Philippe Desjardins-Proulx

September 9, 2017

CURRENT POSITION

Ph.D. candidate, Université de Sherbrooke, Canada,
Canada Research Chair on Integrative ecology, Canada,
Poisot Lab, Université de Montréal, Canada,
Quebec Center for Biodiversity Science, Canada.

CONTACT

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EXPERTISE

- **Machine Learning:** My thesis focuses on theory revision in statistical relational learning (the union of logic with probability), and how deep learning can be used with symbolic systems.
- **Scientific computing:** I worked four years (2009-2012) as a research professional, focusing on C/C++ simulations and GPU computing with CUDA/OpenCL on the Canada Research Chair on Terrestrial Ecosystems' scientific cluster.
- **Bioinformatics:** My main Ph.D. project involved machine learning in ecology. I also contributed to theoretical evolutionary ecology (speciation, community ecology) and worked with several biological data-sets.

EDUCATION

Department of Biology, Université de Sherbrooke, Canada.

Ph.D., September 2012 – Fall 2017

- **Thesis Proposal**: *Automatic Theory Revision and the Problem of Biodiversity*
- **Adviser**: Dr. Dominique Gravel
- **Co-adviser**: Dr. Timothée Poisot
- **Area of Study**: Machine learning, molecular ecology, population genetics.
- **Comprehensive exam**: Maximum Entropy in Ecology & Evolution.
- **Courses**: Advanced Distributed Computing (A13), Business Intelligence (S15).

College of Engineering, University of Illinois at Chicago, Chicago, USA.

Graduate Certificate in Bioinformatics, 2012,

- **Area of Study**: Data Mining & Biostatistics.

Université du Québec, Québec, Canada.

B.S., 2009,

- Major in Biology,
- Minor in Mathematics & Computer Science.

AWARDS

Alexander Graham Bell Graduate Scholarship (2012)

- **From:** Natural Sciences and Engineering Research Council of Canada
- **Description:** Most competitive Canadian scholarship in science.
- **Value:** 105 000 CAD (equivalent to 105 000 USD or 8 150 000 JPY, 2012 est.)

Windows Azure Research Award (2013)

- **From:** Microsoft Research

- **Description:** The first group of 32 awards given by Microsoft (1000 applications). Gives a generous access to Microsoft Azure (in my case, Linux VMs) for research purpose.
- **Proposal:** *Growing Intelligence with Cloud Markov Logic.*
- **Value:** >40 000 USD.

NVIDIA hardware donation program (2014)
- **Description:** I was awarded an NVIDIA card for high-performance computing.
- **Proposal:** *Transfer Learning, Deep Learning, and the Puzzle of Biodiversity.*

Refereed Journal Publications

[1] **P Desjardins-Proulx**, I Bartomeus, T Poisot, D Gravel. Combining Ecological Theories with Machine Learning using Fuzzy Logic, 2017.
In preparation

[2] **P Desjardins-Proulx**, I Bartomeus, T Poisot, D Gravel. A simple (and boring) algorithm to effectively predict ecological interactions, 2017.
In preparation

[3] **P Desjardins-Proulx**, T Poisot, D Gravel. Automatic theory revision for ecological interactions with Markov logic, 2017.
In preparation

[4] **P Desjardins-Proulx**, D Gravel, T Poisot. Scientific Theories and Artificial Intelligence, 2017.
bioRxiv

[5] **P Desjardins-Proulx**, D Gravel, T Poisot. Ecological Interactions and the Netflix Problem.
Submitted.

[6] D Beauchesne, **P Desjardins-Proulx**, P Archambault, D Gravel Thinking outside the box: Predicting biotic interactions in data-poor environments.
Vie & Milieu, 2007 (Accepted).

[7] MG Matias, D Gravel, F Guilhaumon, **P Desjardins-Proulx**, M Loreau, T Münkemüller, N Mouquet Estimates of species extinctions from species–area relationships strongly depend on ecological context.
Ecography 37(5): 431-442.

[8] D Gravel, T Poisot, **P Desjardins-Proulx** Using neutral theory to reveal the contribution of meta-community processes to assembly in complex landscapes.
Journal of Limnology 73 (s1).

[9] **P Desjardins-Proulx**, EP White, JJ Adamson, K Ram, T Poisot, and D Gravel. The case for open preprints in biology.
PLoS Biology 11(5): e1001563

[10] R Vergilino, TA Elliott, **P Desjardins-Proulx**, TJ Crease and F Dufresne. Evolution of a transposon in *Daphnia* hybrid genomes. *Mobile DNA* 4-7, 2013.
DOI: 10.1186/1759-8753-4-7

[11] D Ai, **P Desjardins-Proulx**, C Chu, and G Wang. The influence of immigration and dispersal limitation on the repeatability of niche and neutral communities.
PLOS ONE 7(9): e46164, 2012.
DOI: 10.1371/journal.pone.0046164

[12] **P Desjardins-Proulx** and D Gravel. A complex speciation-richness relationship in a simple neutral model. *Ecology and Evolution* 2(8): 1781–1790, 2012.
DOI: 10.1002/ece3.292

[13] **P Desjardins-Proulx** and D Gravel. How likely is speciation in neutral ecology? *The American Naturalist* 179(1):137-144, 2012.
DOI: 10.1086/663196

Other Contributions

[14] **P Desjardins-Proulx**. The case for arXiv and a broader conception of peer-reviews. Invited blog, International Network of Next-Generation Ecologists, 2012.
http://www.innge.net/?q=node/330.

[15] **P Desjardins-Proulx**, JL Rosindell, T Poisot, and D Gravel. A simple model to study phylogeographies and speciation patterns in space, 2012.
arXiv: 1203.1790.

[16] **P Desjardins-Proulx**. A foot in the neutral trap.
Invited comment for *Trends in Ecology & Evolution*, 2012.

[17] **P Desjardins-Proulx**. L'origine de la Biodiversité. Le Mouton Noir, Mai-Juin. Cahier Spécial sur la Biodiversité p.2, 2010. *Selected and republished by Gaia-Presse, a group sponsored by the Université Laval.*

Job Experiences

Research Professional, Canada Research Chair on Terrestrial Ecosystem

- From 2009 to 2012.
- **Supervisor**: Dr. Dominique Gravel
- **Responsabilities**: Programming high-performance simulations in C, C++, and CUDA on a distributed cluster (Xeon processors + Tesla cards); Design ecological models to understand biodiversity; Teaching scientific computing to graduate students (C, C++, CUDA, UNIX tools).

Teaching Experiences

Université du Québec, Québec, Canada.

- 2013. I organized a series of meetings on information theory and inference.
- 2012. CUDA training (intensive one-day course).
- 2012. Scientific computing with C and C++ (grad. students/post-docs).
- 2011. Scientific computing with C and C++ (grad. students/post-docs).

Referee Service

Physica A: Statistical Mechanics and its Applications; Molecular Ecology Ressources; Methods in Ecology and Evolution; Ecology Letters; Journal of Theoretical Biology; Theoretical Ecology; Acta Biotheoretica; The American Naturalist; Journal of Plant Ecology.

Programming skills

I have some experience with many programming languages, libraries, frameworks. I only list here my current working tools:

- **Languages**: *Expert* C++11/14, C; *Intermediate* Rust, Python, Haskell, Scala; *Basic* Java, R, F#.
- **High performance computing**: CUDA, OpenCL, OpenMP, basic MPI.
- **Operating Systems**: Linux (mostly Debian/Ubuntu-based).
- **Cloud:** Azure (Linux VMs), Google, Amazon.
- **Writing**: LaTeX 2_ε.

Graduate Courses

- 2015. Business Intelligence [A, 3 credits] — Athabasca
- 2013. Advanced Distributed Computing [A, 3 credits] — Athabasca
- 2012. Datamining (machine learning) [A, 4 credits] — UIC
- 2011. Biostatistics [A, 4 credits] — UIC
- 2010. Intro. to bioinformatics [A, 4 credits] — UIC
- 2010. Reading course on Ancestral Recombination Graphs [A+, 3 credits] — UQAR

Online Courses	• 2014. Technology Entrepreneurship	NovoEd/Stanford