Grand Programme de Recherche BPS | Bordeaux Plant Sciences



## **POST-DOC POSITION**

The genetic bases of phenotypic plasticity: a dynamic approach through time, generations and multiple organisms? (Dynasty)

Starting Date: As soon as possible
Duration: 30 months
Location: UMR Biogeco
Proportion of work: full-time
Salary: 31k€ yearly before-tax salary (approx. 25k€ net)
Desired level of education: PhD
Experience required: PhD + 1-3 years of research experience

A thirty months' position supported by Bordeaux Plant Science (BPS) research program is available in the Biogeco research unit in Bordeaux, France. This post-doc position is one of 19 offered positions as part of Bordeaux University excellence BPS program, which will provide access to many scientific events and resources.

The post-doc project is part of the project 'Genetic determinants of phenotypic plasticity to identify a dynamic approach through time, generations and multiple organisms (Dynasty, WP8)'. The impact of phenotypic plasticity (PP) is largely accepted as a driver of adaptation (Pigliucci, 2005). PP dynamics are a major component in acclimation ability (Nicotra et al 2010) but also in adaptation across generations, particularly for perennial plants (Baker et al. 2017; Auge et al, 2019).

Four technical and scientific questions will be addressed: (Q1) What biostatistics and modelling approaches can be leveraged to analyse response curves involving time series? (Q2) Have reaction norms of the studied organisms evolved over time or generations? (Q3) What is the contribution of the genetic determinants of PP to quantitative trait variation? (Q4) Are PP genetic determinants independent from those of the classical traits used in breeding programs? The post-doc position will be mainly involved in Q1 and Q2.



**Job description:** The aim of the post doc position is to develop mathematical models. These models will be developed for modelling univariate time series and optionally forecasting their evolution. Time series data are already available to characterize temporal trends of PP across different developmental stages. Time series data are available on different models from yeast to tree. Specific bio-statistic

methods will be developed to build models based on time-series data, i.e. daily micro-fluctuations of trunk diameter in maritime pine, transpiration responses induced by water deficit in grapevine rootstocks, monitoring of metabolism in Arabidopsis, infection and in vitro growth time-courses in Fusarium, phenological monitoring over several years for cherry tree and strawberry and fermentation kinetics in Saccharomyces. Time related reaction norms are rarely studied and require specific statistical models. Time-related reaction norms will be characterised for each organism based on the biostatistical methods developed previously. Time series data are already available to characterize temporal trends of PP across different developmental stages. To characterize PP over generations (Fusarium, Saccharomyces and Arabidopsis), new phenotypic assays will be carried out. The selection pressure on the PP will be tested over several generations through experimental evolution designs.



**Environment:** The position is open at UMR BioGeCo, recognised for their expertise in quantitative genetics in forest trees. The project is co-supervised with UMR EGFV, recognised for their expertise on Grapevine. We are located on the plant science campus of the INRAE (French National Research Institute for Agriculture, Food and Environment).

**Bordeaux** is an easy-going and enjoyable UNESCO world heritage city with many cultural, social, sportive events, famous for its vineyards and only one hour away from marvellous sand beaches.



**Skills:** Skills in modelling, biostatistics are expected. Skills/interest in quantitative genetics would be a plus. The person should be able to work independently and have the ability to interact with several partners located on different sites in Bordeaux. A good knowledge of English is required as well as writing and good communication skills.



Selection process: The candidate will submit their application, consisting of a letter of motivation and a CV (including list of publications, if applicable), to Elisa Marguerit and Jean-Marc Gion. The advertisement is valid until the position is filled.



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## Team/lab website:

https://www6.bordeaux-aquitaine.inrae.fr/egfv/ https://www6.bordeaux-aquitaine.inrae.fr/biogeco

## Selected publications:

★ Marguerit E, Brendel O, Lebon E, van Leeuwen C, Ollat N (2012) Rootstock control of scion transpiration and its acclimation to water deficit are controlled by different genes. The New Phytologist 194: 416-429 <u>https://doi.org/10.1111/j.1469-8137.2012.04059.x</u>

★ Labadie M, Denoyes B\*, Guédon Y.\* 2019. Identifying phenological phases in strawberry using multiple changepoint models. Journal of Experimental Botany 70:5687-5701 doi: 10.1093/jxb/erz331.

★ Bartholomé, J., Mabiala, A., Burlett, R., Bert, D., Leplé, J. C., Plomion, C., & Gion, J. M. (2020). The pulse of the tree is under genetic control: Eucalyptus as a case study. The Plant Journal, 103(1), 338-356.

★ Bartholomé, J., Van Heerwaarden, J., Isik, F., Boury, C., Vidal, M., Plomion, C., & Bouffier, L. (2016). Performance of genomic prediction within and across generations in maritime pine. BMC genomics, 17(1), 1-14.



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