

IS THE CAMERON RIVER GREENSTONE BELT ALLOCHTHONOUS?;
Timothy M. Kusky, Department of Earth and Planetary Sciences,
The Johns Hopkins University, Baltimore, Maryland, 21218, U.S.A.

Many tectonic models for the Slave Province, N.W.T., Canada, and for Archean granite - greenstone terranes in general, are implicitly dependent on the assumption that greenstone belt lithologies rest unconformably upon older gneissic basement. Other models require originally large separations between gneissic terranes and greenstone belts. A key question relating to the tectonics of greenstone belts is therefore the original spatial relationship between the volcanic assemblages and presumed-basement gneisses, and how this relationship has been modified by subsequent deformation. Unconformities have been reported from the Cameron River Greenstone Belt northeast of Yellowknife, and from the Point Lake area to the north (1,2). What remains unclear in these examples is the significance of the so-called "later faulting" of the greenstone - gneiss contacts. Do the angular discordances really represent unconformities, or could they be better - interpreted as a consequence of the juxtaposition of originally widely separated terranes? Where unconformities between gneisses and overlying sediments are indisputable, such as at Point Lake, the significance of faults which occur below the base of the volcanic succession also needs to be evaluated. As part of an on-going investigation aimed at answering these and other questions, I mapped the extremely well-exposed Cameron River Greenstone Belt and the Sleepy Dragon Metamorphic Complex in the vicinity of Webb Lake and Sleepy Dragon Lake during the summer of 1985, extending the efforts of earlier workers (3,4,5,6).

The greenstone belt was found to consist predominantly of mafic pillowed to massive flows and numerous dike complexes. At the preserved base of the greenstone belt these dikes locally retain a sheeted aspect and display one-way chilling. Subordinate amounts of pyroclastic rocks and volcanic breccias are also present. Rocks of the Sleepy Dragon Metamorphic Complex are highly variable, and include both ortho- and paragneisses, along with numerous mylonite zones (3,7,8). Older gneisses and mylonites are intruded by several younger phases of mafic to silicic plutonic rocks which show different intensities of deformation.

The contact between the Cameron River Greenstone Belt and the Sleepy Dragon Metamorphic Complex was found to be a half-kilometer wide zone of very complex structure. All rocks within this high-strain zone have a strong steeply plunging stretching lineation, although rocks from throughout the area also have a less-intense generally vertical lineation. Transposed layering and intensely folded quartz segregations are common in this zone; sheath folds with vertically plunging hinges are present in some localities, indicating very high shear strains. Macroscopic sense-of-shear indicators are not abundant but generally suggest that the Cameron River Belt was thrust over the Sleepy Dragon Complex. Supporting microscopic work is

currently underway. In one area north of Webb Lake some slivers of gneissic basement are intercalated with phyllonites of the major high-strain zone; further mapping will reveal the lateral extent of this tectonic juxtaposition, but it is apparently the first-documented example of Archean basement-involved thrusting in the Slave Province.

Pillow lavas of the Cameron River Belt immediately adjacent to the basal high-strain zone have aspect ratios locally exceeding 1:3:10. In an area to the northwest of Sleepy Dragon Lake these lavas are overturned in an anticline as shown by locally-consistent facing directions. The axial trace of this fold is parallel to the contact zone, and the fold's geometry is consistent with formation during thrusting of the Cameron River Belt over the Sleepy Dragon Complex. Preliminary mapping in the greenstone belt in the Webb Lake area has revealed the presence of a few other subparallel shear zones containing structures similar to those just described; a common origin is tentatively inferred pending more detailed mapping.

Interpreting the structures within the Sleepy Dragon Metamorphic Complex is difficult because of the complex deformation history of this terrane. The only structure which, at this point, can unambiguously be related to movement along the contact with the Cameron River Belt is a foliation which trends parallel to and increases in intensity towards the contact zone. The foliation cuts earlier structures including folded gneissic and mylonitic foliations; earlier foliations are folded about this later one (3). The fact that this late foliation is cut by some plutonic bodies suggests that a minimum age may be placed on the thrusting and emplacement of the Cameron River Greenstone Belt over the Sleepy Dragon Metamorphic Complex.

Numerous mafic dikes are present both at the base of the Cameron River Belt and within the Sleepy Dragon Complex near its contact with the greenstone belt (6). The textures and xenolith content of the dikes in the Sleepy Dragon Complex appear to be generally different from the dikes in the greenstone belt. Deformational and metamorphic fabrics in the dikes of the Sleepy Dragon Metamorphic Complex suggest that they are of at least two, and probably three generations, while only two distinct generations of dikes are recognized from the Cameron River Greenstone Belt. Pending further field and laboratory work it is tentatively suggested that (a) the first two generations of dikes in the Sleepy Dragon Complex are not directly related to any dikes in the greenstone belt, (b) the earliest generation of (locally sheeted) dikes in the greenstone belt are not present in the basement complex, and (c) only the latest, relatively undeformed dikes are correlatable between the two terranes.

Although it is a bit premature to propose tectonic models for the Cameron River Greenstone Belt it is useful to keep a working hypothesis in hand. It is tentatively proposed that the Sleepy Dragon Complex is a preserved remnant of a rifted Archean continent; many of the metasedimentary gneisses may represent a

highly deformed Atlantic-type margin sequence originally deposited on top of older basement. The Cameron River Greenstone belt has many affinities with Phanerozoic ophiolites and/or island arc complexes, including the presence of sheeted dikes. Although an unconformable relationship has been reported between the Cameron River Belt and the Sleepy Dragon Complex, I have not yet been able to support this contention based on observed field relationships. In fact, all data collected to-date indicates that the greenstone belt is allochthonous. Structures at and near the base of the greenstone belt suggest that it has been imbricated and thrust over the Sleepy Dragon Metamorphic Complex, incorporating slices of gneiss in the process. It must be emphasized that these are only preliminary conclusions that need to be verified by several more seasons of detailed mapping but, so far, many similarities are seen between Slave Province greenstone belts and Phanerozoic collisional tectonic zones.

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