LITHOLOGIC AND STRUCTURAL ANALYSIS OF THE QUETICO AND WAWA SUBPROVINCE JUNCTION, KAWNIPI LAKE, QUETICO PROVINCIAL PARK, ONTARIO CANADA

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Introduction

The purpose of this study was to analyze the lithologies and structural characteristics of the Quetico and Wawa belts near their junction, on northwest portion of Kawnipi Lake in Quetico Provincial Park, Ontario Canada. These two belts belong to the Superior Province (Card and Ciesielski, 1983). The Quetico belt contains volcanically-derived metasediments that pass southward into a zone of relatively high grade metasedimentary migmatites. However, the Wawa belt is composed primarily of metamorphosed mafic volcanic rocks with mappable units of intermediate and felsic volcanics (Williams and Stott, 1991).

Discussion

Lithology and structure of the Quetico subprovince

The primary mappable units of this subprovince are amphibolite migmatite breccia and granite-rich and biotite schist-rich migmatite. Biotite schist-rich migmatite contains more than 50% biotite schist rafts within a granitic matrix. Alongside these rafts, granitic leucosomes and quartz veins are commonly found. Granite-rich migmatite is composed of 5%-50% biotite schist rafts within a granitic matrix. The less abundant amphibolite migmatite breccia is composed of coarse-grained gabbro blocks that are shaped into lense-like structures within a granitic matrix. The biotite schist-rich migmatite and granitic migmatite foliations within this subprovince have strike orientations that fall within the range of N20°E to N40°E. The strike of the axial planes of most antiformal and synformal structures are oriented within the range of N20°E to N45°E. Ptygmatic folds of the leucosomal material found within the granite-rich migmatite strike at N44°E. The amphibolite lenses in the amphibolite migmatite breccia unit, are oriented at N40°E.

The Lithology and Structure of the Wawa Subprovince

The Wawa subprovince is a highly mafic region consisting of amphibolite-biotite schist-rich migmitite (Abs), granitic migmatite (Agx) amphibolite migmatite breccia (Anmb), and biotite schist-rich migmatite (Ap) . Abs is the most abundant unit, while Agx is less abundant. Anmb and Ap are the least abundant units. Abs contains amphibolite schist rafts and biotite schist rafts which are all set within a granitic matrix. The amphibolite and biotite schist rafts contain quartz and granitic veins, as well as trondhjemitic and granitic leucosomes. Agx is a migmatite containing 5%-50% biotite schist rafts within a granitic matrix. Anmb is a migmatite containing coarse-grained amphibolite and gabbro clasts in a granitic matrix. The gabbro clasts are often cross-cut by granitic veins of this matrix. Data collected from fellow students in this program indicate that large bodies of tonalite are located to the east of our study area within the Wawa subprovince.

Foliations in the amphibolite-biotite schist-rich migmatite and granite-rich migmatite strike consistently in the range of N20°E to N40°E. The units are metamorphosed and highly deformed into sequences of antiforms and synforms. Leucosomes and mafic rafts have been deformed into two types of folds: thin, small-scale isoclinal folds and more massive isoclinal fold structures. The strikes of their axial planes range between N20°E and N50°E. The dips of the axial planes are oriented either vertically or dipping steeply to the northwest or southeast, while the fold axes plunge primarily to the northeast.

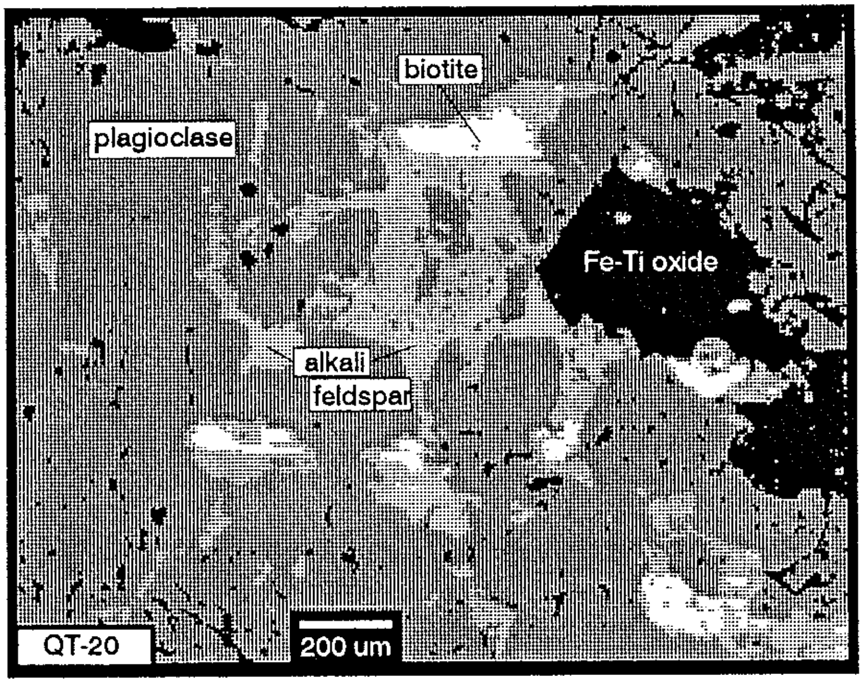

Figure 1. Backscatter electron micrograph showing distribution of biotite (white), alkali feldspar (light gray), plagioclase (dark gray) and Fe-Ti oxide (black). Note disseminated distribution of alkali feldspar and inclusion relation of biotite.

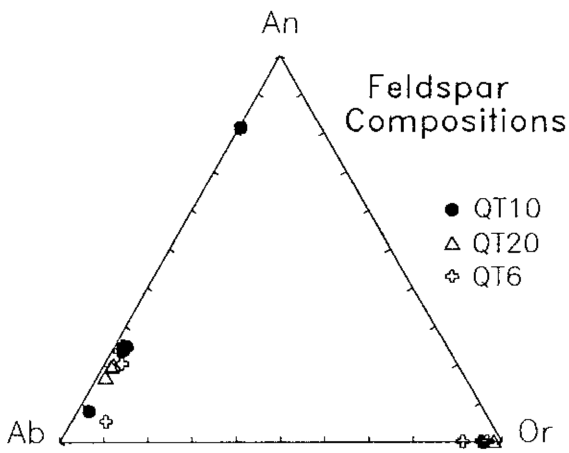

Figure 2. Ternary feldspar compositions. Clustering of compositons around An_{20-30} may suggest metamorphic reequilibration.

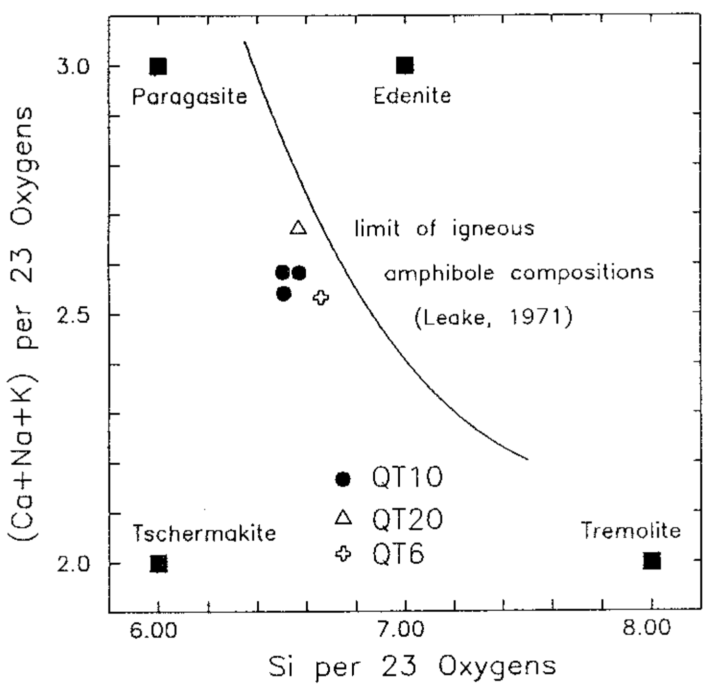

Figure 3. Compositions of amphiboles in Quetico tonalites compared to Leake's (1971) *limit of igneous amphibole compositions*. Samples plot on *igneous* side of this line.

Lithology and Structures along the Junction of the Quetico and Wawa Subprovinces

Along the junction of these two belts there are several mafic intrusions. Basaltic dikes, ranging in thickness from 7.5 to 30 centimeters, were found on the northeast shore of center Kawnipi lake. These dikes are composed of unmetamorphosed, fine-grained rocks that contain pyroxene and plagioclase. The dikes are oriented between N35W to N50W and dip approximately 50SW. They may belong to the Keweenawan dike swarm (Osmani, 1991). Gabbro units also occur near the junction and have foliation that strikes N55E and dips sub-vertically. The gabbro is composed of 70% hornblende and 30% plagioclase.

The amphibolite migmatite breccia is a mappable unit primarily located near the junction of the two subprovinces. This migmatite is composed of lensoid bodies which are set within a granitic matrix. The breccia consists of amphibolite that occurs as rafts, layers, and/or angular blocks. The migmatite breccia also contains smaller amounts of quartz and plagioclase.

Interpretations and Conclusions

Our research in the Quetico and Wawa belts indicates that the two subprovinces have differient lithologic characteristics but similar structural histories. The Wawa belt is much richer in mafic rocks. The structural characteristics of the mafic dikes near the junction indicate that they were emplaced both before and after the deformation. The difference in the lithology between the two belts lends credence to the idea that the subprovinces belonged to separate subcontinents. The similarity in the structures indicate that the two subcontinents were subjected to the same tectonic event. This tectonic event may have generated the same regional structures after the two subcontinents had joined.

References

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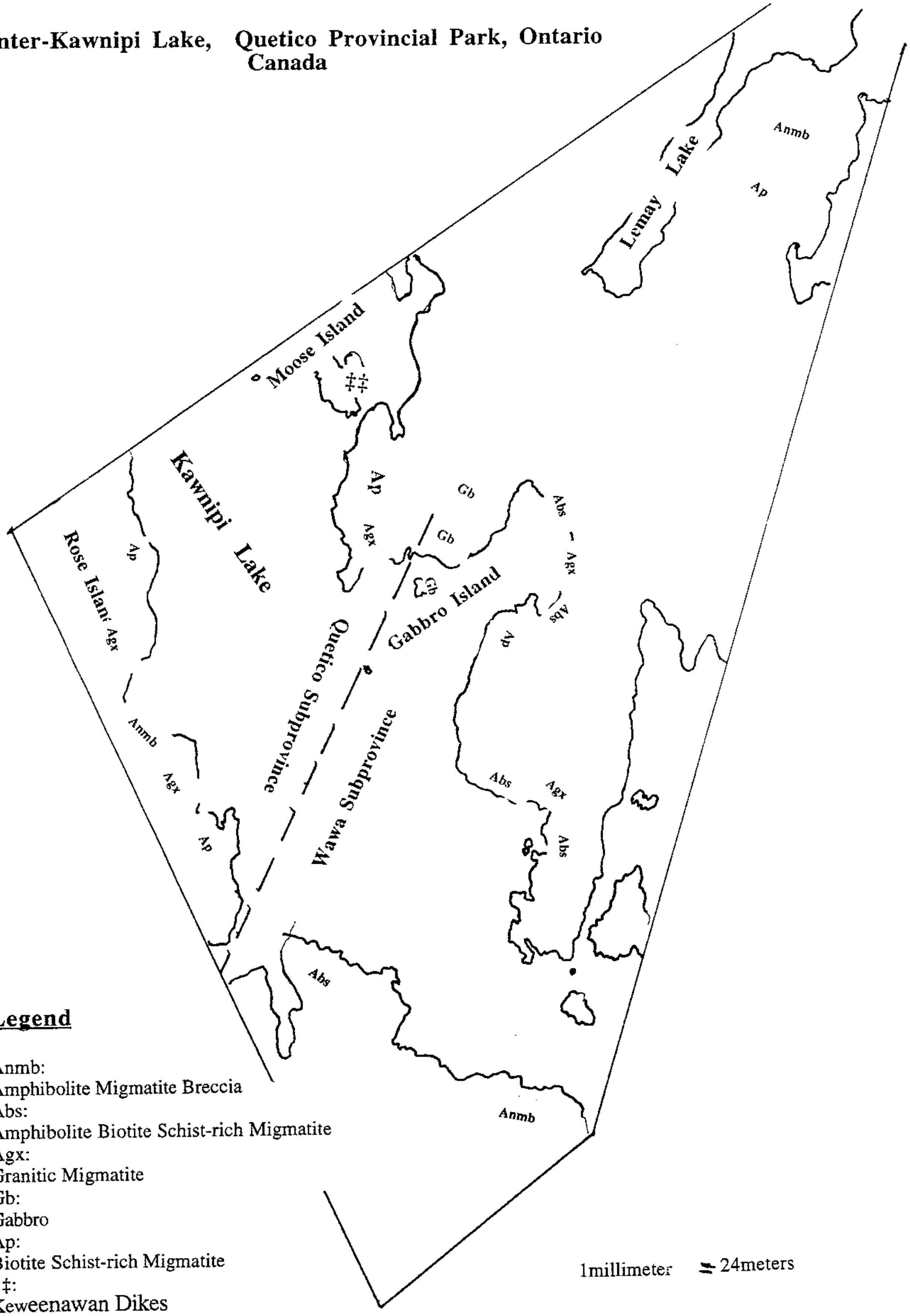

Legend

Anmb:
Amphibolite Migmatite Breccia
Abs:
Amphibolite Biotite Schist-rich Migmatite
Agx:
Granitic Migmatite
Gb:
Gabbro
Ap:
Biotite Schist-rich Migmatite
‡‡:
Keweenawan Dikes

1millimeter ≒ 24meters