

PRELIMINARY STRUCTURAL MODEL FOR THE SOUTHWESTERN PART OF  
THE MICHIPICOTEN GREENSTONE BELT, ONTARIO; George E. McGill and  
Catherine H. Shradly, Dept. of Geology and Geography, University of  
Massachusetts, Amherst, MA 01003

The southwestern part of the Michipicoten Greenstone Belt includes a 100 km<sup>2</sup> fume kill extending northeastwards from the town of Wawa, Ontario. Except for a strip along the Magpie River that is covered by Pleistocene gravels, outcrop in the fume kill averages about 30-50%. Within this area are all the major lithologic belts characteristic of the southwestern fourth of the Michipicoten Greenstone Belt. All of the area mapped to date lies within Chabanel Township, recently mapped at 4" = 1 mile by Sage et al. (1). Following a brief reconnaissance in 1983, mapping at a scale of 1" = 400' was begun within and adjacent to the fume kill in 1984. We have concentrated on two objectives: 1) determination of the geometry and sequence of folding, faulting, cleavage development, and intrusion; and 2) defining and tracing lithologic "packages", and evaluating the nature of the contacts between these packages. Results for objective 1) are discussed in a companion abstract (2); this abstract will present tentative results for objective 2).

The entire Michipicoten Greenstone Belt has experienced relatively late movement on steep faults, most of which trend approximately NNW or NE (1,2,3). Some of this movement preceded the emplacement of diabase dikes, some followed. These displacements may be easily removed in order to reassemble older structures, which are of much greater tectonic interest.

For mapping and descriptive purposes, it long has been customary to divide the stratified rocks of the Michipicoten Greenstone Belt into 4 major lithologic groups (1,3): mafic-intermediate volcanics, intermediate-felsic volcanics, clastic sediments, and chemical sediments (including iron formation). This is certainly valid, because outcrop belts of these groups maintain integrity for long distances. However, there are along-strike intergradations among them, and there is no easy way to correlate between physically separated belts of similar lithology. This last problem means that there is no really dependable belt-wide stratigraphy, and relative ages of the various belts of similar lithology are known only in the few places where modern radiometric ages have been measured (4,5).

Our detailed mapping (Fig. 1) indicates that the situation is more complex than one would infer from published maps and descriptions (1,3,6). There are several lithologic packages within the single belt of clastic sediments in Chabanel Township, all of which appear to be bounded by fault contacts. In some cases, stratigraphic way up reverses across these faults, in other cases it does not. At map scale, the package boundaries follow bedding or volcanic layering on one or both sides, but locally this is not so, and at outcrop scale it commonly

ORIGINAL PAGE IS  
 OF POOR QUALITY

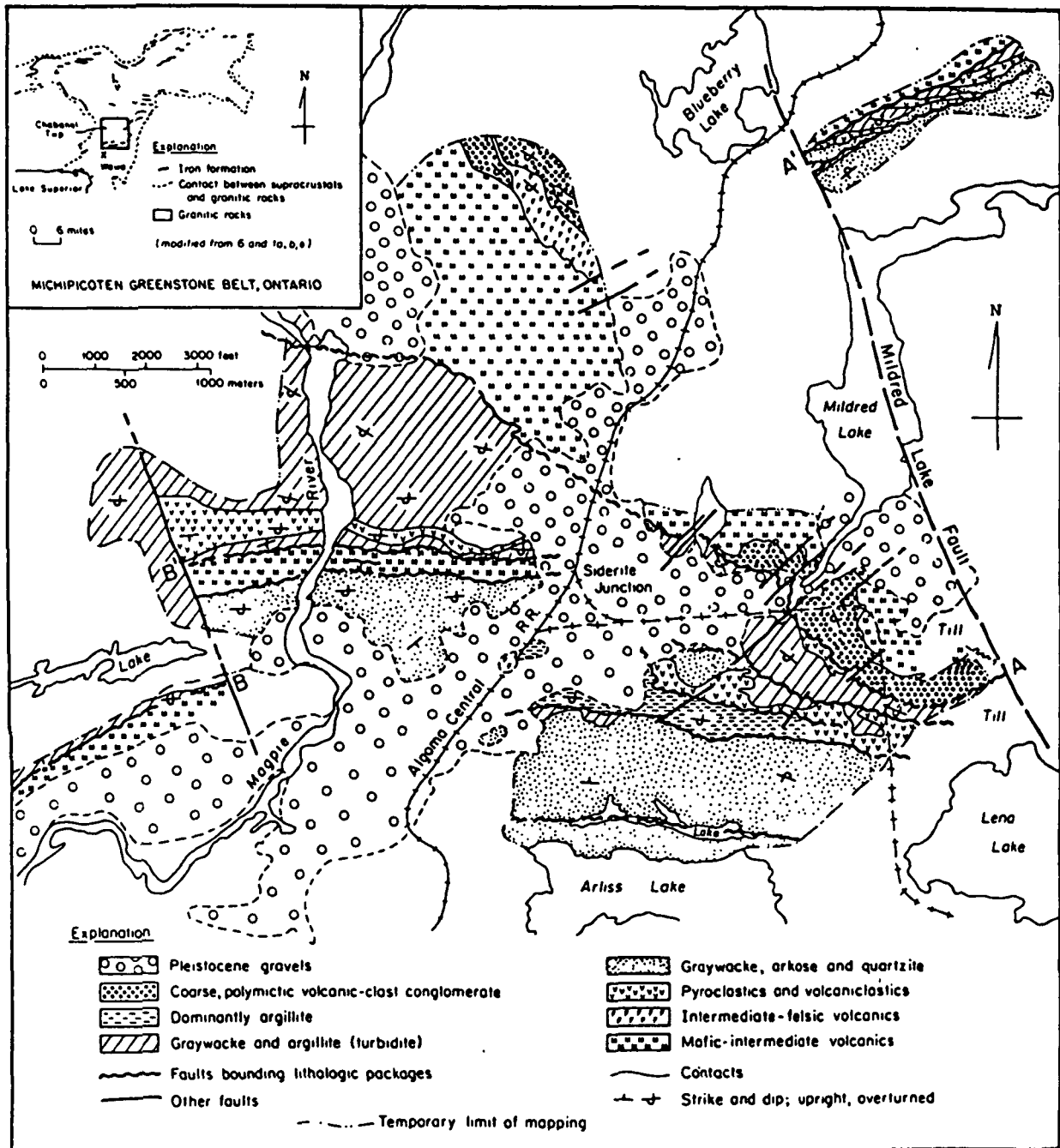


Fig. 1. Geologic sketch map of the central part of Chabanel Township, Ontario. All intrusive igneous rocks omitted for simplicity. B-B' and A-A' indicate corresponding points across late faults.

is not so. In places, these faulted boundaries are characterized by locally developed cleavages, excessive flattening or elongation of pebbles, or minor folds.

The area we have mapped seems to be a zone of faults and folds separating a large region to the south underlain by overturned rocks with tops north from an even larger region to the north underlain by overturned rocks with tops south (1,6). This relationship would seem to indicate an antiformal fold in the inverted limb of a very large nappe, but we have not been able to define such a structure, and rocks that should correlate across the structure are not the same age (R. Sage, pers. com.). Major faulting thus is necessary, but earlier or synchronous folding at township or larger scale would seem necessary to account for the opposed overturning. Almost all of the rocks north and south of our area are volcanic, so it may never be possible to determine if these terranes consist of continuous sections or if they, too, are divided into fault-bounded packages.

Because we have yet to sort out the sequence of minor and major structures with sufficient confidence, and because completed detailed mapping covers such a small fraction of the total belt, we prefer to be rather conservative about interpreting our data. Key observations include a "stratigraphy" that consists mostly of fault-bounded "packages", the apparent early age of these faults, and the large areal extent of the inverted sequences facing each other. The most attractive and probably the simplest explanation for these relationships involves early imbricate thrusting--before the imposition of the almost universal steep dips. However, this interpretation remains to be proved.

#### References

- (1) Sage, R.P., et al., (1982) Ontario Geol. Surv. Prelim. Maps of Precambrian Geology: a. Chabanel Twp., Map P. 2439; b. Esquega Twp., Map P. 2440; c. McMurray Twp., Map P. 2441; d. Lastheels Twp., Map P. 2442; e. Musquash Twp., Map. 2568.
- (2) Shradly, C.H. and McGill, G.E. (1986) This volume.
- (3) Sage, R.P., et al., (1984) Prelim. Map of Precambrian Geology of Corbiere Twp., Ontario Geol. Surv. Map P. 2607.
- (4) Turek, A., et al., (1982) Can. Jour. Earth Sci., 19, 1608-1626.
- (5) Turek, A., et al., Can. Jour. Earth Sci., 21, 457-464.
- (6) Goodwin, A.M. (1962) Geol. Soc. America Bull., 73, 561-586.