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PhD in Evolutionary Genomics

The Department of Ecology and Genetics is an international environment with staff and students from all over the world. Our research spans from evolutionary ecology and genetics to studies of ecosystems. For more information, see www.ieg.uu.se.

A PhD student position in Evolutionary Genomics is available at the Department of Ecology and Genetics, in the Plant Ecology and Evolution program.

Project description

Structural Variants (SVs) encompass a broad variety of (macro-)mutations from hundred nucleotides up to large parts of chromosomes (e.g., large-scale deletions / duplications, inversions). SVs are so common in eukaryotic genomes that the amount of genetic diversity they explain is higher than that explained by single nucleotide polymorphisms (SNPs). However, mainly for technical reasons, SVs have so far been little studied and our understanding of key evolutionary processes is therefore incomplete. For instance, little is known about the mutation rates of the various types of SVs, their segregation patterns, and how recombination is affected nearby or within them. Similarly, little is known about the distribution of their fitness effects. This knowledge is much needed to understand the evolution of SVs and genome evolution in general.

In this project, two approaches will be used to study SV evolution and its specificities. First, we will take advantage of two major evolutionary transitions that have occurred repeatedly and independently within several plant families, and that can be expected to influence the evolution of SVs. We will test theoretical predictions regarding the effect of mating system evolution and changes in ploidy level on SV evolution using Brassicaceae as study system.

1. Mating system evolution – A comparison of outcrossing and closely related self-fertilizing species will be used to draw inferences about the global fitness effects of SVs.
2. Changes in ploidy level – Comparisons of populations/species of different ploidy levels, (e.g., containing two to four copies of the genome), and an examination of patterns of SV variation in the sub-genomes of the polyploids will be used to explore mutation and recombination rates.

Second, we will take a closer look at the evolution of copy number variations (CNVs), which is particularly poorly known. CNVs are peculiar among SVs because of their multiallelic nature. This means that to characterize the polymorphism, the frequency of different copy number variants needs to be determined. We will combine experimental evolution and designed crosses with comparative genomics and direct genotyping to estimate mutation rates (in terms of change in copy number), and recombination rates, and also to follow the segregation pattern of CNVs.

This project will pave the road for the development of new models of population genetics incorporating the specificities of the various types of SVs.

Duties

The selected candidate will conduct experimental evolution studies using designed crosses in growth chamber, perform wet-laboratory experiments (e.g. DNA/RNA extraction, quantitative PCR), generate and analyze -omics data.

Qualifications required

To meet the entry requirements for doctoral studies, you must

- hold a Master's (second-cycle) degree in Evolutionary Biology, Population and Quantitative Genomics, Computational Biology, or a related field.
- have completed at least 240 credits in higher education with at least 60 credits at Master's level including an independent project worth at least 15 credits, or
- have acquired substantially equivalent knowledge in some other way.

We attach great importance to personal qualities such as initiative, creative thinking, the ability to collaborate and to get involved in the life of the research group and the institute.

Candidates must be able to express themselves very well in English, both orally and in writing.

Qualifications desired

The applicant should master the main concepts in Evolutionary Biology, have a background in population genetics/genomics and a solid foundation in the statistical considerations for these analyses and a taste for bioinformatics. The following skills will be considered a merit: Molecular biology/wet-lab, Programming, Mathematics / Modelling. Please note that a back-ground in Plant Biology is not mandatory.

Rules governing PhD students are set out in the Higher Education Ordinance chapter 5, §§ 1-7 and in [Uppsala University's rules and guidelines](#).

About the employment

The employment is a temporary position according to the Higher Education Ordinance chapter 5 § 7. Scope of employment 100 %. Starting date January 2024 or as agreed. Placement: Uppsala.

For further information about the position please contact: Pascal

Milesi, pascal.milesi@scilifelab.uu.se, Assistant professor.

Application: The application should include 1) a brief letter of intent describing yourself, your research interests and motivation of why you want to do a PhD, and why you are suitable for the position (1 page maximum), 2) your CV, 3) a copy of your master degree, your course grades and a copy of your master thesis, 4) the names and contact information to at least two reference persons (e-mail address and phone no.) The application should be written in English.

You are welcome to submit your application no later than November, 24 2023. UFV-PA 2023/3568.

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relevance to make a difference in society. Our most important asset is all of our 7,500 employees and 54,000 students who, with curiosity and commitment, make Uppsala University one of Sweden's most exciting workplaces.

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Please do not send offers of recruitment or advertising services.

Submit your application through Uppsala University's recruitment system.

Placement: Department of Ecology and Genetics

Type of employment: Full time, Temporary position

Pay: Fixed salary

Number of positions: 1

Working hours: 100%

Town: Uppsala

County: Uppsala län

Country: Sweden

Union representative: ST/TCO tco@fackorg.uu.se

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Saco-rådet saco@uadm.uu.se

Number of reference: UFV-PA 2023/3568

Last application date: 2023-11-24

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