PhD position: The role of developmental genetic architecture in shaping evolutionary trends

A PhD position is available in the context of a research project between the laboratory of Christian Braendle (Institut de Biologie Valrose, Nice; http://www.braendlelab.net) and Marie-Anne Félix (Institut de Biologie, Ecole Normale Superieure, Paris; http://www.ibens.ens.fr/spip.php?rubrique29&lang=en).

Project description

Mutation is the ultimate source that generates phenotypic variation. Random mutation, however, does not translate into random phenotypic variation because development limits or biases the mutationally inducible phenotypic spectrum. Hence, the mutationally inducible phenotypic spectrum is fundamental in determining the potential phenotypic trajectories that can be explored by evolution. Whether and how such biases in the introduction of phenotypic variation may influence evolutionary trends – particular directions of evolutionary variation in the phenotypic space – remains extremely poorly understood. In the proposed project, we aim to generate comprehensive empirical insights into the nature and evolution of mutational variance of a developmental system.

This project will therefore investigate how developmental architecture may limit or bias the phenotypic spectrum obtained after random mutation. Whether such biases in the production of phenotypic variation may influence evolutionary trends is poorly understood. Here we address this problem using random mutation lines to explore whether differential mutational sensitivity of developmental cell fates can explain divergent evolutionary patterns in the fates of different homologous vulval precursor cells in two clades of nematodes. This project will (1) quantify mutability of these cell fates in wild isolates of *Caenorhabditis* and *Oscheius*, (2) connect these experimental data with patterns of evolutionary variation in these traits in the two genera, and (3) characterize the developmental genetic basis for this differential mutability. The results will be among the first to causally connect mutability, developmental biology and evolutionary trends. This approach is unique as it integrates molecular and evolutionary genetic analysis at the single-cell level.

The candidate should have a Master's degree in evolutionary or developmental biology and an understanding of the fundamental problems of quantitative and developmental genetics. The PhD student will be expected to conduct full-time independent research in the Braendle lab.

The PhD position is funded by the National Agency of French Research (ANR) for three years, subject to an initial evaluation after 6 months, with a potential one-year extension. The starting date is flexible.

To apply, send a CV, a letter of motivation, and the contact information for two referees as a single PDF file to Christian Braendle (braendle@unice.fr). Informal inquiries are welcome.

For relevant background information see:

Braendle et al. 2010. https://doi.org/10.1371/journal.pgen.1000877
Grimbert & Braendle 2014. https://doi.org/10.1111/ede.12091
Félix & Barkoulas 2015. https://doi.org/10.1038/nrg3949
Besnard et al. 2017. https://doi.org/10.1534/genetics.117.203521