Institut de recherche en biologie végétale

Centre sur la biodiversité de l'Université de Montréal

# Ph.D. project Canada/Australia:
# Long-term ecosystem development and plant functional diversity

**Project overview**

Long-term soil chronosequences (i.e. gradients of soil age) provide the opportunity to study terrestrial ecosystem development over geological time scales, and also provide exceptionally strong natural gradients of soil nutrient availability. This is because old, strongly-weathered soils become impoverished in rock-derived nutrients such as phosphorus (P). As such, long-term soil chronosequences offer powerful model systems to determine how soil nutrient availability influences vegetation and ecosystem functioning. Well-studied long-term soil chronosequences are very rare worldwide, but in the last five years we have established a new network of long-term coastal dune chronosequences in south-western Australia (SWA), a global biodiversity hotspot. These SWA chronosequences are unique in that their oldest soils are among the most infertile ever measured yet support some of the most floristically diverse plant communities on Earth.

The proposed Ph.D. project will be part of our broader research program on long-term soil and ecosystem development and plant-soil interactions in SWA. Specifically, the Ph.D. student will measure changes in foliar and fine root morphological, chemical and physiological traits along natural soil nutrient availability gradients, in order to: (i) determine the degree of coordination between foliar and root traits, (ii) determine the degree of inter-specific and intra-specific trait variation (especially root traits), and (iii) use these trait data to predict changes in plant community composition. The Ph.D. student will benefit from an existing database on vegetation and soil properties along these SWA chronosequences.

**Exchange between Canada and Australia**

The Ph.D. student will be enrolled in the Department of biological sciences of Université de Montréal (UdeM) and be based at the Institut de recherche en biologie végétale, located in the Montreal Botanical Garden. However, the field research component of the Ph.D. project will be done in SWA (Perth), using our established network of long-term dune chronosequences. It is anticipated that the Ph.D. student would spend the first year in Canada (developing project, Ph.D. exam, coursework), the second year in Australia (field work) in the School of Plant Biology at the University of Western Australia (UWA), and the remainder of the Ph.D. back at UdeM. The student exchange from UdeM to UWA will be faciliated by a bilateral agreement between UdeM and UWA allowing UdeM students to spend a year at UWA.

**Funding**

The project is funded by an NSERC Discovery Grant awarded to Etienne Laliberté, who will act as the Ph.D. supervisor. It is anticipated that the Ph.D. student will be co-supervised by a UWA-based professor. The amount of the Ph.D. scholarship will depend on the candidate's skills, but will meet or exceed the minimum amount set by our Department. However, preference will be be given to candidates with the willingess to apply, and potential to attract, an external Ph.D. scholarship (e.g. NSERC, FRQNT).

**Minimum requirements**

- M.Sc. or First-Class Honours in biology, ecology, botany or related field
- Previous field research experience in terrestrial ecology
- Strong motivatation and high degree of independence
- Excellent oral and written communication skills in English, and willingness to learn French
- Valid driver's license

**Applications**

Interested candidates should send the following documents by email to Etienne Laliberté (etienne.laliberte@umontreal.ca): (i) letter of motivation, (ii) CV, (iii) B.Sc. and M.Sc. transcripts (if applicable), and (iv) names and contact details of at least two referees **on or before July 3, 2015**.

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