THE IIIAB –PALLASITE RELATIONSHIP REVISITED: 
THE OXYGEN ISOTOPE PERSPECTIVE
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Introduction: The relationship between the IIIAB iron 
meteorites and the main group pallasites (MGP) has been 
debated for many years. The metal composition of the MGP is 
consistent with originating from IIIAB metal after 80% fractional 
crystallisation [1]. On the other hand differing cooling rates 
argue for separate parent bodies [2]. Previous O-isotope analyses 
of oxygen containing inclusions in IIIABs indicate a potential 
relationship with the silicates in MGP [3], albeit in a crowded 
portion of the O-isotope diagram. However, Wasson and Choi 
[1] argued that there remained a significant difference in the O-
isotope signatures.

Samples and Methods: We have measured the O-isotope 
composition of chromites from 5 different IIIAB irons (17 
analyses) using high precision laser fluorination to better 
constrain the O-isotopic signature of the IIIABs. Chromites are 
notoriously difficult to analyse [e.g. 4], and therefore we used a 
more focused laser at higher power than normal to improve yield 
and isotopic reproducibility. Tests with terrestrial standards 
showed yields approaching 100% and analytical precision 
comparable to that for silicates [5]. While some of the meteorite 
chromites displayed greater variability in δ18O than expected, O 
yields approached expected values and generally lacked 
systematic correlation with δ18O. Therefore, some of the variation 
may be intrinsic to the samples. In any case, such effects would 
be mass dependent and therefore not affect Δ17O.

Results and Discussion: Four of the 5 IIIABs analysed 
display a very restricted range in linearized Δ17O with a mean 
value of -0.18‰, and a 2σ scatter of ±0.02‰ that is similar to the 
variation observed from bodies believed to have experienced 
extensive homogenisation. Most δ18O values ranged from -1.3 to 
-3.8‰. The mean Δ17O value of these four IIIABs is identical to 
that of the MGP (-0.18 ± 0.02) [6], arguing strongly for a 
common origin for the IIIABs and the MGP. The fifth sample 
analysed, Cape York, has a Δ17O value of -0.27‰. As Cape York 
appears to be a typical IIIAB it may be that multiple sources of 
chromites exist in the IIIAB parent body (e.g. those precipitated 
directly from solid metal and those found in troilite nodules). 
Alternatively, the IIIAB parent body had a more complex structure 
than previously considered, or even that Cape York originated 
from a distinct parent body. Further analyses are planned to 
explore the variation in the IIIABs, or even to resolve this anomaly.

et al. (1999) Rapid Communications in Mass Spectrometry 
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