

STRUCTURAL ANALYSIS AND METAMORPHIC HISTORY OF A CORDIERITE SCHIST UNIT, FREMONT COUNTY, SOUTH-CENTRAL COLORADO

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Unusually large cordierite porphyroblasts, 3-11 cm in diameter, occur within a 300 m thick unit of Proterozoic schist along the Arkansas River, Colorado. Prominent internal fabrics within cordierite porphyroblasts do not coincide in orientation with foliation in the surrounding muscovite schist. Average foliation in the schist strikes N80W. 65 N. while the orientation of the internal fabric is extremely variable. The external schistosity crosscuts the fabrics within the cordierite.

The fabric preserved within the cordierite represents early fabric present at the time of cordierite growth. In thin section, there are two fabrics visible in the cordierite. The first is microscopic layering of quartz, feldspar and opaque minerals. The separation of heavy minerals and variability of the thickness and spacing of layers strongly indicates that this represents primary sedimentary layering, S_0 . Such fine-scale bedding would have formed during the deposition of clay-rich sediments in a low-energy environment. The second internal fabric, S_i , is a crenulation cleavage that coincides with an early deformational fabric and lies at an angle to the external schistosity, S_2 . S_1 , and S_2 may have developed during prograde dynamic metamorphism at ~1.67 Ga, during which the cordierite crystals nucleated, overgrew S_0 and S_1 , and probably were rotated and wrapped by external foliation. Finally, randomly-oriented sillimanite and biotite grew across the foliation, an indication that their growth postdated the deformation at 1.67 Ga. The most likely cause of the final mineral growth is the regional heating which occurred during regional metamorphism at ~1.4 Ga.