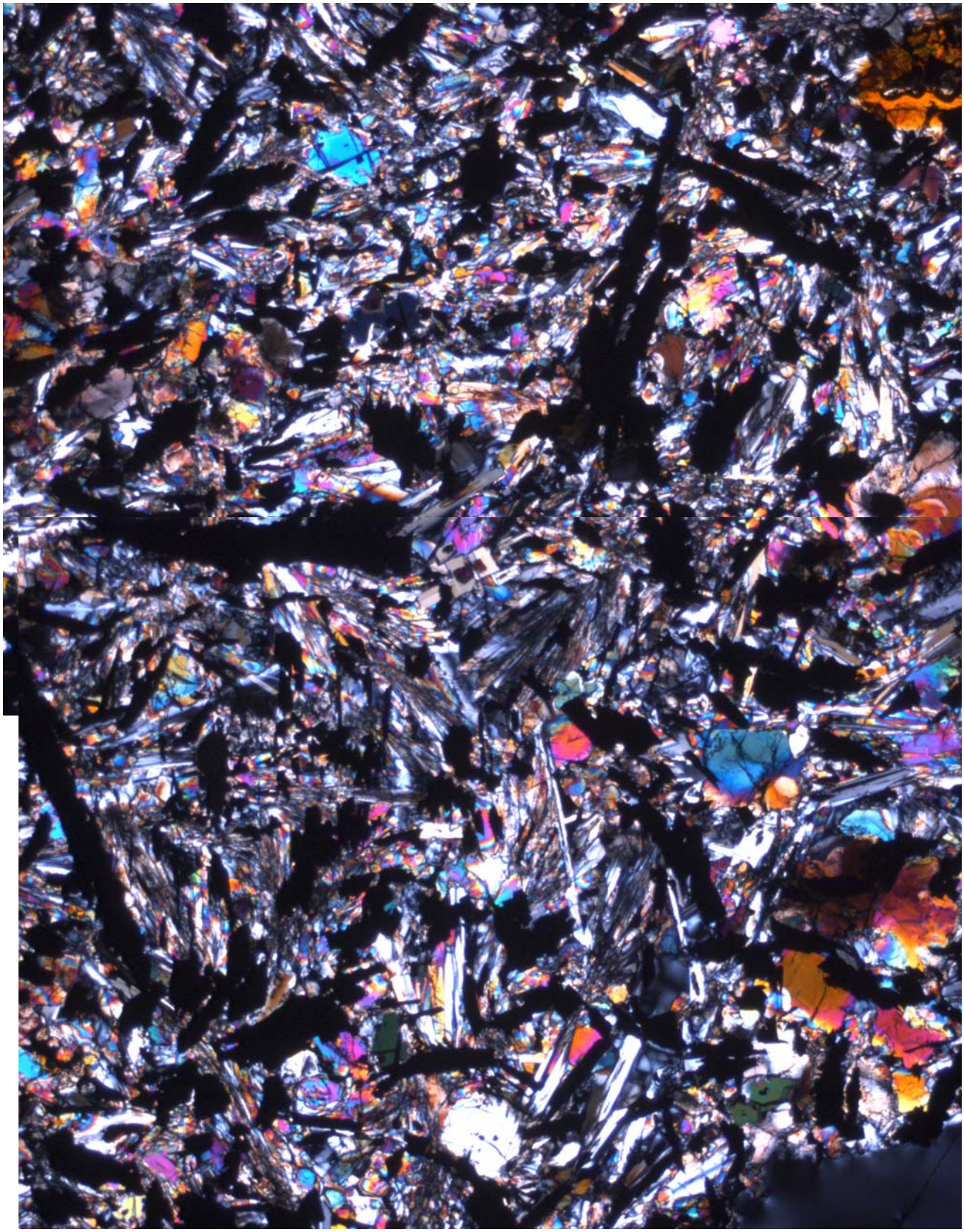



*Figure 4: Composition diagrams for pyroxene and olivine in 71578 (Warner et al. 1978).*

*Figure 5: Photomicrograph of thin section 71577,9. 2.8 mm across*

by Warner et al. (1976 a, b, 1978)(figures 2 and 4).
The mineral mode is given in Warner et al. (1978).



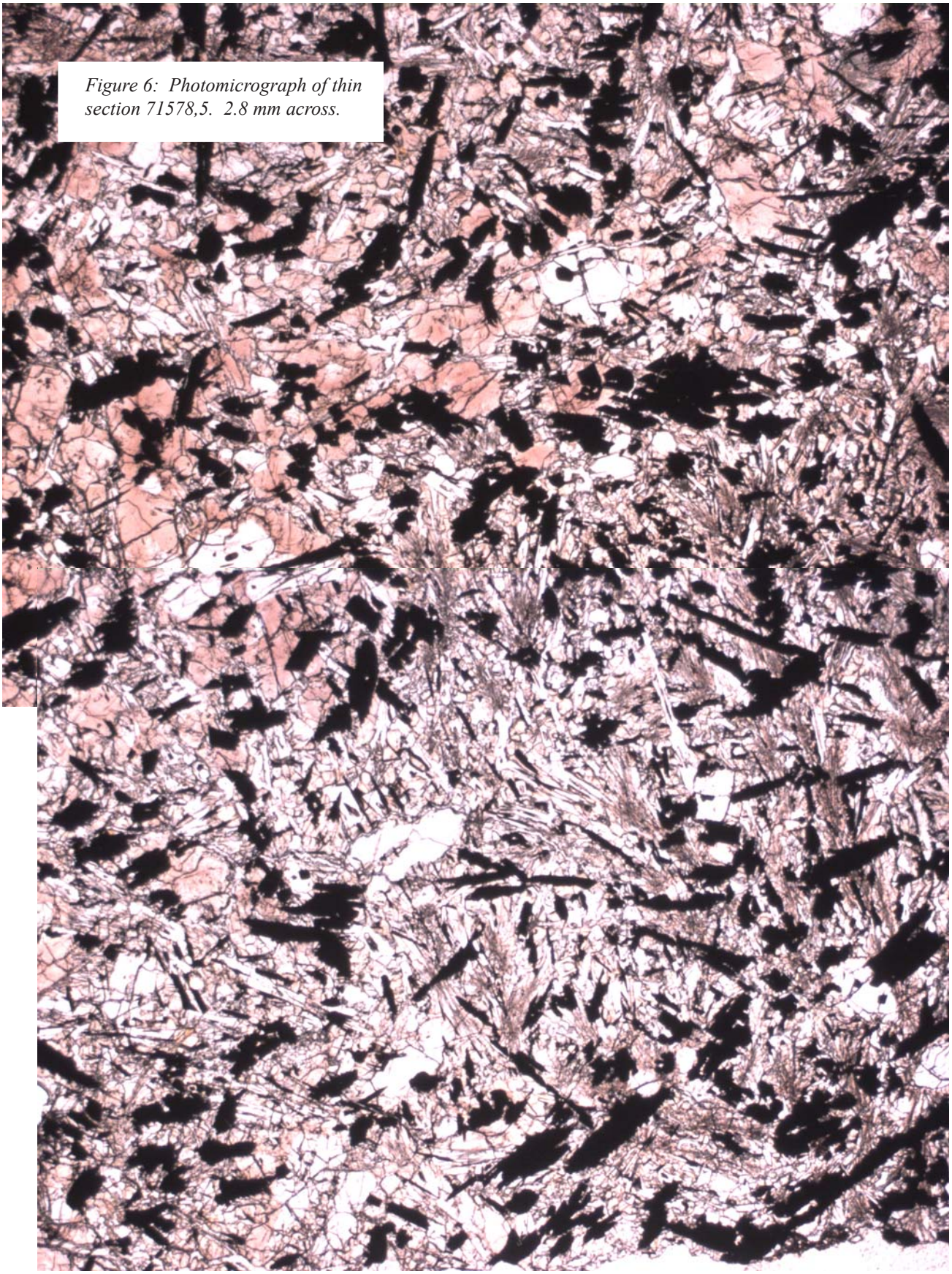
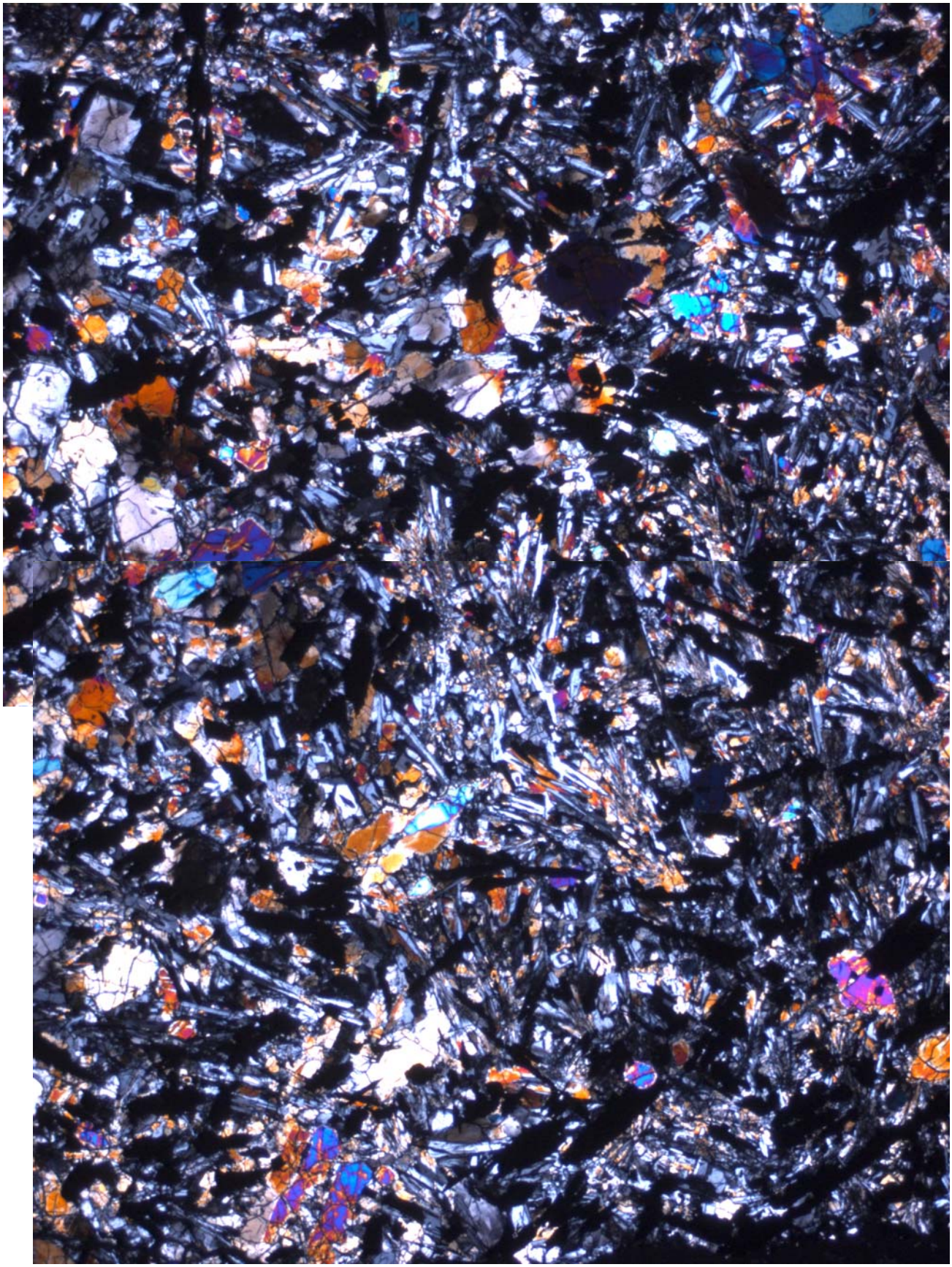


*Figure 6: Photomicrograph of thin section 71578,5. 2.8 mm across.*



## Table 1. Chemical composition of 71577.

| *reference* | Warner78 | | Rhodes76 | |
|---|---|---|---|---|
| *weight* | Warner75 | | Nyquist76 | |
| SiO2 % | Laul75 | | 39.18 | (b) |
| TiO2 | 12.8 | (a) | 12.04 | (b) |
| Al2O3 | 8.8 | (a) | 8.92 | (b) |
| FeO | 20.5 | (a) | 18.9 | (b) |
| MnO | 0.26 | (a) | 0.28 | (b) |
| MgO | 8.3 | (a) | 8.15 | (b) |
| CaO | 10.4 | (a) | 10.95 | (b) |
| Na2O | 0.44 | (a) | 0.39 | (b) |
| K2O | 0.07 | (a) | 0.06 | (b) |
| P2O5 | | | 0.05 | (b) |
| S % | | | 0.17 | (b) |
| *sum* | | | | |
| | | | | |
| Sc ppm | 79 | (c ) | 81 | (c ) |
| V | 110 | (c ) | | |
| Cr | 3147 | (c ) | 2805 | (b) |
| Co | 20.6 | (c ) | 18.4 | (c ) |
| Ni | | | | |
| Cu | | | | |
| Zn | | | | |
| Ga | | | | |
| Ge ppb | | | | |
| As | | | | |
| Se | | | | |
| Rb | | | 0.64 | (d) |
| Sr | | | 191 | (d) |
| Y | | | | |
| Zr | | | | |
| Nb | | | | |
| Mo | | | | |
| Ru | | | | |
| Rh | | | | |
| Pd ppb | | | | |
| Ag ppb | | | | |
| Cd ppb | | | | |
| In ppb | | | | |
| Sn ppb | | | | |
| Sb ppb | | | | |
| Te ppb | | | | |
| Cs ppm | | | | |
| Ba | | | 84 | (d) |
| La | 6.8 | (c ) | 6.9 | (d) |
| Ce | 28 | (c ) | 23.8 | (d) |
| Pr | | | | |
| Nd | 28 | (c ) | 26.5 | (d) |
| Sm | 10.4 | (c ) | 11 | (d) |
| Eu | 2.14 | (c ) | 2.17 | (d) |
| Gd | | | 16.8 | (d) |
| Tb | 2.6 | (c ) | | |
| Dy | 18 | (c ) | 19.5 | (d) |
| Ho | | | | |
| Er | | | 11.4 | (d) |
| Tm | | | | |
| Yb | 9.3 | (c ) | 10.4 | (d) |
| Lu | 1.4 | (c ) | 1.43 | (c ) |
| Hf | 9.2 | (c ) | 9.7 | (c ) |
| Ta | 1.7 | (c ) | | |
| W ppb | | | | |
| Re ppb | | | | |
| Os ppb | | | | |
| Ir ppb | | | | |
| Pt ppb | | | | |
| Au ppb | | | | |
| Th ppm | | | | |
| U ppm | | | | |

*technique: (a) broad beam e probe, (b) XRF, (c ) INAA, (d) IDMS*

## Table 2. Chemical composition of 71578.

| *reference* | Warner78 | |
|---|---|---|
| *weight* | Laul 75 | |
| SiO2 % | | |
| TiO2 | 11.7 | (a) |
| Al2O3 | 8.4 | (a) |
| FeO | 18.6 | (a) |
| MnO | 0.24 | (a) |
| MgO | 8.1 | (a) |
| CaO | 9.5 | (a) |
| Na2O | 0.42 | (a) |
| K2O | 0.07 | (a) |
| P2O5 | | |
| S % | | |
| *sum* | | |
| | | |
| Sc ppm | 74 | (a) |
| V | 100 | (a) |
| Cr | 2874 | (a) |
| Co | 18.5 | (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 | 6 | (a) |
| Ce | 25 | (a) |
| Pr | | |
| Nd | 28 | (a) |
| Sm | 9.8 | (a) |
| Eu | 1.96 | (a) |
| Gd | | |
| Tb | 2.5 | (a) |
| Dy | 17 | (a) |
| Ho | | |
| Er | | |
| Tm | | |
| Yb | 8.5 | (a) |
| Lu | 1.3 | (a) |
| Hf | 8.9 | (a) |
| Ta | 1.6 | (a) |
| W ppb | | |
| Re ppb | | |
| Os ppb | | |
| Ir ppb | | |
| Pt ppb | | |
| Au ppb | | |
| Th ppm | | |
| U ppm | | |

*technique: (a) INAA*

## Chemistry

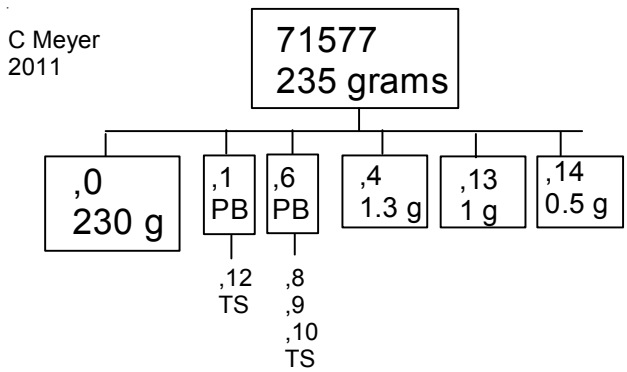
These are Ti-rich basalts typical of Apollo 17 (figure 7). Warner et al. (1975) and Rhodes et al. 91976) found that 71577 and 71578 were type A, Apollo 17 basalts (figures 8 and 9). The analysis by Laul et al. (1975) is apparently the same as by Warner et al. Nyquist et al. (1976) reported Rb, Sr and the $Sr^{87/86}$ ratio.

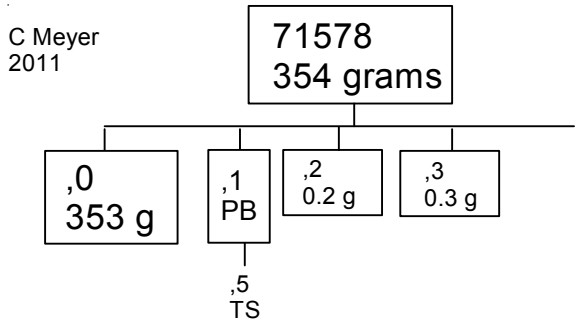
## Radiogenic age dating

none

## Processing

There are 4 thin sections of 71577, but only 1 for 71578. Neither rock has been sawn, nor allocated for scientific study.



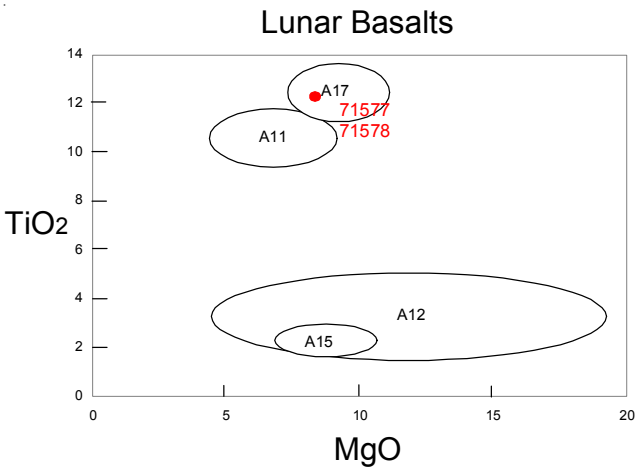




*Figure 7: Chemical composition of 71577 and 71578 compared with that of Apollo basalts.*

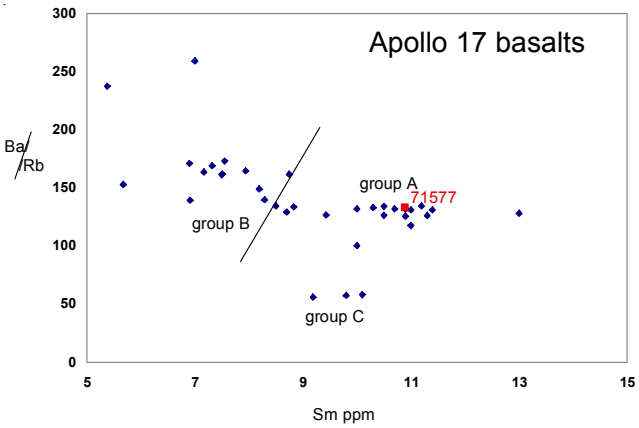



*Figure 8: Trace element characteristics of 71577 showing it is a type A basalt.*

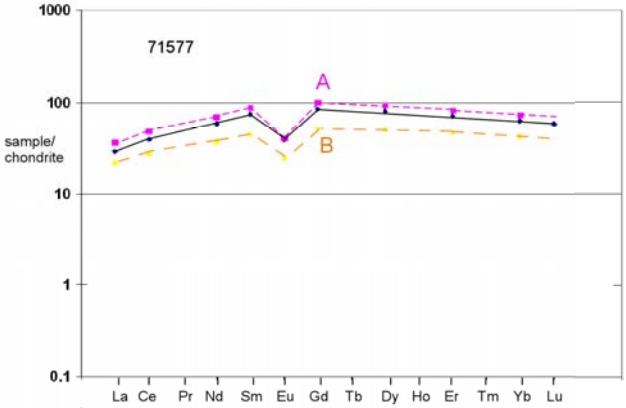



*Figure 9: Normalized rare-earth-element diagram for 71577 and type A and B basalts.*

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