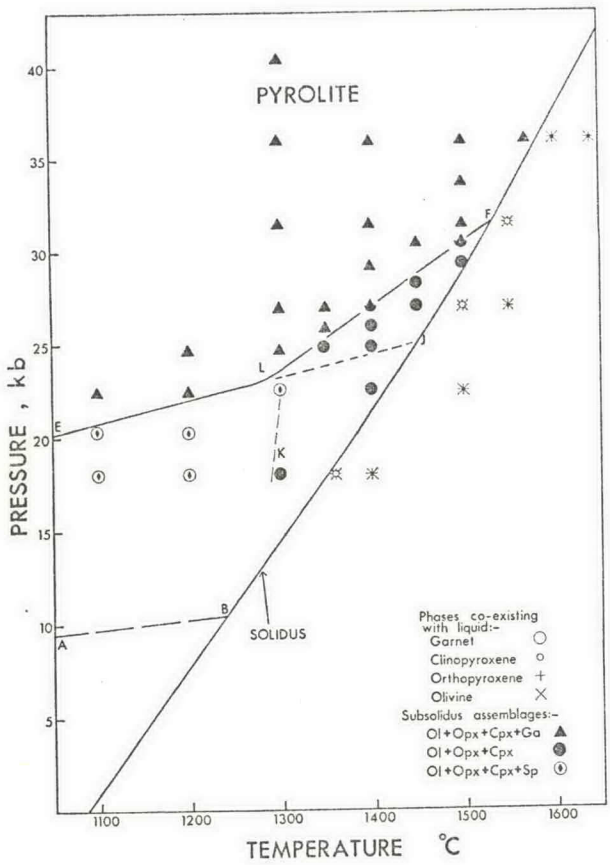

Fig. 1. Experimental runs on pyrolite III composition. Garnet is absent on the low pressure and present on the high pressure side of ELF. Spinel is absent on the high temperature side of the line K. In pyrolites I and II garnet is present on the high pressure side of ELJ. (From GREEN and RINGWOOD, 1967a).

across these boundaries as previous data (BOYD, 1960) had demonstrated difficulty in nucleation of magnesian garnet near its low pressure stability limit. Reversals involving complete disappearance of garnet on the low pressure side of the boundary, were achieved at 1400 °C and 1200 °C (table 2). The starting mix for the 1400 °C reversals was a large capacity run at 36 kb, 1000 °C, 3 hrs yielding fine grained olivine and pyroxene and very poikilitic garnet. For the 1200 °C reversal, the starting material was a 50:50 mix of runs carried out at 1200 °C, 18 kb, 2 hrs and 1200 °C, 27 kb, 2 hrs. The reversals at 1400 °C and 1200 °C confirm the positions of the boundaries established from the olivine + pyroxenes + plagioclase + chromite starting mixtures. The analysis of the roles of spinel and aluminous pyroxenes gives a theoretical explanation for the change in slope of the boundary marking the appearance of garnet in pyrolite III and the absence of such a change in slope of the boundary in pyrolites I and II. Microprobe analyses of orthopyroxene (table 4) show regular variations in Al_2O_3 and $CaSiO_3$ solid solution which are in themselves very good evidence that the experimental assemblages closely approach equilibrium.

In the runs (table 3) on the olivine + amphibole + pyroxenes mix, amphibole breaks down finally between 27 kb and 28.8 kb at 1000 °C. There is a transitional assemblage of olivine + pyroxenes + garnet + amphibole from 23.5 kb to 28 kb. In this assemblage the amount of garnet is less than in lower pressure runs. Experiments on the stability of amphibole in basaltic compositions (ESSENE *et al.*, 1970) have demonstrated that amphibole may form readily from (glass + H_2O) mixtures and persist metastably at high pressures and at 700–800 °C beyond its stability field as defined by growth in garnet + pyroxene + amphibole + water mixtures. This possibility has not been fully tested in the

TABLE 2

Results of experimental runs aimed at reversal of the boundary for appearance of garnet from olivine + aluminous pyroxenes and from olivine + spinel + pyroxenes assemblages

Run no.	Capsule	Pressure (kb)	Temperature (°C)	Time (hrs)	Starting material	Products
1096	Graphite	27.0	1450	1	Ol + Opx + Cpx + Ga	Ol + Opx + ?Cpx + Melt
1098	Graphite	28.1	1450	1	Ol + Opx + Cpx + Ga	Ol + Opx + Cpx + Melt
1099	Graphite	25.9	1400	1	Ol + Opx + Cpx + Ga	Ol + Opx + Cpx
1055	Pt	25.9	1400	1	Ol + Opx + Cpx + Plag + Chromite	Ol + Opx + Cpx
1100	Graphite	27.0	1400	2	Ol + Opx + Cpx + Ga	Ol + Opx + Cpx + rare Ga
1016	Pt	27.0	1400	1	Ol + Opx + Cpx + Plag + Chromite	Ol + Opx + Cpx + rare Ga
2289	Pt	20.7	1200	4	50% (Ol + Opx + Cpx + Ga) 50% (Ol + Opx + Cpx + Sp)	Ol + Opx + Cpx + rare Spinel
2290	Pt	22.5	1200	4	50% Ol + Opx + Cpx + Ga 50% Ol + Opx + Cpx + Sp	Ol + Opx + Cpx + Ga (minor garnet but with euhedral form)