The Palmer Granite:
Geochronology, Geochemistry and Genesis

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Abstract

Various igneous bodies have intruded into the Palmer area throughout the Delamerian Orogeny. The earliest, the Rathgen Gneiss, intruded either before or during D1 which gave it the prominent foliation. D1 was also responsible for crenulations in migmatite veins throughout the area. These crenulated migmatite veins are in areas folded by D2 mesoscale folds. Some pegmatite veins are also folded by the D2 folds. The Palmer Granite intruded during D2 as is seen by shearing in a semi-crystalline state and a tectonic foliation that has been folded. The ballooning of the granite during emplacement deforms the surrounding sediments and the pre-granite folds hence their axis lie parallel to the contact of the granite. The effect of the granite intruding during the deformation has lead to the axis of the D2 folds forming after the granite to have a degree of randomness about their axis. Migmatite grade was reached again after the intrusion of the granite causing melt veins to develop that disrupt the foliation. D3 formed a regional syncline of the area combined with some small scale folding within the granite, however a foliation did not form.

The emplacement of the granite and other igneous bodies throughout the area has been controlled by using the bedding plane of the Kanmantoo.

The geochemical trends throughout the Palmer granite is formed by two different groups fractionally crystallising zircon, amphibole, and biotite. This results in a decrease of normally incompatible elements. The two groups form by one group from a homogeneous source and the other a heterogeneous source. The xenoliths crystallised from a mafic magma. The amphibolites form two groups according to their differentiation and genetic relationship. They both form by fractional crystallisation however U and Pb are decreasing cannot be explained by this. Another possible mechanism is liquid un-mixing.

To tie all of the groups together a model of a mafic pluton that crystallises the xenoliths as a chilled margin. The mafic magma evolves some of the Palmer Granite whilst turbulently convecting hence homogenising the magma. A magma recharge forms the more evolved mafic and this forms more Palmer Granite which convects in a laminar fashion forming heterogeneities. Part of the mafics evolve enough to be caught up in the Palmer Granite and as it does not crystallise zircons all the fractional crystallisation of the Palmer Granite must have occurred in the mafic pluton.

? || G

G

mafic + intermediate

why not magma?

what

magma chamber

G: Grammar / style / wording — rephrase

"mafic" is an adjective, not a noun.

Abstract

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