



Les **Amis** du Parc de la Gatineau
Friends of Gatineau Park

Amis Friends

2012-I

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Biodiversity

Diatoms: biological radars for water quality assessment

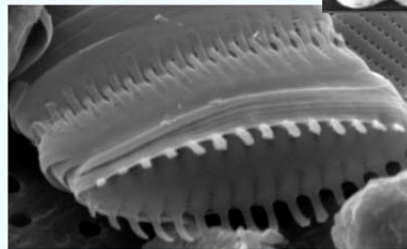
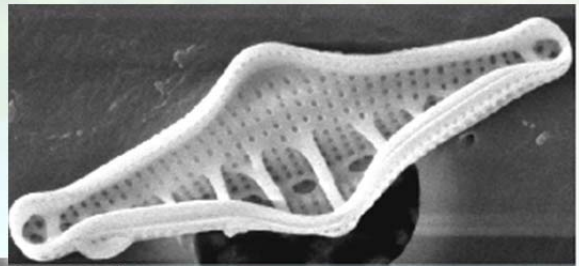


by Isabelle Lavoie, INRS

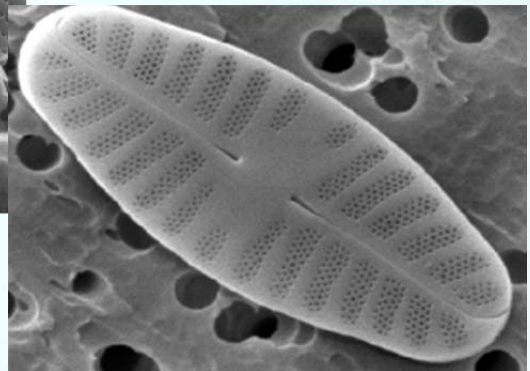
Traditional water quality measurements used to monitor human impacts on aquatic ecosystems are precise and accurate, but do not provide information about the effects on biological communities. Moreover, water chemistry data do not provide a temporally integrated picture of the fluctuating environmental conditions. On the other hand, the use of living organisms provides an integrated measurement of water quality as experienced by the aquatic biota, and offers a useful addition to chemistry-based water quality assessments. Microscopic algae are widely used bioindicators. In particular, a group of algae called *diatoms* (*bacillariophyceae*) are commonly included in water quality biomonitoring programs. These unicellular microscopic algae have a characteristic external skeleton made of glass (silica), inside which the cellular content is found (nucleus, chloroplasts, mitochondria, vacuoles, etc.). This siliceous skeleton, called the *frustule*, is composed of two valves that fit together analogous to a Petri dish. Each species of diatom has distinct ornaments on the frustule allowing for the identification of the species. Diatoms are particularly abundant in oceans, but are also found in lakes, ponds, streams and rivers, as well as in wetlands and other humid environments. On your next walk by a stream, have a look at the diatoms

growing on rocks, they will look like a slimy brownish biofilm. Caution, slippery!

Each diatom species has its own environmental preferences and tolerances, which means that a species generally found in an unpolluted aquatic environment will not grow in a polluted water body. If environmental conditions change, the diatom assemblage will slowly be modified by a proliferation of species that are better adapted to the new conditions. The study of diatom composition at a site therefore provides information on the water quality.



The samples of microscopic algae indicate biological integrity which goes from "good" to "excellent".



The Eastern Canadian Diatom Index (IDEC; *Indice Diatomées de l'Est du Canada*) is a diatom-based index that integrates the effects of multiple stresses on streams. The IDEC scores provide information related to the "distance" from the non-impacted state. The pollution gradient of the IDEC ranges on a scale of 0 to 100; a high index value represents a non- or less-impacted site while

a low index value represents a more heavily impacted site. For example, an index value over 80 suggests that the diatom assemblage reflects reference conditions (pristine or minimally-disturbed) and that there is little or no human impact.

In addition to being a key element in the proper functioning of our planet (food chain, production of oxygen, carbon fixation), diatoms infiltrate incognito in our daily lives. In effect, because of their porous nature, they excel as filtering, insulating and absorbent agents. Diatoms are used in the production of wine, beer and juice as well as for the refining of sugar. They excel just as brilliantly in the filtration of oils and chemical waste. Their glass (silica) skeletons offer an abrasive power for polishing metals and manufacturing detergents. Diatoms are choice ingredients in the manufacture of ceramics, enamel and porcelain. They also serve as a filler in the production of paper, paint, plastic, concrete, and even dynamite!

A study was conducted in July 2011 by the Institut national de la recherche scientifique – centre Eau Terre Environnement ([INRS-ETE](#)) to evaluate the biological integrity of numerous watercourses distributed within the Gatineau Park using the IDEC as a biological indicator. This project was supported by a research grant offered by the National Capital Commission. Financial support was also provided by Friends of Gatineau Park and INRS-ETE. For this biomonitoring study, IDEC values were calculated using diatom assemblages collected at 25 sites distributed on 20 watercourses within the limits of the Gatineau Park. As anticipated, the results showed that most of the sites sampled were characterised by diatom assemblages reflecting an excellent or a good biological integrity (very high and high IDEC scores); suggesting that the biological integrity of the streams and rivers in the Gatineau Park are minimally affected by human activities. There are, however, certain diatom assemblages scoring lower on the IDEC pollution gradient, indicating that the biological integrity at some sites is moderately impacted. Only one site showed a bad water quality with a low IDEC value. A detailed report of this diatom-based assessment with IDEC values for each site was submitted to the National Capital Commission. Aquatic ecosystem

monitoring is an essential aspect of the conservation mission of the Gatineau Park. The results from this study represent valuable information that could eventually be used to evaluate if the biological integrity of the watercourses in the Park has degraded over time or in response to changes in the watersheds. 🌿

Written with the cooperation of Claude Fortin, INRS-ETE

Activities

Adopt-a-trail program

by Paule Tremblay

The fifth season of the Adopt-a-trail program is a success! More than eighteen trails have been regularly patrolled by as many volunteers. The tasks involved walking the trail every second week. A report was then sent to NCC to advise of fallen trees and erosion problems. The volunteers also gave their commentaries and suggestions for improvement of the trails. NCC and Demsis promptly fixed up the trails.



Club Oxygène is part of the Adopt-a-Trail program and they have been adopting trail #1 for several years. Well done and thank you!

Congrats to all volunteers who made it possible for all the users of Gatineau Park to enjoy clean and safe trails. 🌿

Paule Tremblay is Adopt-a-trail volunteer coordinator

Biodiversity

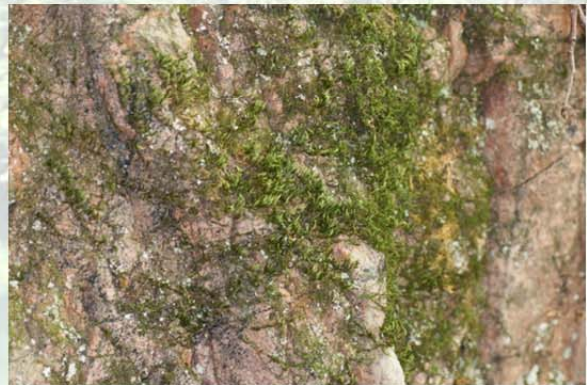
Surprising Bryophyte Find on the Eardley Escarpment

by Jean Faubert, Flora Quebeca

Inventories of bryophytes (mosses and liverworts) conducted on the rocky walls of the Eardley Escarpment during the spring and fall of 2011 by two members of FloraQuebeca revealed the bryological wealth of this remarkable site. As an added surprise, the researchers made some rather unexpected discoveries.

The Eardley Escarpment is well known as a habitat for rare vascular plants, including many calcicolous species. This scenario is mirrored by the bryophytes. We observed the presence of many taxa specific (or tolerant) to an alkaline growth medium on the rocky walls of the Park. This was expected. What was less anticipated, however, was the discovery of two basophilous arctic alpine species of liverwort that are not generally found in deciduous forests in temperate environments: *Odontoschisma macounii* and *Scapania gymnostomophila*. This was a significant increase in the area of these populations on the southern edge of the main distribution area for these taxa. While it is difficult to prove, we are tempted to interpret these populations as relics of the last deglaciation period that have been preserved on the Park escarpment, doubtless because competition from forest species is attenuated by the generally difficult environmental conditions in this area. The species *Scapania gymnostomophila* is also considered rare in the province. Three other species from this category were also discovered: *Grimmia pilifera*, *Haplomyenium triste* and *Thamnobryum alleghaniense*. Conversely, these plants are located on the northern edge of their distribution area, in contrast with the two species mentioned previously, and coexist on the same site with plants having quite different biogeographical affinity.


However, a significant surprise awaited us on the bare, vertical rock surface of the Shrine rock-climbing site: *Forsstroemia trichomitria* moss, which is unknown in Quebec and has only been mentioned in Canada at several rare colonies at the extreme southern border of Ontario. This species prefers the temperate regions on our southern border. It is now likely the most northerly known population of this species. And,



on the Eardley Escarpment, the species shares the space with arctic alpine plants that are themselves far south of their usual distribution area.

Forsstroemia trichomitria also differs in certain exceptional aspects of its biology. The plant takes eighteen (18) months to produce its capsules, the organs that contain the plant's reproductive spores. This is in contrast to the expected scenario in which a plant generally produces fruit on an annual basis (of course, many exceptions come to mind). And, since the embryos of the new capsules are produced each year, the plant contains several generations of capsules at various stages of development. While this is not exceptional in the bryological world, the phenomenon is remarkable among Quebec plant life. Another element worthy of mention, the plant disperses its spores during the winter, once again in contrast with the majority of our species, which prefer milder seasons. Let us conclude with another unusual adaptation: *Forsstroemia* releases its spores when atmospheric humidity is high. Most mosses do the exact opposite, the premise being that a dry day permits better dispersion than a rainy one.

With its extreme rarity, unusual location with respect to its distribution area, coexistence with

arctic alpine species, exceptional biology and adaptation contrary to that of the majority of bryophytes in our region...what wonderful potential *Forstroemia trichomitria* offers for interpretation in Gatineau Park! 

Photographs: M. Lapointe




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www.friendsofgatineaupark.ca

Heritage

Mackenzie King Estate Gets a Facelift

It's been a few months already, but you may not have seen it happening. Teams are hard at work planning and fixing things, to restore to the Mackenzie King Estate some of its lost glamour.

Many parts of the Estate have been showing signs of aging for a while now: shingles on the Kingswood cottages, landscaping at Moorside, the mortar of the Abbey ruins... Consequently, the NCC has decided to invest time and money in order to renovate the Kingswood buildings and to renew many elements (interpretation panels, signage, exhibits, etc) in order to better meet visitors expectations for years to come. Among other things, important changes will upgrade universal access.

Work is already underway on the Kingswood side, which is closed to the public until summer 2013. Moorside will remain open, although some minor work will be visible from time to time in summer and fall 2012. Work will wrap up in summer 2013, just in time to highlight the 75th anniversary of the creation of Gatineau Park. 

Les Amis du Parc de la Gatineau/Friends of Gatineau Park, a registered charity publishes in Amis/Friends articles on a selection of ecology and heritage research undertaken in the Gatineau Park, particularly that funded by us as well as related to our other educational programs. Published twice a year, the Bulletin is archived at friendsofgatineaupark.ca and deposited with the National Library ISSN 1926-6537 (print) + 1913-7648 (online). Comments, suggestions, stories: send via www.friendsofgatineaupark.ca or 33 Scott Road, Suite 227, Chelsea QC J9B 1R5 Tel. 819-827-3113. Publisher: David Rayner; editing and layout: Jean-Philippe Rheault; printing: Imprimerie Vincent. Printed on recycled paper. Thanks to all volunteer contributors to this edition.

