The role of conjugate crenulation cleavage and stepwise porphyroblast growth in the development of "Millipede" microstructures

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This paper describes the results of a microstructural study into the development of 'Millipede' microstructures found in Archean metaturbiditic rocks surrounding the Back River volcanic complex, eastern Slave structural province. Millipede microstructures are locally developed within andalusite porphyroblasts which developed late in the deformation history of the study area in response to the intrusion of late kinematic granitoids. The mechanism for the development of the millipedes involves the stepwise porphyroblast growth with andalusite growth occurring after initial D_3 buckle folding. These initial andalusite porphyroblasts represent a rheological heterogeneity resulting in the development of conjugate crenulation cleavage along the porphyroblast margin. Subsequent porphyroblast growth included the crenulation cleavage with the inclusion trail within the porphyroblasts defined by the trace of the quartz-rich crenulation cleavage microlithon. The classical reversal in inclusion trail vergence is the result of the porphyroblasts overgrowing conjugate pairs formed along the porphyroblast margin.

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