

Title: Assessing the functional connectivity of highly fragmented temperate deciduous forests through gene flow among populations of two contrasting herbaceous plants

Summary: Habitat fragmentation is a major threat to biodiversity. Nonetheless, habitat fragmentation may have an unequal influence over genetic flow depending on species life history traits and dispersion capacities [1]. Generally, the effects of fragmentation on genetic flow is more pronounced for sessile organisms, compared with more mobile or vagile ones [2], and for specialists compared with generalists [3,4]. The plant species *Geum urbanum* (wood avens) and *Primula elatior* (true oxlip) are common within highly fragmented European temperate forests. They are nonetheless two contrasting models in terms of dispersion abilities and ecological specialisation: *P. elatior* being a notorious forest specialist with limited dispersal abilities. The proposed internship aims at evaluating functional connectivity in a fragmented system (temperate deciduous forests) by means of indirect estimators for these two contrasting model species. Contemporary and past genetic diversity will be measured using cytoplasmic genes (cpDNA – historic genetic variation) and microsatellites loci (contemporary gene flow) [5:7]. Two landscape windows were selected for both the Hauts-de-France region (Thiérache) and the Brittany region (Zone Atelier Armorique): one window is characterized by forest patches interconnected through a dense hedgerow network (locally called ‘bocage’) while the other window is characterized by a highly fragmented system with few to no hedgerows. For the Hauts-de-France region, a third landscape window was selected as a control or baseline unfragmented system based on ‘virtual forest patches’ spread out across a forest matrix. Individuals were sampled in forest patches (or ‘virtual patches’) and in hedgerows during two field seasons (i.e. in 2017 and 2018). Functional connectivity and population genetic structure will be investigated using classic methods (DAPC) [8] and Bayesian assigning tests [9,10] for characterizing genetic structure. The role of landscape features on genetic structure will be assessed by means of correlative approaches and graph-theory methods. The successful applicant will be highly encouraged to propose other analytical methods if he/she deems fit.

The internship fits within the European project Woodnet (BiodivERsA, APR 2017, <https://woodnetweb.wordpress.com/project/>) and the regional project PEGASE (Région Picardie, APR 2016). Those two projects aim at understanding the functional relationships between biodiversity and woody corridors in rural landscapes, at different spatiotemporal scales. The analysis is carried along a range of landscapes from highly fragmented forest systems within agricultural landscapes to more connected systems typical of the so-called bocage.

We seek a highly motivated and curious candidate. The successful candidate will be closely supervised by Professor Annie Guiller, Senior Researcher Jonathan Lenoir and PhD student Pedro Poli during the internship. He/She should be able to work independently. Strong interest in population genetics, landscape ecology, evolution and biostatistics are recommended, meaning that a good background in those domains is desired, but not mandatory. Those skills will be developed during the internship.

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Duration: 6 months

Host Institute: EDYSAN (<https://www.u-picardie.fr/edysan/>) is a mixed research unit of CNRS and Université de Picardie Jules Verne. The research work developed in the laboratory aims at understanding natural and semi-natural ecosystem functioning and impacts environment changes over those systems. We are well placed in Amiens, a nice and active city in the Picardy region. The laboratory has an ongoing partnership with Regional Molecular Biology Centre (CRRBM) that dispose of state of the art equipment and infrastructure.

Supervisor: Annie GUILLER (Professeur), Jonathan Lenoir (CR CNRS) and Pedro POLI (PhD student)

Potential candidates should send a CV and cover letter (in English or French) to: annie.guiller@u-picardie.fr, jonathan.lenoir@u-picardie.fr and pedro.poli@u-picardie.fr

References: [1] Baguette et al. 2013. *Biol. Reviews* 88(2), 310-326 [2] Callens et al. 2011. *Mol. Ecol.* 20:1829-44. [3] Bonte et al. 2003. *Proc. R. Soc. B*, 270:1601-1607. [4] Entling et al. 2011. *Oikos*, 120:1099-1109. [5] Arens et al. 2004. *Mol. Ecol. Notes*, 4:209-212. [6] Van Geert et al. 2006. *Belg. J. Bot.*, 139:261-264. [7] Seino et al. 2014. *Conserv. Genet. Res.*, 6:653-655. [8] Jombart et al. 2010. *BMC Genetics*, 11: 94. [9] Pritchard et al. 2000. *Genetics*, 155 :945-959. [10] Guillot et al. 2005. *Mol. Ecol.*, 5:712-715.