

TRIP B2

THE POTSDAM-GRENVILLE CONTACT REVISITED (II)

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INTRODUCTION

This field trip continues the review, initiated in Trip A2 (Bursnall and Elberty, this volume), of outliers and enclaves of younger arenaceous rocks in contact with Grenvillian gneissic basement. The trip will concentrate on relationships between this basement and cover rocks, or enclaves, in the Dekalb and Richville areas whose affinity with the Upper Cambrian (?) Potsdam Sandstone is equivocal .

Repeats of Stop 7 and 8 of Trip A2 (described below) provide a basis for the trip, which includes an investigation of a newly exposed section in Dekalb (Stop 3). This exhibits somewhat similar relationships to those seen at the Rock Island roadcut (A2, Stop 6) which have been proposed as originating from burial of a karst topography - specifically the infill of solution pockets in marble on the Precambrian erosion surface (Carl and Van Diver, 1971). Outcrops of quartzarenite, "metaquartzite", and conglomerate to the south of Dekalb which were seen by Bloomer (1965, 1967) as being inseparable from the surrounding Grenville will also be visited. These, or very similar lithologies are contained as clasts in some of the sandstones (*e.g.*, Stop 8, A2 and Stop 3, this trip).

"The Potsdam-Grenville contact in the St. Lawrence valley represents a hiatus of some 500 Ma. Mineral assemblages within the Grenville gneisses indicate that perhaps 25 km of material was eroded prior to the deposition of the transgressive Cambro-Ordovician sequence, over an undulating Precambrian erosion surface. Many of the isolated, predominantly sandstone, bodies within the Grenville gneiss terrane of the Adirondack Lowlands can be confidently interpreted as outliers of Potsdam Sandstone. Such enclaves vary in

composition from matrix supported breccias to equigranular orthoquartzites and their depositional environment has been variously interpreted as: pre-Potsdam solution pocket infills (related to a karst topography on a Grenville marble surface); fault related debris slides; fault breccias; and fault scarp talus accumulations. Some are seemingly crudely interlayered with the gneisses and are locally foliated" (Bursnall and Elberty, this volume).

The age of these enigmatic rocks have variously been proposed as:

- 1) outliers of Potsdam Sandstone
- 2) pre-Potsdam, post-Grenville remnants
- 3) Grenville in age, in that they suffered at least the later stages of Grenvillian deformation

ROAD LOG

Cumulative mileage	Miles from last point	Route description
Start		Junction of Route 11 and Park Street in the center of Canton. Head west, cross the Grasse River, and turn left (south) at the traffic lights.
0.3	0.3	
8.2	8.2	Proceed through Dekalb Junction.
11.7	11.7	Cross over a railroad bridge and park well onto the shoulder at low but extensive outcrop of marble on north side of road opposite a contact with iron-stained sandstone. This is Stop 1.

STOP 1: East Dekalb (Stop 8, Figure 1)

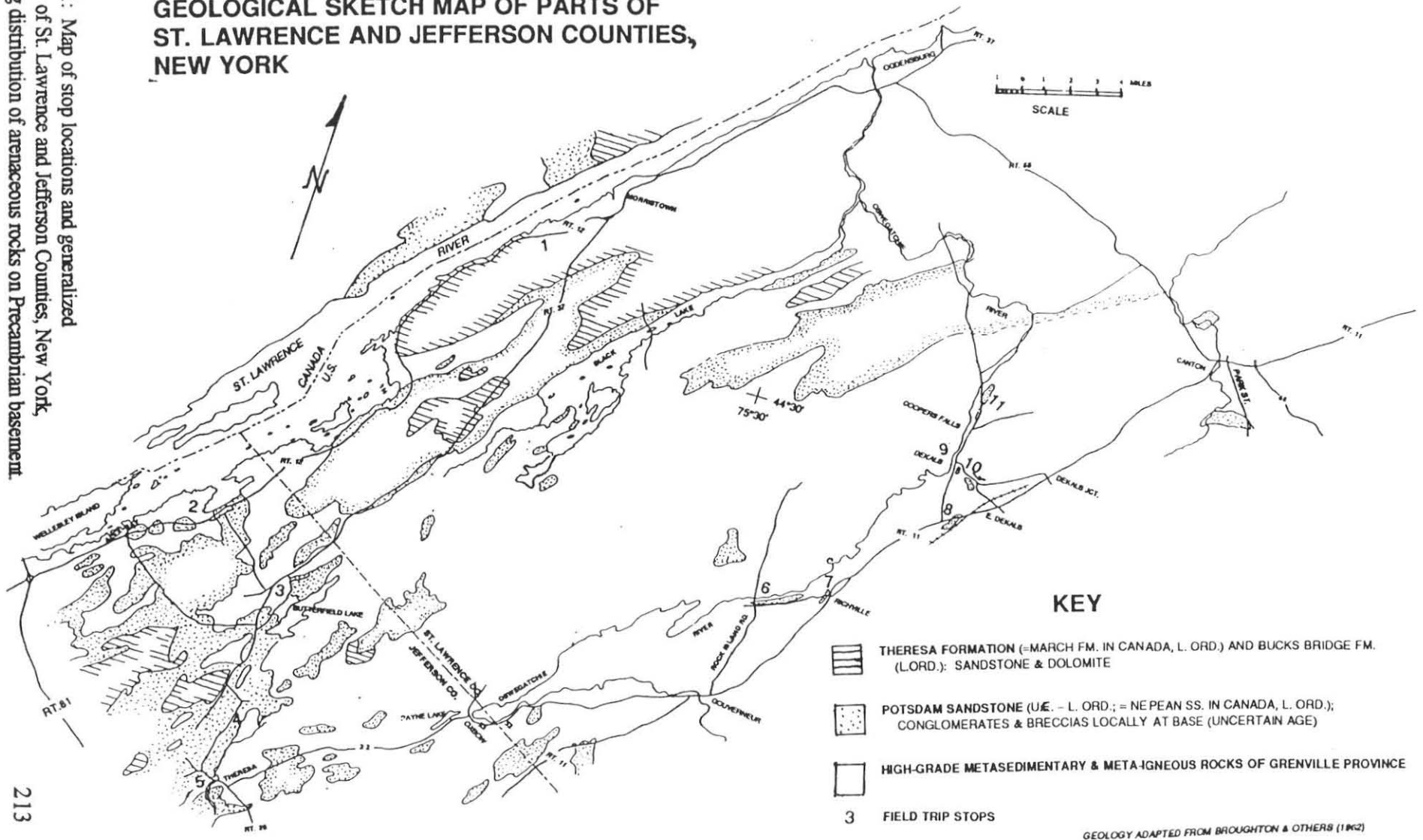
For convenience, the following description is taken from Trip A2 of this volume.

"Roadcuts due south of Dekalb further illustrate the complexities within these post-Grenville rocks. A long series of low exposures on the northwest side of the road contain well-layered marble (reclined folds at the north end) to the north which in the central section give way to a complex steep contact with rusty weathered arenaceous rocks. A number of small sandstone breccia wedges penetrate downwards into the marble in the vicinity, again supporting the solution-pocket infill model for the larger scale relationships seen elsewhere (*e.g.* Rock Island Road). Evidence for sulfide mineralization is present at some contacts, in common with the Rock Island Road locality (Elberty and Romey, 1990).

Bedding in the sandstone is irregular and breccia/conglomerates are common, particularly lower in the section a hundred yards to the south and at the base of the southernmost outcrop

GEOLOGICAL SKETCH MAP OF PARTS OF ST. LAWRENCE AND JEFFERSON COUNTIES, NEW YORK

Figure 1: Map of stop locations and generalized geology of St. Lawrence and Jefferson Counties, New York, showing distribution of arenaceous rocks on Precambrian basement.



GEOLOGY ADAPTED FROM BROUGHTON & OTHERS (1962)

on the northwest side of the road. A poorly defined cylindrical structure exists in the latter section and may be seen on the top of a low outcrop of compact, rusty weathered, quartz-arenite (compare with Stop 3).

Similar conglomerate and breccia occur in a large outcrop on the southeast side of Route 11. Quartz, quartzarenite, and metaquartzite are common clast compositions and are similar to those at Stop B3 (Stop 9 in Fig. 1). In both the western and southeastern outcrops shaly zones could have been generated by shear and at the northern end of the latter bedding dips are steep ($> 60^\circ$; Karboski, 1977), yet again supporting the notion of "significant post-depositional deformation" (Bursnall and Elberty, this volume).

Continue south on Route 11.

12.4	0.7	Junction with Route 812. Continue south on Route 11.
17.3	4.9	Road rises and curves to the left. Large outcrop on northwest side of road. Park well onto shoulder. Stop 2.

PLEASE WATCH OUT FOR FAST MOVING TRAFFIC

STOP 2. The Richville breccias (Stop 7, Figure 1)

Please note that description for this stop is taken from Trip A2, this volume

"Karboski et al. (1983) described this outcrop this as containing a "flow breccia" at its base, followed by a densely consolidated breccia with an overlying highly deformed metaquartzite, overlain by an "orthoquartzite", which contains pebble-sized quartz clasts - possibly derived from the underlying metaquartzite. The breccias contain quartz clasts set in a hematite stained, medium grained arenite. Large (0.5 m) phacoidal blocks of the breccia are enveloped by thin shaly borders, the whole giving the impression of a shear zone.

This outcrop certainly inhibits any notion that the unconformity between Precambrian basement and overlying cover is a simple one!

Points to concentrate on are:

- 1) Possible shear fabrics in the lower part of the outcrop, in part defining the borders of coherent blocks of breccia
- 2) Compositional variation of clasts in the breccias
- 3) The relationship between and the textural character of the each of the recognized rock types

If the upper part of this outcrop is indeed comprised of rocks which are part of the Grenville basement as supposed by Karboski (1976) and Karboski et al. (1983) then the current disposition of lithologies seems not to be satisfied by a model that involves karst infill

alone (Van Diver, 1976) as seems possible at Rock Island Road. It is possible, however, that the wall collapse of a large solution depression may have allowed a slab of basement to slide into the argillite filled basin. The presence of shear fabrics within the breccia may be accommodated by this model provided that these rocks were only partially lithified at the time.

Cross over to the vehicle and investigate the southern end of the outcrop on the southeast side of the road. Here, a narrow zone of sandstone breccia dips steeply through marble. One of the contacts is sheared indicating high angle faulting. Is there evidence for displacement sense?

[Note: if time permits an outcrop of marble on the northwest side of Route 11, a few hundred yards to the south should be visited. It contains narrow subvertical veinlets of arenite at the northeast end, which provide good evidence for solution cavity infill]" (Bursnall and Elberty, this volume.

Return to vehicle and continue up the hill to Welch Road.

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|------|-----|--|
| 17.4 | 0.1 | Turn around at Welch Road and head back towards Dekalb Junction |
| 25.2 | 7.8 | Turn left and follow Route 812 northwards |
| 27.2 | 2.1 | Stop 3. Large outcrop on the west side of the road at the entrance to Dekalb (gentle left-hand bend) |
- Note: the best parking is approximately 100 yards to the south along a disused section of Route 812, opposite an Amish farm.

STOP 3. (Stop 9 in Figure 1)

This outcrop possesses a newly exposed surface resulting from road-widening and contains a number of irregular sandstone bodies within well-layered Grenvillian marble.

A number of sub-vertical arenaceous zones, varying in width from less than one to greater than ten feet in width occur throughout the outcrop. In the largest of these fragmentation and "stopping" of the marble wall rock is evident but relatively few areas exhibit "permissive-veining" relationships - where separated marble fragments could be pieced together in their pre-fragmentation configuration. In places, it is possible that injection of sand could have occurred from below. In addition to marble, abundant angular quartzarenite fragments similar to the foliated quartzite of Stop 4 are present.

Continue north on Route 812, towards the center of Dekalb. (Refreshments may be purchased at the village store)

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| 27.55 | 0.25 | Turn right (south) just after the store onto County Route 17 and head south towards Route 11 and Dekalb Junction. |
| 28.55 | 1.0 | Where this road curves sharply to the left, continue and park on the right. Stop 4 is in the woods on the right (west). |

STOP 4. Deformed quartzarenites of possible Grenville age (Stop 10 on Figure 1).

Outcrops of conglomerate and foliated quartzarenite occur 75 yards into the woods (stay close to an old fence on the left until these outcrops are visible). These rocks were thought by Bloomer (1965, 1967) to belong to an infolded sequence within the Precambrian gneisses and to have been affected by probably the latest stages of Grenvillian deformation. Foliated and folded metaquartzite (best seen on the top of the ridge) is petrographically very similar to clasts at the previous stop and at Stop 1.

Fold style here, however, and the nature of the conglomerate (at the base of this outcrop), suggests that these rocks may not have experienced the full Grenvillian deformation sequence but could represent a post-Grenville, pre-Potsdam, depositional period.

Turn around and head north on Route 17 to Dekalb.

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|-------|-----|--|
| 29.55 | 1.0 | Turn right (north) onto Route 812 and continue along a section containing a number of outcrops containing quartzarenite of questionable age. A number of stops should be made in this section (see also Trip A3, Stop , this volume) |
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STOP 5, et seq. (Stop 11 on Figure 1)

The section referred to above extends from the northern part of Dekalb village to the Oswegatchie bridge near Kendrew Corners (at 3.25 miles from the junction of Routes 812 and 17). It includes a quarry on the east side of the road (at 0.8 mi.) and conglomerates exposed on the Oswegatchie River at Coopers Falls (at 1.3 mi.). To reach the falls ask permission at the house opposite the intersection of the Old Canton Road and follow the track that passes the house to the south. For additional description of a part of this section see Trip A3, Stop 2 in this volume.

Return to Canton along the Old Canton Road or through Rensselaer Falls, following County Route 14 (turn right at Kendrew Corners just north of the Oswegatchie bridge) and Route 68 south - about 12 miles.

END OF TRIP

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- Karboski, F.A., Elberty, W.T., Romey, W.D., and Doyle, J.A. 1983. Sandstone and conglomerate enclaves in Grenville rocks, St. Lawrence Co., NY; Evidence for basement remobilization. *Geological Society of America Annual Meeting Abstracts with Program*, **15**, p. 607.
- Van Diver, B.B. 1976. *Rocks and Routes of the North Country, New York*. Humphrey Press, Geneva, New York, 204p.