

GEOLOGY OF THE OTTAWA AREA

OTTAWA-GATINEAU GEOHERITAGE PROJECT

FIELD TRIP

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INTRODUCTION

The Ottawa area contains many interesting exposures of rock that are of great interest to geologists and non-geologists alike. These rocks are dominated by Paleozoic-age sedimentary strata that overlie older Precambrian-age rocks which are extensively exposed in the Gatineau Hills to the north of Ottawa. Although developed over many millions of years, the rocks in the Ottawa area record only a small fraction of geological history.

This field trip takes participants to rock exposures in the Ottawa area that show geologic features typical of the local Precambrian and Paleozoic rocks. As the field trip progresses, it attempts to work through the local stratigraphic succession; that is, it starts with the oldest Precambrian rocks and progresses to the younger, overlying Paleozoic rocks units. You are encouraged to contact the Ottawa-Gatineau Geoheritage Committee (OGGC) in the future about this field trip, Geoheritage in the Ottawa-Gatineau region or any other related scientific question.

For the sake of protecting the rock outcrops that will be visited on this field trip, thereby protecting Geoheritage in the Ottawa-Gatineau region, participants are asked not to mark, scratch or remove even loose pieces from the outcrops (using hammers etc.). We ask that you observe and preserve your memories through notes and photographs.

GEOLOGIC OVERVIEW

As shown by the accompanying tables, rocks of the Ottawa area represent the middle Proterozoic Eon and the early Paleozoic Era, with older Proterozoic and Archean, and younger Paleozoic, Mesozoic and Tertiary rocks missing. The next youngest geologic unit stratigraphically overlying the early Paleozoic sedimentary rocks in the Ottawa area, are unconsolidated sediments which were deposited in the Pleistocene, during the last stage of the Ice Age and subsequent incursion of the Champlain Sea, about 12,000 to 10,000 years ago. The time gap in the rock record (missing geology) represented by the unconformity between the early Paleozoic rocks and Pleistocene is roughly 438 million years. The following paragraphs offer an overview of the geology in the Ottawa area.

ERA	AGE (Ma) (start)	PERIOD	
Cenozoic	.01	Quaternary	Holocene Epoch
	1.6		Pleistocene Epoch
	56.4	Tertiary	
Mesozoic	144	Cretaceous	
	208	Jurassic	
	245	Triassic	
Paleozoic	286	Permian	
	360	Carboniferous	
	408	Devonian	
	438	Silurian	
	505	Ordovician	
	570	Cambrian	
Precambrian	2500	Proterozoic Eon	
	4500	Archean Eon	

ERA	PERIOD	EPOCH	AGE (Ma) (start)	GROUP	FORMATION
Paleozoic	Ordovician	Late	458		Queenston
					Carlsbad
					Billings
				Ottawa	Eastview (Mbr.)
					Lindsay
					Hull
					Bobcaygeon
					Chaumont
					Lowville
					Pamelia
		Hog's Back			
Rockcliffe					
Early	505	Beekmantown	Carillon		
			Beauharnois		
			March		
Cambrian	Late	523	Potsdam	Nepean	
				Covey Hill	
Precambrian	Proterozoic Eon	Middle	1600	Grenville Province	

Precambrian Geology

The oldest rocks in the Ottawa area are part of the Precambrian Canadian Shield referred to as the Grenville Province. The Grenville Province is subdivided into distinct belts of geology within tectonic terranes, with the local Precambrian being part of the metamorphosed and deformed sedimentary, volcanic and plutonic package of rocks known as the Central Metasedimentary Belt and Frontenac Terrane. Locally, the Precambrian rocks crop out in the Gatineau Hills north of Ottawa and the northwest-trending Eardly fault, and in the Carp ridge west of Ottawa (Kanata through Carp to Arnprior) and north of, and parallel to, the northwest-trending Hazeldean fault.

The Precambrian rocks include deformed metamorphosed gneiss and marble, of sedimentary origin, and intrusive plutonic rocks such as diorite, gabbro, syenite and granite. These Precambrian rocks were part of an ancient mountain belt that formed during the Middle Proterozoic (ca. 1600 Ma to 900 Ma). The youngest age determination in the local Precambrian rocks is ca. 950 Ma for diabase intrusions that are part of the Grenville dyke swarm. Millions of years of erosion and weathering wore down the ancient mountain belt. Today, Precambrian rocks are exposed in elevated areas, largely due to uplift along the Hazeldean and Eardly faults, possibly during the Mesozoic.

Relatively flat lying and unmetamorphosed Paleozoic Era sedimentary rocks overlie the deformed and metamorphosed Precambrian rocks. Separating the Precambrian and Paleozoic rocks is an unconformity developed during erosion and subaerial weathering of the Precambrian rocks, over hundreds-of-millions of years, prior to deposition of the sediments during the Paleozoic. The weathering of the Precambrian rocks lead to the development of a paleosol (ancient soil). Pervasive erosion of the Precambrian rocks also eroded the paleosol so that its preservation is rare. Perhaps the best local exposure of the paleosol is in Parc de la Lac Beauchamp, Gatineau, where it is developed on Precambrian metamorphic rocks and buried by basal Paleozoic sandstone (Nepean Fm.).

Paleozoic Geology

The succession of Cambrian to Ordovician age sedimentary rocks in the Ottawa area, consists of sandstone, limestone, dolostone and shale units deposited in terrestrial to shallow marine environments associated with a widespread epeiric sea that transgressed the margins of the Precambrian Canadian Shield during the early Paleozoic. Locally, this site of sediment deposition is referred to as the Ottawa Embayment or the Ottawa-St. Lawrence Lowlands. Through correlation with similar sedimentary rocks in the northeastern United States and Ontario, and age-specific fossils in the limestone units, the Paleozoic rocks in the Ottawa area range from late Cambrian to late Ordovician in age (ca. 523 Ma to 438 Ma). A cumulative stratigraphic thickness for all Paleozoic sedimentary rocks in the Ottawa Embayment is about 300 metres.

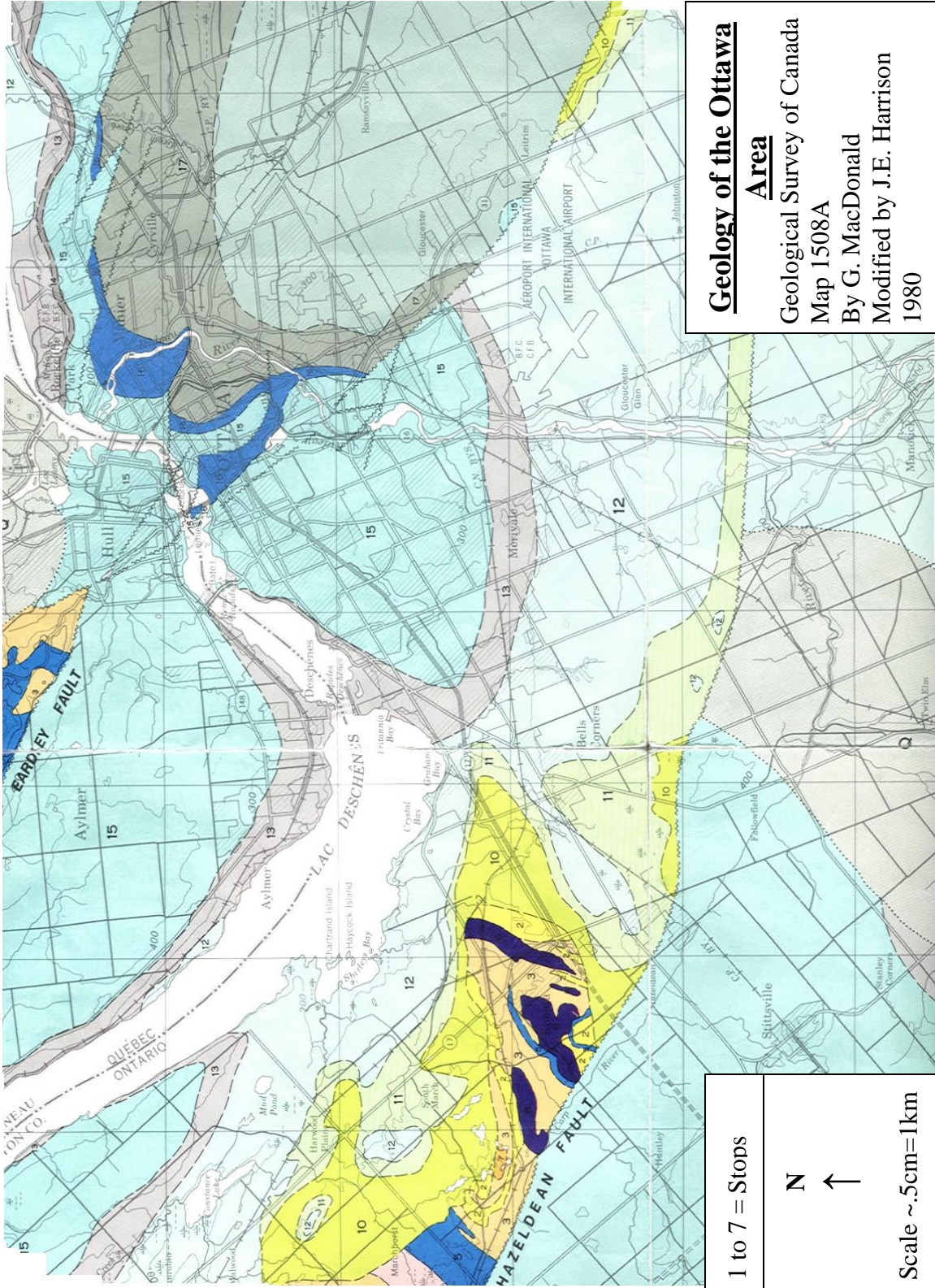
The name and age of the different sedimentary rock units in the Ottawa area are shown in the table. In ascending order, the basal conglomerate-sandstone of the Covey Hill Formation (Fm.) underlie the quartz-rich sandstone and minor conglomerates of the Nepean Fm., deposited in marginal marine, fluvial and aeolian environments and

containing trace fossils including evidence of the earliest land-based animal activity (arthropod). These sedimentary units are overlain by more fossiliferous shallow marine strata, beginning with the mixed sandstone-dolostone of the March Fm. and then dolostone-limestone of the Beauharnois and Carillon formations. In turn, these are overlain by mixed sandstone-shale of the Rockcliffe Fm., then shale, sandstone, impure limestone and dolostone of the Hogs Back Fm. Stratigraphically higher are the dominantly limestone formations of the Ottawa Group, starting with the stromatolitic limestone of the Pamela Fm. Overlying the Ottawa Group, are the shale-rich Billings Fm., sand-shale Carlsbad Fm. and, finally, the uppermost red shale of the Queenston Fm.

The next geologic event in the Ottawa area is the development of west-east and northwest-southeast oriented normal faults which dissect, and locally warp, the late Precambrian and early Paleozoic rocks (e.g., Gloucester, Hazeldean and Eardly faults). These faults, and others along the Ottawa Embayment, are considered to be part of the extensive, northwest-trending Ottawa-Bonnechere Graben. These local faults are in the same orientation as the Ottawa Embayment (subbasin), and it has been speculated that the faults are reactivated Precambrian-age faults that controlled the shape of the early Paleozoic depositional subbasin in the Ottawa area. It has also been suggested that the faulting occurred during the Cretaceous Period (late Mesozoic Era), as a few, small Cretaceous-age alkalic intrusions and dykes in the Ottawa area are similar to the Cretaceous-age Monteregion Hills near Montreal. These alkalic intrusions and dykes may be associated with the initial rifting and formation of the Atlantic Ocean.

Quaternary Geology

The youngest deposits in the Ottawa area are unconsolidated sediments of the Quaternary Period. The lowermost sequence of sediments consists of clay-rich glacial till, deposited during the late Wisconsin ice advance and retreat (ca. 12.8 ka to 10.2 ka) of the Pleistocene Epoch. Stratified sand and coarse gravel that blanket much of the Ottawa area were produced in a glaciofluvial environment. Finer sediment was deposited in proglacial lakes. During glacier retreat, while the land was isostatically depressed, there was a marine incursion into the region by the Champlain Sea. Fine marine sediment, such as the ca. 70 metre-thick Leda Clay, was deposited in the Champlain Sea, before the land rebounded and the sea retreated to the east. As the front of the ice sheet continued to retreat northward, large volumes of Holocene Epoch meltwater drained into the Ottawa area via the Ottawa Valley and Gatineau River valley. River channels cut into the older till and marine deposits and, after some channel reestablishment and terrace and bog formation (e.g., Mer Bleue bog), the reduced present course of the Ottawa River stabilized and soils, beneficial for agriculture, developed.



Geology of the Ottawa Area

Geological Survey of Canada
 Map 1508A
 By G. MacDonald
 Modified by J.E. Harrison
 1980

Geology Legend

- Q
Quaternary
- Ordovician
- 18
Carlsbad Fm.
- 17
Billings Fm.
- 14 - 16
Ottawa Gp.
- 13
Hog's Back & Rockcliffe fms.
- 12
Carillon & Beauharnois fms.
- 11
March Fm.
- 10
Nepean Fm.
- 1 - 9
Precambrian rocks
- ~~~~~
Fault

1 to 7 = Stops

N
↑

Scale ~.5cm=1km

FIELD TRIP STOPS

Drive west on the Queensway (Hwy. 417) and take March Rd. exit to Kanata. At the lights, continue straight through on Campeau Dr. then turn right onto Teron Rd. Proceed to the intersection with Beaverbrook Rd. and turn left. Then turn right off Beaverbrook Rd. onto Varley Dr. Follow Varley Dr., just past Georges Vanier Catholic School, to W. Erskine Johnston Public School on the left. Park near the playground at the back of the school. If the school is open, you should go to the main office and confirm permission to look at the Stop 1 outcrops.

Stop 1. Precambrian gneiss

Several glacially scoured outcrops of Precambrian gneiss (metamorphic rock) are exposed just beside the school's temporary classroom buildings. The Precambrian gneiss belongs to the Grenville Province of the Canadian Shield, is over 1 billion years old, and represents the oldest exposed rocks in the Ottawa area (often referred to as "basement" rocks" to the younger Paleozoic rock and Quaternary sediment, which have been eroded from this particular area). Glacial erosion of these outcrops has shaped them into roches moutonnées, the classic shapes of which indicate southward movement of the Pleistocene ice at this locality.

The coarse-grained gneiss displays a metamorphic layering (foliation) along which the minerals are aligned. Gneiss mineralogy includes quartz, feldspar, mica, hornblende and garnet. The foliation has been folded during deformation of the gneiss, which has also caused some minerals to recrystallize and grow parallel to the fold axes (= mineral lineation). Also evident in the outcrops, are coarse-grained pegmatite dykes of igneous origin (mainly granite, consisting of quartz and alkali feldspar), which cut across the gneissic foliation. These cross-cutting, intruding relationships indicate that the dykes formed after deformation of the gneiss. There are also a few dykes of aplite (finer-grained crystalline granite) and diorite composition (more mafic minerals).



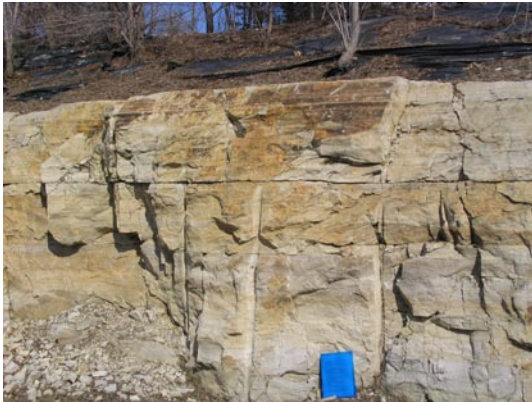
Precambrian gneiss outcrops

From the school turn left onto Varley Dr. and go to the T-junction at Beaverbrook Rd. Turn right, proceed to Weslock Way, and turn left (south) onto Knudson Dr. At the intersection with Campeau Dr., turn right and drive along to the intersection with Kanata Rd. Turn left onto Kanata Rd., until you meet Earl Grey Dr on your right, and park in the parking area at this intersection. The next outcrops to look at are behind the Wal-Mart store.

Stop 2. Nepean Fm. and March Fm. contact

The outcrops behind Wal-Mart and beside Kanata Dr. provide a vertical section of the upper part of the Nepean Formation (below) passing into the basal part of the overlying March Formation (top of outcrops). The few metres of vertical section at this stop record thousands of years of sand deposition during the early Ordovician, which was followed by burial and subsequent lithification. In the section behind Wal-Mart, the quartz-rich sandstone of the Nepean Fm. displays abundant cross beds formed by the migration of subaqueous dunes during sand deposition. Joints in the section provide a three-dimensional view of some of the cross beds, making it possible to determine the paleocurrent flow direction. Several joint faces are covered with oxidized crystals of marcasite / pyrite. At the top of the lower section, some ripple marks can be seen, and a few, millimetre-scale circular depressions interpreted as ancient rainprint marks.

In the upper section, on the east side of Kanata Dr., the outcrop starts to display dolomitic carbonate beds as well as quartz-rich sandstone beds. This is the transition into the March Fm. that overlies the Nepean Fm. In the upper section, ripple marks, cross bedding, dewatering structures, and fossils fragments in the more dolomitic beds can be seen. The sedimentary bedding dips towards the road, away from the local Precambrian 'basement'.



Nepean Fm. sandstone behind Wal-Mart store



Nepean Fm. to overlying March Fm. transition

Drive to Terry Fox Dr. on the west side of the Centrum Shopping Centre. Turn left (south) onto Terry Fox Dr. and drive over the Queensway to Hazeldean Rd. where you turn left (east). Proceed on Hazeldean Rd., pass across the intersection with Eagleson Rd. (where Hazeldean Rd. becomes Robertson Rd.), into Bells Corners and turn right (south) at the intersection with Moodie Dr. Drive south on Moodie Dr. The road curves right, and becomes Richmond Rd. Continue south on Richmond Rd. past the T-junction with West Hunt Club Rd. Approximately 1 km past the West Hunt Club Rd. T-junction, turn right into parking area (blue P6 sign) for the Stony Swamp Conservation Area. From the parking area, walk along the footpath and boardwalk to a large exposure of white bedrock.

Stop 3. Nepean Fm.

This large exposure offers an extensive bedding plane view of the quartz-rich sandstone typical of the Nepean Fm. The sandstone beds are still in their original, horizontal position. The sandstone is composed almost entirely of well-sorted sand-size quartz grains that are cemented by quartz cement. There are abundant sets of trough cross bedding, from which the paleocurrent direction can be determined (troughs open down-current to the south). Occasional sets of ripple marks show trends essentially perpendicular to the paleocurrent flow direction. The sand was likely deposited in a braided river environment, approximately 500 million years ago. However, the presence of a few elongate crystal pseudomorphs in the sandstone that are interpreted to have been gypsum (hydrated calcium-sulphate), suggests that the environment may have had a marine influence, or that the depositional waters may have occasionally become alkaline.

The outcrop surface displays abundant evidence of Pleistocene glaciation. Many top surfaces have been polished smooth by glaciation. Nested arcuate chatter marks (opening towards the down ice direction) and glacial striations parallel to the axes of the chattermarks both indicate that the ice was moving southward in this area.



Nepean Fm. sandstone



Nepean Fm. cross-bedding



Pseudomorph crystals in Nepean Fm.

Turn left out of the parking area onto Richmond Rd. Drive north into Bells Corners and through the intersection with Robertson Rd. Keep driving north on Moodie Dr. to the Queensway (Hwy. 417), and merge onto the Queensway going east towards downtown Ottawa. Keep going east on the Queensway until you get to the Bronson Ave. exit ramp. Take the Bronson Ave. exit ramp, and turn right (south) onto Bronson Ave. Drive south on Bronson Ave., over the Rideau Canal, past Carleton University and the Heron Rd. exit. As you pass over Heron Rd. on Bronson Ave., take a right turn to merge with Brookfield Rd. and proceed west along Brookfield Rd. Cross over the intersection with Riverside Dr. onto Hog's Back Rd. Just before the bridge over the Hog's Back water falls (where the Rideau Canal and Rideau River meet), turn right into the Hog's Back Park parking area.

Stop 4. Hog's Back Falls- Ordovician Sedimentary Units

From the Hog's Back Bridge where it crosses the Rideau River, by looking downriver one can get a good overview of the local geology. Exposed in the falls area are Middle Ordovician sedimentary rocks which have been faulted, gently folded, and tilted within small fault blocks as seen in the middle of the falls. Walk down onto the observation area on the left side (west) of the falls. The Rockcliffe Fm. sandstone is exposed here. The Rockcliffe Fm. sandstone is fine- to medium-grained, micaceous, and the grains are cemented by calcite. This sandstone contains more feldspar and lithic grains compared to the quartz-rich Nepean Fm. sandstone seen at previous stops. Also visible are parting lineations, hummocky cross bedding and smaller, superimposed linguoid ripples.

Looking eastward across the river, are beds of the Hog's Back Fm. and, at the top of the cliff, the overlying Pamela Fm. (basal unit of the Ottawa Group). The bedding of the Hog's Back Fm. is generally thinner than that of the Rockcliffe Fm., and consists of argillaceous (clay-rich) dolostone, limestone and shale. The limestone beds display ripple cross-lamination and contain abundant fossils such as ostracods and bivalves and

other skeletal fragments. Scattered through the more nodular limestone beds are quartz granules. The argillaceous dolostone beds contain mud cracks and phosphate-rich burrows. The Pamela Fm. at the top of the cliff section, overlies the Hog's Back Fm., and is comprised of bioturbated and phosphatic sandstone, shale and fossiliferous limestone beds. Exposures of the Pamela Fm. further downriver, display abundant hemispherical stromatolites and, in some outcrops, good evidence of karst weathering.



Hog's Back Falls from bridge



Ripples in Rockcliffe Fm. sandstone

The next two stops will be on the north (Québec) side of the Ottawa River. As the outcrops are along the edge of the river they are occasionally covered when the river water level is high. As well, although the river is neither deep nor very fast at these localities, trip participants must exercise caution and use common sense for safety sake.

From the parking area, turn right onto Hog's Back Rd. and proceed over the bridge to Prince of Wales Dr. Turn right (north) on Prince of Wales Dr. and drive through the intersection with Heron Rd. / Baseline Rd. into the Central Experimental Farm. Keep going on Prince of Wales Dr. until you come to the traffic circle. Go $\frac{3}{4}$ of the way around the traffic circle, and drive along the Driveway (through the Central Experimental Farm) until you come to stop lights at the intersection of Holland Ave. and then Carling Ave. Proceed across Carling Ave., where the road becomes Island Park Dr. Drive along Island Park Dr., under the Queensway, across Richmond Rd., across Scott St. and across the Ottawa River Parkway until you are on the Champlain Bridge that spans the Ottawa River. On the far side of Champlain Bridge (Province of Quebec), turn left onto Boulevard de Lucerne. About 100 metres on the left is Samuel-de-Champlain parking lot where you should park. Walk towards the Ottawa River to the paved path, and, turning left, walk back towards the Champlain Bridge on the path. Just before the bridge is a house, and across the pathway from the house, along the shore of the Ottawa River and extending under the Champlain Bridge is the outcrop for Stop 5. Unfortunately, if the river level is too high this stromatolitic limestone exposure will be under water and inaccessible.

Stop 5. Stromatolitic limestone

Along the shore of the Ottawa River is a continuous exposure of flat-lying Late Ordovician (ca. 450 million years) limestone that is entirely made up of linked stromatolite mounds. The stromatolitic limestone belongs to the Pamela Fm. (Ottawa Group) that was seen at the top of the sedimentary rock section at Stop 4. At this stop, you can walk on the stromatolitic limestone for tens of metres, which indicates that there was a widespread colony of the laminated stromatolites (blue-green algae) that thrived in a shallow marine environment during the Ordovician. A modern analogue exists in Shark Bay north of Perth, western Australia, where stromatolite columns are thriving in the shallow marine, saline lagoons. At Shark Bay, the stromatolite column colonies coalesce and elongate parallel to the prevailing tidal current that is perpendicular to the shoreline. Similarly, at Stop 5, the individual domal stromatolites and coalesced stromatolites have a preferred elongation direction (north-south), which is inferred to be perpendicular to the ancient shoreline that existed during the Ordovician. Furthermore, between some stromatolite domes, ripples are preserved which have crests that have a north-south orientation. The ripples are interpreted as being formed by long-shore currents, moving parallel to the ancient shoreline.

Limestone beds that underlie the stromatolitic limestone are exposed just a little farther from the shore when the level of the Ottawa River is low. In these limestone beds there are no stromatolites but there are abundant fossil gastropods, which are absent in the overlying stromatolite beds. Again, using the modern analogue at Shark Bay where the stromatolites are thriving in a very saline shallow marine environment, the lack of gastropods in the stromatolite beds at Stop 5 suggests that marine conditions that existed during stromatolite growth were too saline for the gastropods to survive. This is compatible to other modern settings, where it has been observed that grazing gastropods destroy algal mats until the local tidal environment becomes too salty for the gastropods to survive.



Domal stromatolites, Champlain Bridge in background

Turn right from the parking lot onto Boulevard de Lucerne. Cross over Place Samuel-de-Champlain, and continue on Boulevard de Lucerne. Turn right (south) onto Rue Bégin, and then right again on Rue Maricourt and park beside Parc Brébeuf next to the Ottawa River. Walk to the shoreline rock exposures behind the statue of Jean de Brébeuf.

Stop 6. Fossiliferous limestone

The fossiliferous (fossil-rich) limestone, exposed along the shore of the Ottawa River, is part of the Late Ordovician Ottawa Group of sedimentary rocks. As such, preserved within the limestone are fossil remnants of the animals that lived in the shallow marine environment that existed in the Ottawa area approximately 450 million years ago. The flat-lying limestone offers a bedding surface view of the fossils derived from the animals that swam above, crawled over, or were rooted to the limey Ordovician seabed. The variety of fossils in the limestone include: corals, stromatoporoids (ancient sponges), straight-shelled cephalopods (orthocones), whorled gastropods, brachiopods, crinoids (mainly their stems), fragments of trilobite shells, and evidence of animal activity (trace fossils) such as burrows and trails. The retaining wall along the shore is made from locally-derived limestone, that not only contains some of these fossils, but also offers a three-dimensional view of some of the primary and secondary sedimentary structures such as, respectively, bedding, cross-bedding, ripple lamination and stylolites and jointing.

Another interesting local feature is the base of the statue of Jean de Brébeuf. The rounded cobbles used to make the base for the statue were derived from a local gravel pit in coarse Pleistocene outwash. They represent different types of Precambrian rocks (mainly metamorphic and igneous rocks) that were eroded from the Gatineau Hills and further north during the Wisconsin Ice Age (Pleistocene); they were rounded and polished during subglacial transportation during melting of the ice.



Statue of Jean de Brébeuf

Drive north on Rue Bégin to Boulevard Alexandre-Tache and turn right (east) towards Hull. Follow Boulevard Alexandre-Tache to Rue Eddy and the Chaudières Bridge. Turn right onto the bridge. Drive ¾ of the way across the bridge, towards Ottawa, to Victoria Island, and turn left at Middle St. Park near the old generating station. Walk down the sloping road to the outcrop on either side of the road, before it passes under Portage Bridge.

Stop 7. Dunes and fossiliferous limestone

These outcrops are Ottawa Group fossiliferous limestone, similar to Stop 6, except that they contain dune-scale bedforms (>4 cm amplitude). The vertical section of the outcrops on either side of the road, show alternation between limestone beds containing abundant fossil fragments (brachiopods, bryozoa, cephalopods and crinoids) and dunes, and limestone beds that are flat-lying and contain abundant feeding burrows and trails (trace fossils). One interpretation of this bedding style alternation may be that it reflects environment changes between stormy periods (sediment and fragmented fossil transportation by dunes along the sea floor) and calmer, 'fair weather' periods with little sediment transportation and more feeding by benthic animals. Occasional mudcracks in the vertical section indicate periodic exposure, resulting in desiccation of the limy sediment. It is also possible that the changing character of the limestone beds reflects periodic rising (deepening) and falling (shallowing) of sea level. The beds that are rich in trace fossils and few dunes, may reflect a deeper water quiet environment that was below normal 'fair weather' wave base.

From the east end of Victoria Island look towards Parliament Hill on the south side of the Ottawa River. You can clearly see the sedimentary rock layers in the cliff faces beneath the Parliament Buildings, Supreme Court and the National Archives. These are primarily units of the Late Ordovician Ottawa Group. A thin veneer ($\leq 1-2$ m) of unconsolidated Pleistocene sediment lies on top of the Ottawa Group.



Dunes and fossiliferous limestone

This concludes the Geology of the Ottawa Area field trip. There is still a lot of interesting geology to see in and around Ottawa and the Gatineau Hills, and the Ottawa-Gatineau Geoheritage Committee hopes that you will be able to see more in the future, perhaps following a self-guided field trip compiled from our website. We also hope that you now understand the importance of preserving, protecting and promoting the natural geoheritage of the Ottawa-Gatineau area, and that you can, in turn, impress this upon your friends and colleagues. Offered below is a brief bibliography where you can find out more about various aspects of geology in the Ottawa-Gatineau area. As well, there is a brief overview of the Ottawa-Gatineau Geoheritage Project.

BIBLIOGRAPHY

The following publications can be found at the Geological Survey of Canada library (601 Booth St., Ottawa), Carleton University MacOdrum library (1125 Colonel By Dr., Ottawa) and the University of Ottawa Morisset Library (65 University, Ottawa).

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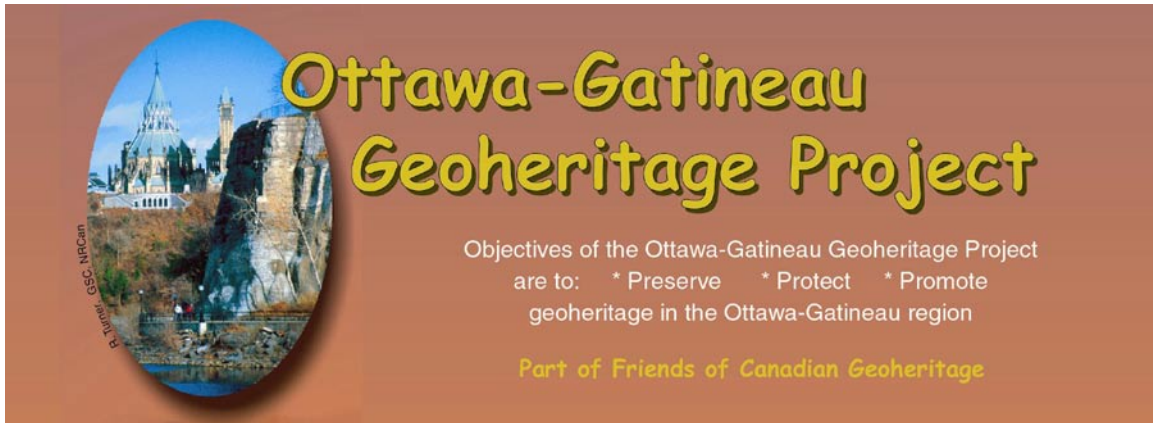
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The **OTTAWA-GATINEAU GEOHERITAGE PROJECT** was started in 2002 to promote public awareness of the geological and landscape aspects of natural history in and around Canada's National Capital Region.

THREE MAIN OBJECTIVES of the Ottawa-Gatineau Geoheritage Project are:

- **PRESERVATION** of world-class geoheritage sites, by minimizing the loss of irreplaceable geological and surface landform features of the Ottawa-Gatineau region through insightful land-use planning
- **PROTECTION** of geoheritage sites by strengthening and enforcing applicable laws to preserve significant records of natural history
- **PROMOTION** of public awareness through the production of informative signs, brochures and guidebooks for geoheritage sites

The preservation, protection and promotion of geoheritage sites in the Ottawa-Gatineau region involve the stewardship of local natural features, and education of people living in the region. Provision of greater geoheritage recognition can be expected to stimulate tourism and international interest in the region. Considerable interest and support for this geoheritage initiative already has been shown by representatives of Carleton University, University of Ottawa, the City of Ottawa, the National Capital Commission, Natural Resources Canada and Ontario Parks.

GEOHERITAGE AND GEOHERITAGE SITES

Geoheritage is concerned with the recognition and preservation of significant natural features, such as distinctive fossils and rare minerals, exposures of major faults and unconformities (erosional gaps in the rock record), unique glacial and post-glacial deposits, and the interaction that human activity has had with these natural features (e.g. natural stone in heritage buildings, and distinctive geological relationships revealed in quarries, road cuts, building excavations and abandoned mines).

Many unique geological and surface landform features provide important records of the past in the Ottawa-Gatineau region. These include the billion-year-old Precambrian rocks of the Gatineau Hills, the 450 million-year-old fossil-bearing Paleozoic rocks of the Ottawa Valley and the unconsolidated sediments produced during the last Ice Age and during the subsequent time when the Champlain Sea covered much of the Ottawa Valley, less than 10,000 years ago. The present drainage systems, dominated by the Ottawa River, have been incised into this geological assemblage, and many areas within the region have been subjected to significant modification by landslides. These components of our local natural history strongly

influence the groundwater reservoirs, surface waterways, agriculture sustenance, mineral wealth, biodiversity and the foundations for buildings and transportation.

A Geoheritage Site is a locality that meets one or more of the following:

- Exposes a significant record of natural history
- Contains characteristic or unique features
- Contributes to understanding the natural history of the region
- Offers new scientific insights
- Offers distinct aesthetic and cultural values

OTTAWA-GATINEAU GEOHERITAGE COMMITTEE

A voluntary committee of geoscientists, educators and communicators who live and work in Ottawa and Gatineau meet regularly to advance the Project's goals. Members of the Ottawa-Gatineau Geoheritage Committee are willing to assist the public, Municipal, Provincial and Federal Committees or Agencies, Primary and Secondary Schools, Museums, Societies and Public Interest Groups in a variety of activities in the Ottawa-Gatineau region. These activities include:

- Striving to preserve, protect and promote local Geoheritage Sites through liaison with the appropriate Municipal or Federal authorities
- Composing Geoheritage Site signage
- Preparing Geoheritage Site information brochures
- Conducting Geoheritage tours of the Ottawa-Gatineau region
- Offering lectures on the natural history of the Ottawa-Gatineau region