Trip A-1

PRECAMBRIAN BASEMENT AND CAMBRIAN-ORDOVICIAN STRATA, AS DISPLAYED IN THREE PROVINCIAL PARKS OF CANADA

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INTRODUCTION

General overviews of the region covered by this excursion are provided by Wilson (1946) and by Williams (1991). A regional sedimentological study of the Nepean formation was carried out by Wolf and Dalrymple (1984). The relationship of Paleozoic strata of eastern Ontario to the Frontenac Axis remains a problem not yet resolved: Was the arch a positive structure during sedimentation, or did it become so as a result of elevation through faulting/subsequent crustal upwarp/compactional draping or some combination of these processes? This question will be considered during the trip, which was designed to provide an overview of Paleozoic strata and the underlying Grenvillian basement along a traverse from the Ottawa River to the St. Lawrence River.

One highlight will be a visit to a shallow underground mica-apatite mine at Murphys Point Provincial Park to view workings abandoned in 1920. Another will be a visit in Charleston Lake Provincial Park to view a giant cylindrical structure in Nepean quartz arenite, which appears to represent the outline of an exhumed dewatering structure. The Paleozoic-over-Grenville unconformity will be viewed at two localities, both showing evidence of paleoweathering of the Precambrian basement. Stops will be made to view a variety of abundant trace fossils, including *Skolithus* and *Diplocraterion*, as well as several Cambrian and Ordovician stromatolite localities (complementary to those seen during Trip F-1). Local sedimentary units have been used extensively as building stone, as will be seen in several historic examples. Teachers and other educators are particularly encouraged to attend this trip, as an introduction to the geoheritage potential of Ontario's Provincial Parks.

This trip has been modified from a series of three guided geoheritage hikes in Ontario Provincial Parks (July 10th, 17th, 24th, 2004), organized by Friends of Canadian Geoheritage, a group founded in 2003 to encourage greater public appreciation and understanding of Canada's geological diversity. The first of these hikes attracted 35 participants, the second drew 40 and the final one drew 80 participants, ranging in age from 3 to 90. The educational aspects of geology and geography provided by visits to these three parks, which offer different slants on the varied geoheritage of this part of North America, should be of particular interest to teachers. The geological heritage of eastern Ontario spans over 1 billion years of Earth history. Ontario's provincial parks provide significant examples of this heritage, ranging from bedrock that shows evidence of billion year-old mountains and ancient sea-floor deposits, to more recent signs of glaciation, succeeded by development of post-glacial lakes and river systems that were initially much larger.

ROAD LOG AND STOP DESCRIPTIONS

Meet at 9:30 am at entrance kiosk, Fitzroy Provincial Park, Ontario. The trip will finish southeast of Charleston Lake Provincial Park, about 20 km north of the Thousand Islands-Ivy Lea International Bridge, and about 50 km west of the Prescott-Ogdensburg International Bridge.

NOTE 1. Allow at least 1.5 hours to drive from the junction of Hwy. 401 and Hwy. 416 to our rendezvous point (Entrance kiosk, Fitzroy Provincial Park). Also be sure to have proper photographic identification for border crossings. Passports, if you have one, are recommended. Delays at the Thousand Islands crossing are common, whereas traffic at the Prescott-Ogdensburg crossing is usually light and border crossing faster.

NOTE 2. Field Trip A-1 will end around 4 pm, near the village of Mallorytown (about 50 km west of the Prescott-Ogdensburg International Bridge). This will allow ample time to return to Potsdam for the NYSGA Banquet and Business Meeting (Adirondack Room, Lehman Hall, SUNY Potsdam, 6:00-8:00 pm).

NOTE 3. Although we hope to negotiate a single fee, daily park fees may apply for each park ($9.50 Cdn. per vehicle for day-use; 20% discount for Ontario Seniors) and thus carpooling is financially, as well as, environmentally a sound decision and highly encouraged to limit the number of vehicles. For additional information, including the camping facilities available at all three parks, you can make direct contact (Fitzroy 613-623-5159, Murphys Point 613-267-5060, Charleston Lake 613-659-2065) or you can visit the Ontario Parks website: www.ontarioparks.com.

NOTE 4. This trip will involve some complex driving including entering a few narrow and/or gravel roads, and frequent turns to reverse direction and obey traffic laws. Thus it is very important to reset your odometer at each locality prior to leaving for the next. In addition, one locality is on private land and we wish to keep the exact location confidential in concert with the wishes of the owner.

To reach Fitzroy Provincial Park from the USA-Canada border: Follow Hwy 401 to Highway 416; take Hwy 416 north to Hwy 417 (also known as 'the Queensway'). Drive westward to Galetta Sideroad (Hwy. 22). Turn right and head north at this intersection. Continue straight, over the railroad tracks. Do **not** take the turnoff to Fitzroy Harbour. Turn to the left on Canon Smith Drive, just past intersection with Carp Road (County Road 5). The entrance to Fitzroy Park is on left side of Canon Smith Drive, less than 3 km from the Galetta Sideroad. Turn left at the green and yellow sign for the park. Our meeting spot is about 500m along the park road, in the parking area to the right of the park entrance kiosk. Stop locations are shown on Figure 1.

STOP 1 - TERRACES TRAIL, FITZROY PROVINCIAL PARK, OXFORD AND ROCKCLIFFE FORMATION (ORDOVICIAN)

N45°29.158' W076°13.251' Park entrance kiosk

From the Terraces Trailhead, a one-hour hike provides a snapshot view of the principal Paleozoic strata comprising the bedrock beneath this park (Figures 2 and 3). A succession of carbonates, sandstone, and shale record a succession of changing environments marginal to and within a sea that episodically covered the area from about 500 million years ago. Low-angle crossbeds in sandstones of the Rockliffe Formation indicate unimodal southward transport, consistent with fluvial accumulation in a system feeding into a basin to the south. Low dispersion about the mean suggests deposition as sandbars in a braided river system. Overlying green shale in the upper part of the Rockliffe Formation gives way upwards to dull red shale. Both varieties contain abundant bedding-parallel vermiform trace fossils, as well as rare desiccation cracks, suggesting transition to relatively quiet-water deposition on tidal flats or in a delta.

The present landscape is largely the product of modification by ice and meltwaters related to the Wisconsinan ice sheet that retreated from the Ottawa Valley less than 12,000 years ago. As the ice sheet melted, it left deposits of glacial drift containing boulders of Precambrian rock derived from the

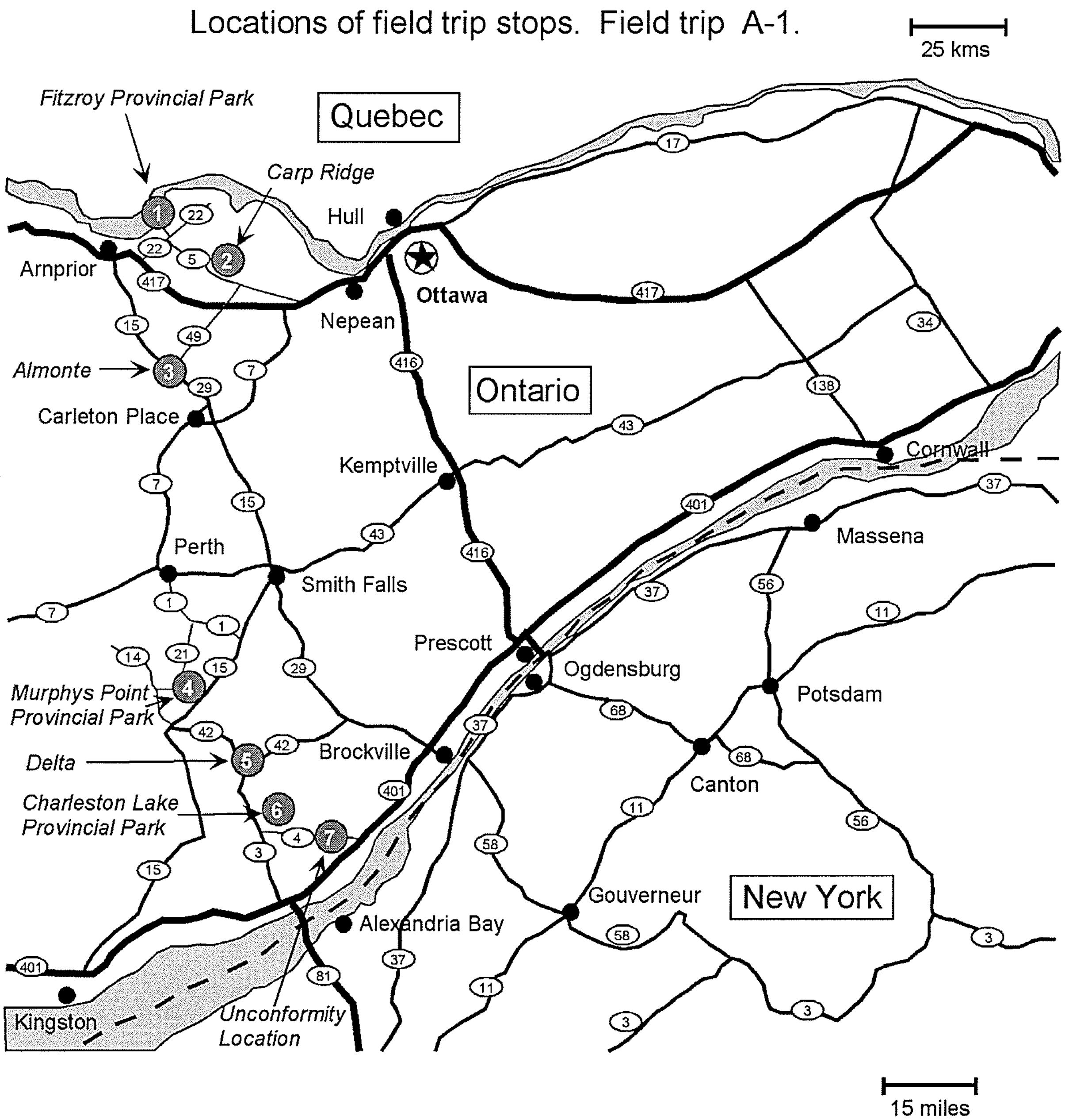

Figure 1. Field trip stop locations. See road log for detailed locations.

Canadian Shield (mainly from the adjacent Grenville Province, but a few from the more remote Superior Province). In addition, many large angular slabs were ripped up from nearby stromatolitic limestone and dolostone. As the once much larger post-glacial ancestor of the Ottawa River cut its way through the Ottawa Valley, it carved increasingly narrower channels in the Paleozoic rock, exposing a succession of bedrock cliffs along Terraces Trail.

On completion of the Trail loop, we will visit the shore of the Ottawa River, just north of the most northerly bathing beach, where a few small outcrops of Oxford dolostone that underlie the Rockliffe Formation display domal stromatolites. These stromatolites, near the top of the Oxford, are laterally linked (Figure 4), generally with smooth, gently domed calcilutitic laminae (some of the smaller stromatolites show incipient branching). The best bedrock exposures occur in shoals and along the shores of several nearby offshore islands in the Ottawa River, where individual stromatolite domes commonly exceed one metre in diameter, have a synoptic relief of up to 40 cm, and display a distinct north-south elongation trend. Discontinuous patches of silicification commonly accentuate the laminae. Locally derived stromatolitic blocks have been placed throughout the park along interior roads, and on both sides of the road at the park entrance. These large blocks provide opportunities to observe three-dimensional morphologies of the stromatolites.

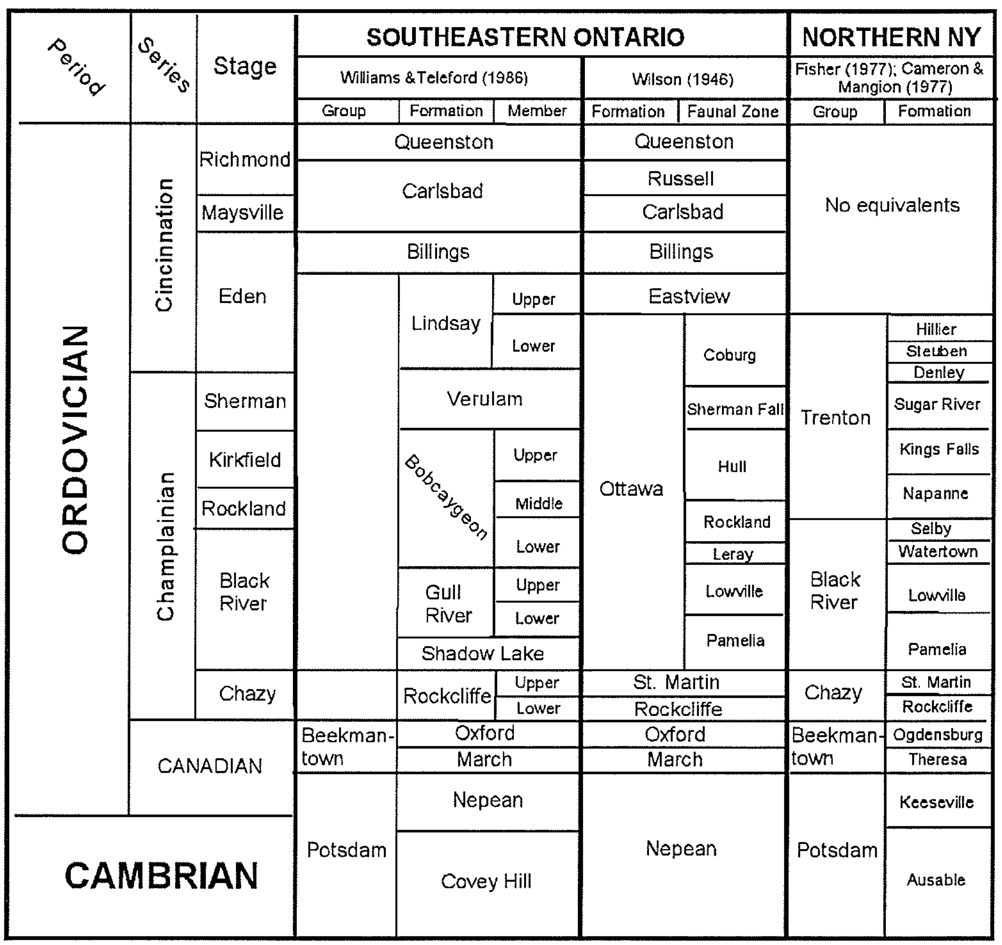

Figure 2. Stratigraphic correlation of Cambro-Ordovician units in the Ottawa area (Southeastern Ontario) with adjacent parts of northern New York (after Willams et al. 1992.)

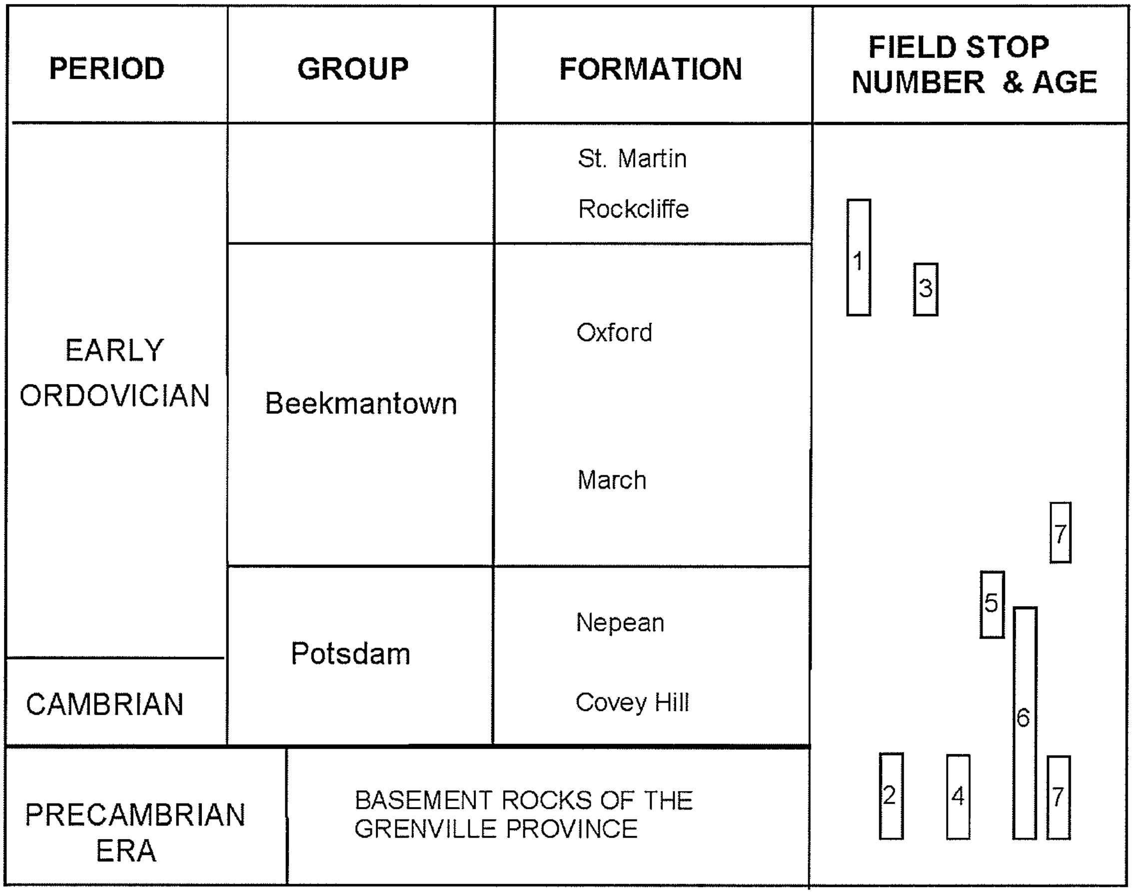

Figure 3. Relative stratigraphic position of units exposed at each of the field trip localities.

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		RESET ODOMETER AT THE INTERSECTION OF CANON SMITH DRIVE AND THE PARK ENTRANCE BEFORE LEAVING **STOP 1.**
0.0 (0.0)		Intersection of Fitzroy Park Entrance Road and Canon Smith Drive.
0.5 (0.3)	0.5 (0.3)	Turn right on Hwy. 5 and continue through the small village of Fitzroy Harbour.
1.8 (1.1)	1.3 (0.8)	At 1.8 km the road bends left and becomes Harbour Road.
3.7 (2.3)	1.9 (1.2)	At the intersection of Hwy. 5 (Harbour Road) and Hwy. 22 (Galetta Sideroad) turn right on Galetta Sideroad.
3.9 (2.4)	0.2 (0.1)	Travel about 200 meters and turn left onto Carp Road, the extension of Hwy 5.
		From here we will travel several kilometers down Carp Road and turn at a driveway to visit the land around a residence. A location is not provided for this site, because it is on private land. **STOP 2.**

Figure 4. Laterally linked stromatolites of the Oxford Formation, Fitzroy Harbour Provincial Park. STOP 1.

The contact of the Oxford with the overlying Rockliffe is exposed in outcrops along the shores of the Carp River, adjacent to the bridge within the park. These exposures are best seen in the late fall, when the river level is at its lowest.

Departing Fitzroy Provincial Park, turn right on Canon Smith Drive. As we leave the park, look to the north to see the Gatineau region of Quebec, where Precambrian Grenville gneisses have been uplifted along a series of faults that form the Ottawa-Bonnechere Graben. This ancient tectonic feature controls the course of the Ottawa River for more than 600 kilometers to the northwest.

STOP 2 - GRENVILLE GNEISS, GRANITE, APLITE PEGMATITE AND XENOLITHS, CARP RIDGE

PRIVATE RESIDENCE

This locality is on the south margin of the Carp Ridge, a northwesterly trending window of Grenville basement bounded on the southern side by a fault, extending west-northwesterly more than 40 km from the Kanata subdivision of Ottawa to Arnprior.

More-than-metre-wide lichen-free coronas around each outcrop provide a great opportunity to study mineralogy, textures, structures and multiple episodes of deformation and intrusion (Figures 5 and 6). Although lacking formal training in geology, the owner has an enduring appreciation of the Precambrian basement, having hired a backhoe to remove considerable overburden from around a number of lichen-covered outcrops. The unearthing project was finished by hand, to avoid scratching the newly exposed bedrock. Please keep this location confidential, as the owner has granted permission for our group to view these spectacular outcrops of Grenville gneisses and intrusive rocks -- a highlight of this trip -- for the official trip only.

The complex geology of the Grenville Province has been debated since a sequence of quartzite, marble, and related paragneisses exposed along the Ottawa River in Grenville, Quebec was named the 'Grenville Series' by Sir William Logan (Logan, 1863). Recent work, fueled by detailed mapping, and advances in structural geology and U-Pb geochronology, has provided the impetus for hefty compilation volumes (Moore et al., 1987; Tollo et al., 2004). This area occurs within what is known as the Central Metasedimentary Belt, a vast area underlain predominantly of originally stratified volcanic and sedimentary rocks now intensely deformed and highly metamorphosed. Numerous lines of evidence suggest that the area has been effected by several collisional events, the most recent named the Ottawan Phase of the Grenville Orogeny. The Ottawan 'Orogeny' occurred approximately one billion years ago and has been compared to more recent events leading to the rise of the Himalayan Mountains. Here however, we have a chance to peer into the very core of the orogenic belt because of the removal of many kilometers of overlying rock. Rocks with a similar tectonic history can be traced for vast distances to the northeast to Greenland, The British Isles, and Scandinavia and south into the Adirondack and Appalachian Mountains, suggesting the 'Grenville' Orogeny' formed an immense mountain chain likely encompassing parts of several continents.

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		Leave **STOP 2** and turn left onto Hwy. 5 (Carp Road) and head east. RESET ODOMETER AT THE INTERSECTION OF CARP AND MARCH ROAD
0.0 (0.0)		Intersection of Carp and March Roads. Turn right and head south for Almonte.
11.7 (7.3)	11.7 (7.3)	Cavanaugh Quarry on left is a source of road metal and aggregate from a vast hillside outcrop of Ottawa Group limestones. Glacially scoured and flat-lying carbonate strata in this area form extensive near-surface pavements -- alvars -- with unique ecological features.
18.5 (11.5)	6.8 (4.2)	The road traverses a bridge crossing the Mississippi River in the village of Almonte.
18.6 (11.6)	0.1 (0.1)	Park in Metcalfe Park, just beyond the bridge, where the road veers to the right.
NOTE	LUNCH HERE	Walk back to the parking lot of the Victoria Woolen Mill on Mill Street. As one of several projects undertaken by Friends of Canadian Geoheritage, some of the large blocks bordering the parking area of Metcalfe Park have been selected from nearby building sites and quarries to illustrate a variety of sedimentary structures. The Town Council and several owners of construction companies and quarries played a key role in making arrangements to move and place these large blocks. **STOP 3.**

STOP 3 - OXFORD FORMATION STROMATOLITES (ORDOVICIAN), ALMONTE

N45°13.530' W076°11.875' Victoria Woolen Mill

This stop will allow an opportunity to see some of the various stones used to construct the many historic buildings in this village of approximately 4500 inhabitants. Depending on the water level we will observe several units of laterally linked stromatolites in Ordovician carbonate strata (Oxford Formation), right beneath the centre-town dam on the Mississippi River, in downtown Almonte. These stromatolite beds are best viewed from the observation deck behind the Victoria Woolen Mill on Mill St., immediately east of Slide Bridge (Main Street/Hwy 49).

Lunch may be obtained in any of several restaurants along Mill St. Information pamphlets are available from the Visitor Centre, immediately east of the Victoria Woolen Mill (note the stromatolite-bearing block near the entrance).

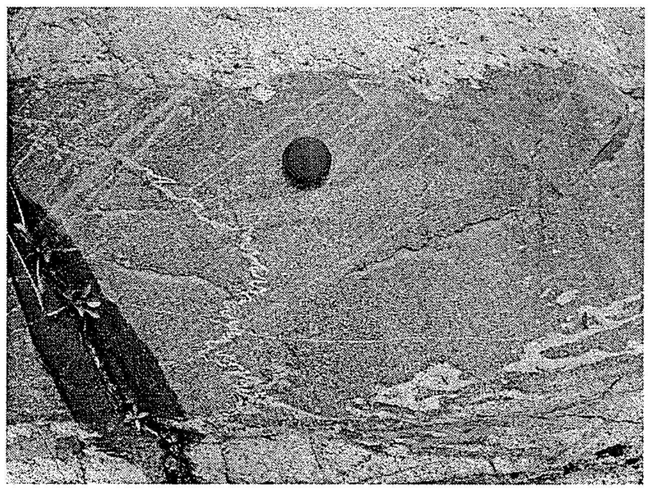

Figure 5. Complex relations between pegmatites, ptygmatically folded aplitic dykes, and amphibolite gneiss, Grenville Province, Carp Ridge location. STOP2.

Figure 6. View of phenocryst-rich mafic gneiss at Carp Road location. Note zoning in large plagiolcase phenocryst near lens cap. STOP 2.

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		RESET ODOMETER BEFORE LEAVING **STOP 3**.
0.0 (0.0)		From the Metcalfe Park parking lot, continue on Hwy. 49 (Mill Street) to Hwy. 29 (Christian Street).
0.7 (0.4)	0.7 (0.4)	At the intersection of Hwy. 49 (Mill Street) and Hwy. 29 (Christian Street) turn left. Follow Hwy 29 south into Carleton Place. Bear right and continue on Townline Road (Hwy 7B) until it intersects Hwy. 7.
14.0 (8.7)	13.3 (8.1)	Intersection of Townline Road and Hwy. 7. Turn right and follow Hwy. 7 south towards Perth.
43.8 (27.2)	29.8 (18.5)	At the intersection of Hwy. 7 and Wilson Road (Hwy.1) take a left (second traffic light). Follow Hwy. 1 as it winds through town (left at Code's Mill and then right onto Gore Street).
52.7 (32.7)	8.9 (5.5)	At the intersection of Hwy. 1 and Hwy. 21 (Elm Grove Road), take Hwy. 21 south.
63.3 (39.2)	10.6 (6.5)	Turn left into the entrance of Murphys Point Provincial Park and follow the park road to the entrance gate.
64.8 (40.2)	1.5 (1.0)	Park entrance gate). Group will proceed to the parking area of the Silver Queen Mine trail (Lally Homestead) after checking in (another 5 km farther along Hwy. 21, where it becomes a gravel road. **STOP 4**.

STOP 4 - MURPHYS POINT PROVINCIAL PARK, SILVER QUEEN APATITE-MICA-FELDSPAR MINE, LALLY HOMESTEAD

N44°46.840' W076°13.844' Park Entrance; N44°46.044' W076°15.317' Silver Queen Mine Parking Lot

Murphys Point Provincial Park lies within the Grenville Province, on the eastern side of the Frontenac axis. A wide variety of both igneous and metamorphic rocks are exposed within the park. Some of the metamorphic rocks show evidence of multiple stages of folding, best seen in exposures of the several belts of crystalline limestone that traverse the park. We will park at the Lally Homestead, where an outcrop of marble displays folding, foliation, possible relic bedding and a variety of positive-weathering inclusions (Figure 7).

Closed in 1920, the Silver Queen Mine was an important source of phosphorous for munitions during World War I. A part of this mine has been restored to allow safe underground entry, where large crystals of mica and apatite stand out on the partially mined rock walls.

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		RESET ODOMETER BEFORE LEAVING **STOP 4**.
0.0 (0.0)		Parking lot of Lally Homestead. Follow Hwy. 21 (here a narrow gravel road) west. Previously Elm Grove Road, it is now called Lally Road.
2.9 (1.8)	2.9 (1.8)	At the intersection of Hwy. 21 and Hwy. 14 turn left and proceed south on Hwy 14 (Narrows Lock Road).
8.4 (5.2)	5.5 (3.4)	Turn left at stop sign and head towards Crosby.
11.3 (7.0)	2.9 (1.8)	One lane Narrows lock on Big Rideau Lake.
17.4 (10.8)	6.1 (3.8)	Intersection of Hwys. 14, and 15/42 at Crosby. Turn left onto Hwy. 42.
17.6 (10.9)	0.2 (0.1)	At stop sign cross HWY. 15 and continue east on HWY. 42.
21.1 (13.1)	3.5 (2.2)	Bear right in Forfar.
31.5 (19.5)	10.4 (6.4)	Once in Delta the Old Stone Mill is on the right. Turn into parking lot just past the mill. **STOP 5.**

Figure 7. Grenville marble with isolated calc-silicate layers and xenoliths weathering in relief, Murphys Point Provincial Park. These xenoliths may once have been coherent layers, disrupted during deformation. STOP 4.

STOP 5 – TRACE FOSSILS IN NEPEAN SANDSTONE, OLD STONE MILL, DELTA

N44°36.587' W076°07.373' Old Stone Mill, Delta

Built in 1810 of Nepean (Potsdam) sandstone, this is the only stone gristmill in Canada designated as a National Historic Site. The quartz arenite blocks used to construct this building are remarkable for their almost universal abundance of the trace fossils, *Skolithus* and *Diplocraterion*. (Figure 8). We are currently unaware of the provenance of this building stone, but are attempting to track down where it was quarried. Some Nepean/Potsdam and March/Theresa beds have such traces in abundance (cf. Bjerstedt and Erikson, 1989).

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		RESET ODOMETER BEFORE LEAVING **STOP 5**.
0.0 (0.0)		Leave Old Stone Mill by turning right and continuing east on HWY. 42.
3.1 (1.9)	3.1 (1.9)	At the intersection of Hwy. 42 and Hwy. 33, turn right on Hwy. 33, and drive through Lyndhurst. You will see signs to Charleston Lake Provincial Park and Lyndhurst Bridge.
9.4 (5.8)	6.3 (3.9)	One lane bridge at Lyndhurst.
9.8 (6.1)	0.4 (0.3)	Just after bridge, at the intersection of Hwy. 33 and Hwy. 3,, turn left onto Hwy. 3.
21.0 (13.0)	11.2 (6.9)	Take left turn off Hwy. 3 on Charleston Lake Road.
22.1 (13.7)	1.1 (0.7)	Turn left onto park road and proceed one km to entrance gate.
22.7 (14.1)	0.6 (0.4)	Entrance kiosk. **STOP 6.**

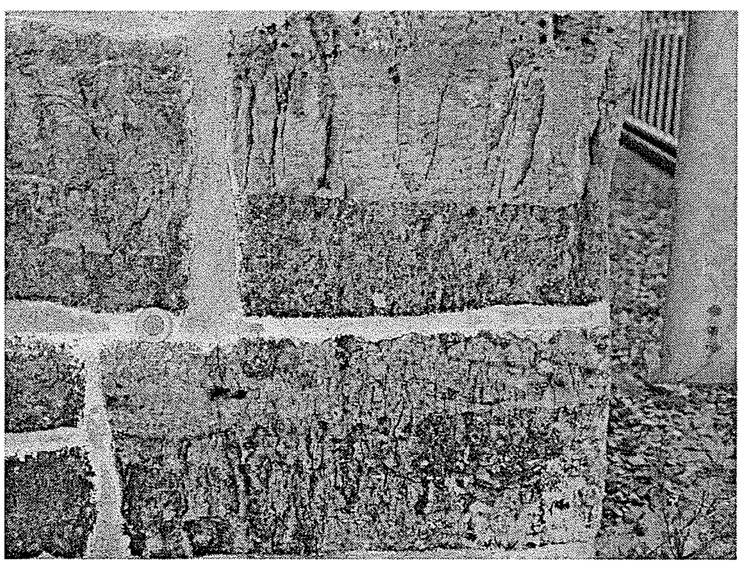

Figure 8. Bioturbation in blocks of Nepean sandstone used to build the old gristmill in Delta. Note abrupt truncation of burrows in the upper right hand block. STOP 5.

STOP 6 - CHARLESTON LAKE PROVINCIAL PARK, GIANT CYLINDER IN NEPEAN FORMATION

N44°30.100' W076°02.532' Entrance kiosk.

We will drive to Sandstone Island Trailhead, and follow Sandstone Island Trail (Figure 9) to view basal conglomerate and sandstone of the nearly 500-million-year-old Nepean Formation in unconformable contact with billion-year-old Precambrian metamorphic and igneous rocks of the Grenville Province (Figure 10). This contact, representing more than half a billion years of elapsed time, is best displayed at Post 2, where weathered granite at the top of the Grenville basement may well represent a paleosol. Isoclinally folded units of crystalline limestone and intercalated siliciclastic metasediments are abundant within the park (see map of Hewitt, 1961).

Many of the well-rounded conglomerate clasts (readily seen on the undersides of undercut bedding surfaces, as well as in vertical sections at Posts 3 and 4) consist almost exclusively of vein quartz and Precambrian quartzite, but a few clasts are identical to the Nepean, indicating early cementation and cannibalism of basal Paleozoic units (some Covey Hill reworking?). Crossbedding shows a preferential southerly trend, but herringbone patterns (well-exposed at Posts 6 and 7) are locally abundant, suggesting alternation between fluvial and marine depositional environments. A few cross-sections of probable tidal channels are visible in close proximity to packages of strata displaying herringbone crossbedding. Similar successions, as well as facies containing spectacular aeolian dunes, occur on the west side of the Frontenac Axis (cf. Dalrymple and Wolf, 1988).

A particularly fascinating structure occurs at the site described as 'The Waterfall' (Post 8). Initially thought to have been formed by rapidly flowing meltwater cascading over a cliff during Wisconsinan deglaciation, it now is apparent that this hollowed segment of almost half a cylindrical structure (Figure 11), extending vertically through 5 m of well-indurated Nepean strata, is an exhumed dewatering structure (cf. Gruhman and Pederson, 1992). This interpretation, first presented here to account for 'The Waterfall', is provided by two lines of evidence: 1. A patch of sandstone on one side of the structure shows lamination parallel to the cylindrical surface; and 2. Below the level at which a conglomerate bed within the stratigraphic section intersects the cylindrical surface, pebbles and cobbles are cemented to the inner surface of this columnar structure by sand identical to sand in the horizontal source bed (Figure 11).

While still unconsolidated, forceful upward hydraulic overpressure could create such a structure, with streaming parallel to the walls accounting for creation of an annulus of nested concentric laminations in sand along the margin of the vertical dewatering column. During waning stages of dewatering, individual pebbles and cobbles from the intersected gravel bed could have readily sunk along the periphery of the dewatering cylinder, to then be concentrated along the cylinder's margin, and held in place by a matrix of sand until the walls and interior of the structure were completely cemented. Similar structures elsewhere within the Nepean/Potsdam have long been recognized and debated (Baker, 1916; Hawley and Hart, 1934; Hawley, 1935; Miser, 1935; and Deitrich, 1953).

We probably will return back along the path from this point, but if time permits, we will follow the trail forward to Post 11, where glacially polished surfaces on uppermost exposures of Nepean quartz arenite display high polish, parallel grooves and striae, and abundant chattermark clusters, all showing consistent facings of concave chattermark curvatures in a down-ice (southwestward) direction.

CUMULATIVE MILEAGE KM (MILES)	KM (MILES) FROM LAST POINT	ROUTE DESCRIPTION
		RESET ODOMETER AT INTERSECTION OF PARK ENTRANCE ROAD AND CHARLESTON LAKE ROAD
0.0 (0.0)		Leave (**STOP 6**) by turning right onto Charleston Lake Road.
1.1 (0.7)	1.1 (0.7)	At the intersection of Charleston Lake Road and Hwy. 3 turn left and head south.
5.2 (3.2)	4.5 (2.8)	Turn left onto Hwy. 4 (Warburton Road).
9.5 (5.9)	5.0 (3.1)	Sharp turn to the right on to Blue Mountain Road (Hwy 4).
10.6 (6.6)	1.1 (0.7)	Sharp turn to the left and continue through Rockfield.
16.3 (10.1)	5.6 (3.5)	Bear right on Junetown Road.
18.4 (11.4)	2.1 (1.3)	At the bottom of a downward slope bounded by tabular-bedded rock cuts, turn into the side road (Quabbin Hill Road) to the right and park on the shoulder. Walk back to the rock cuts on the hill. **STOP 7.**
END OF TRIP	RETURN DIRECTIONS	Proceed east on Hwy. 4 until you reach Mallorytown. Turn left onto Hwy. 2 and head east (13.5 miles). At the intersection of Hwy. 2 and Hwy.5 (13.7 miles) (Mallorytown Road) take Hwy 5. south to Hwy 401. Enter Highway 401 (14.4 miles) and head east to the Prescott-Ogdensburg Bridge to return to Potsdam.

STOP 7 - ORDOVICIAN LIMESTONE AND SANDSTONE UNCONFORMABLY OVERLYING GRENVILLE BASEMENT

N44°28.311' W075°54.934' Intersection of Hwy. 4 and Quabbin Hill Road.

Corestones in a variety of mafic and felsic basement rocks are preserved below the unconformity on the north side of the road. The overlying sandy carbonates, probably in the lower part of the March Formation, contain abundant trace fossils, as well as a few nodular zones that may represent soil profiles (Figure 12). The lowermost beds contain quartz sand and silt, and shaly beds become locally abundant upwards in the section. The lack of Covey Hill or Nepean beds suggests that this may have been a paleohigh during early Ordovician time.

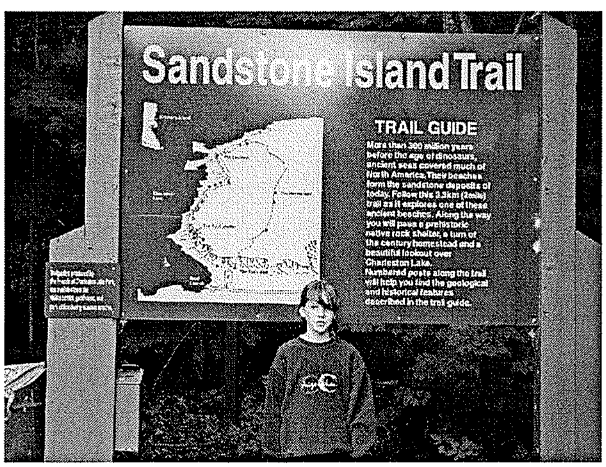

Figure 9. The start of the Sandstone Island Trail, Charleston Lake Provincial Park. Such signage, if properly presented and accurate, is an invaluable tool in promoting an area's geoheritage. STOP6.

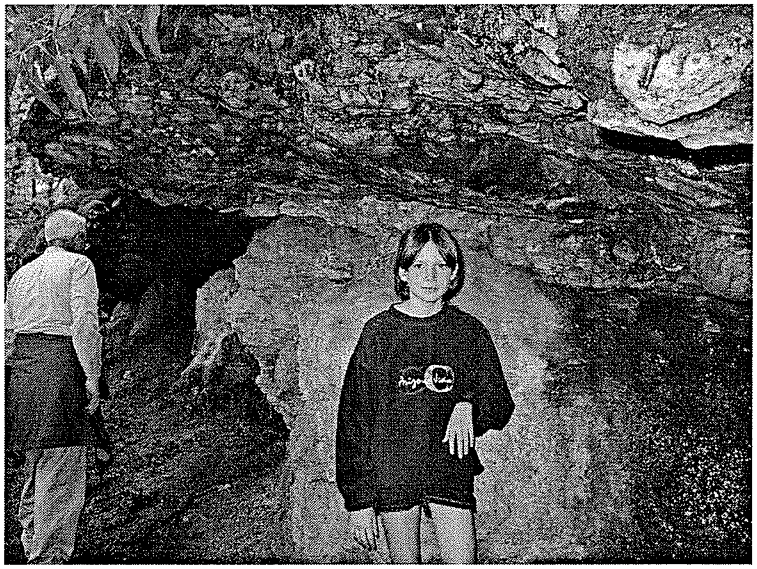

Figure 10. Contact of the Nepean Conglomerate unconformably overlying Grenville granitic basement rocks, Charleston Lake Provincial Park. Large clasts of quartzite, vein quartz, and quartz arenite occur in conglomerate forming the overhang just above the young lady. STOP 6.

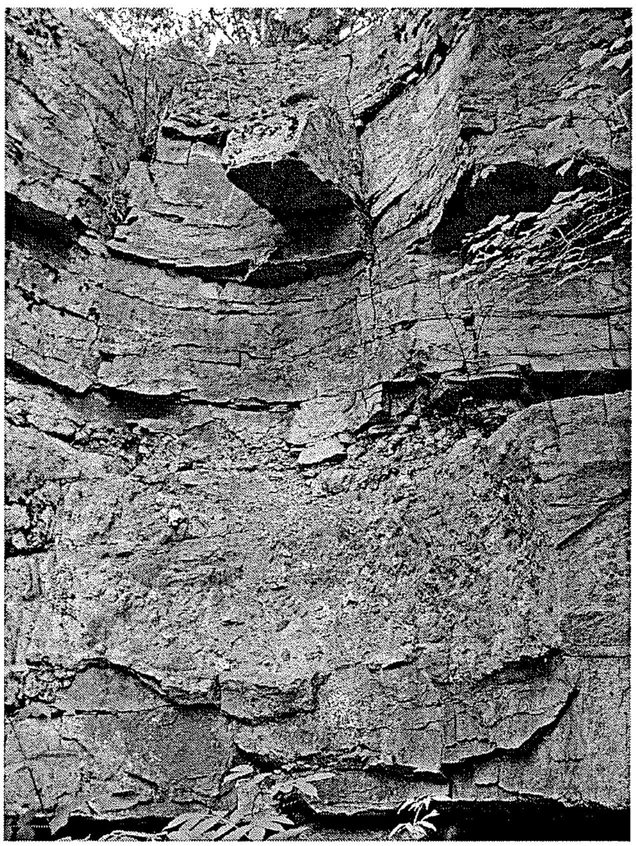

Figure 11. The cylindrical structure along Sandstone Island Trail, Charleston Lake Provincial Park. Note draping of conglomeratic layer half way up photograph into the annulus of the cylinder. STOP 6.

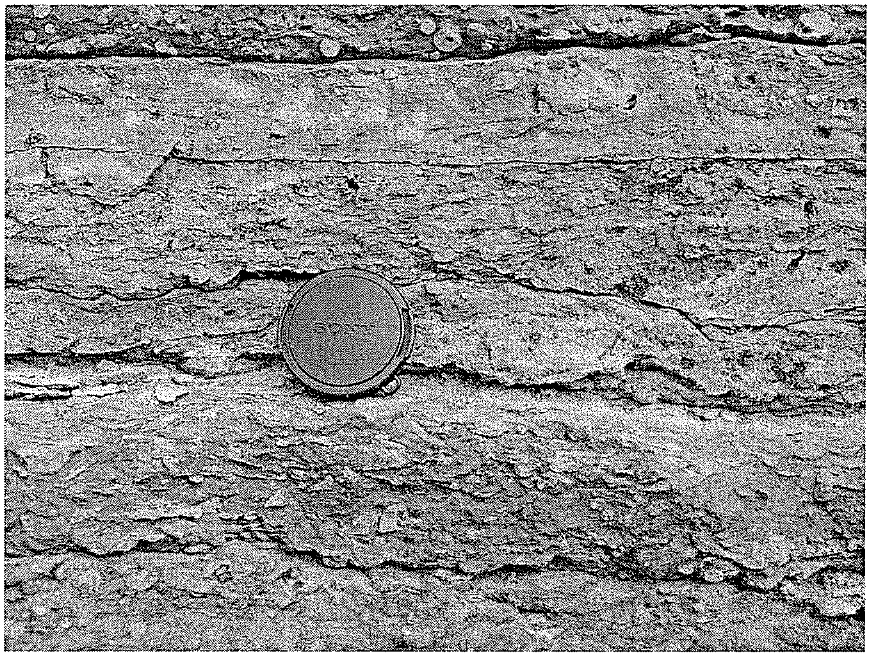

Figure 12. Possible pedorelics (?), circular structures above the lens cap, in the March (?) Formation, Mallorytown, Ontario. STOP 7.

END OF FIELD TRIP

REFERENCES CITED

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