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Flame perthite in metapelitic gneisses at Cooma, SE Australia

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ABSTRACT

Flame perthite occurs locally in high-grade migmatitic gneisses of pelitic composition at Cooma, SE Australia. It is developed best in leucosomes and rocks in which cordierite is largely unaltered. Such rocks are inferred to have been stronger than more-altered rocks, causing local stress concentrations sufficient to promote the nucleation of flames. The variability in the abundance of flames could be due to variability in stress concentrations in relation to orientation of the microperthite grains, if the Pryer-Robin model for flame perthite is applicable to these rocks.

Possible sources of Na are (1) release of Na as cordierite and potassium feldspar were replaced by biotite-andalusite-quartz symplectite at upper amphibolite-facies conditions and (2) release of Na as microperthite was replaced by muscovite. Both these reactions appear to have occurred at amphibolite-facies conditions, because late fibrous sillimanite has replaced all minerals, including myrmekite, albite flames, and much of the muscovite; conceivably some muscovite that has not been replaced by sillimanite may have formed at greenschist-facies conditions. Alteration of plagioclase does not appear to have been a major source of Na for the flames, because plagioclase is absent from many of the Cooma metapelitic rock and, where present, is unaltered.