The Netherlands Institute of Ecology in Wageningen (NIOO-KNAW) invites applications for

Two PhD positions in plant epigenetics

The two PhD positions are part of the EU-funded Marie Curie training network EpiDiverse (www.epidiverse.eu) which is led by NIOO-KNAW. This is a cross-European network that involves leading research groups from molecular genetics, ecology and computational biology to investigate epigenetic mechanisms and their adaptive significance in wild plant species. The EpiDiverse network provides an excellent opportunity to receive cross-disciplinary doctoral training and to do cutting-edge research in plant epigenetics. A comprehensive training program is offered to learn molecular, bioinformatic and ecological aspects of epigenome analysis, including dedicated summer schools, workshops and extended exchange visits to different groups in the network. Students will be part of a group of 15 PhD students from across Europe that will all work on similar questions, and that will regularly meet and interact.

Project descriptions for both positions are attached:

- **Life history variation and epigenetic inheritance (EpiDiverse RP9)**
- **Epigenetic contribution to phenotypic plasticity in *Populus nigra* (EpiDiverse RP13)**

Requirements: We seek two bright and enthusiastic biologists with a background in either (molecular) ecology or genetics, and a keen interest in working at the interface of these two disciplines. Candidates from other relevant programs such as computational biology, with a strong interest in ecology and evolution, are also invited to apply. Experience with NGS technologies is a plus, but comprehensive training in both wetlab and computational aspects of epigenomic analysis will be provided. A high standard of spoken and written English is required, as are good quantitative and analytical capabilities, good interpersonal and communication skills, and the ability to work independently and as part of a team. For these Marie Curie network positions some specific eligibility criteria apply: candidates must be within in the first four years after obtaining their MSc degree and may be of any nationality but must not have spent more than 12 months in the 3 last years in the country of the recruiting host institution.

Contact and application information: For questions on the projects, please contact Koen Verhoeven (k.verhoeven@nioo.knaw.nl and www.nioo.knaw.nl/users/kverhoeven). More information, and instructions on how to apply, are on the network's webpage (www.epidiverse.eu). The deadline for applications is 24 November 2017.

The positions are 4y temporary, full-time appointments. Salaries include a mobility allowance and the appointments come with an extensive package of fringe benefits. The Netherlands Institute of Ecology (NIOO-KNAW) is a top research institute of the Royal Netherlands Academy of Arts and Sciences (KNAW). It is located in Wageningen and focuses on fundamental and strategic research on individual organisms, populations, communities, and ecosystems. The PhD student position will be hosted at NIOO-KNAW's Department of Terrestrial Ecology.

PhD project: Life history variation and epigenetic inheritance (EpiDiverse RP9)

Supervisor: Koen Verhoeven
Host Institution: Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, Netherlands
Duration: 48 months
Start date: 1 April 2018

Project description: DNA methylation variants can arise spontaneously, they can be under genetic control, or they can be triggered by environments. In plants, some DNA methylation variants are stable across many generations whereas other variants are very transient. A good understanding of the transgenerational dynamics of DNA methylation variants is essential to understand their impact on heritable traits and their effect on adaptation. Current insight in the transgenerational dynamics of DNA methylation is limited to very few plant species, but it is predicted that these dynamics are not constant between plant species. For instance, plant reproduction mode can have a large effect, because asexual reproduction bypasses some of the epigenetic resetting mechanisms that normally occur during sexual reproduction. Adaptive differences in transgenerational stability may also evolve between species with different life spans or from habitats of different environmental predictability.

In this project, we aim to investigate differences in DNA methylation dynamics between species with different life history traits. Specifically, we will characterize environmental effects and transgenerational stability of DNA methylation and compare these between sexually and asexually reproducing wild *Fragaria* (strawberry) species, and between different Brassicaceae species that differ in life history characteristics (for instance, annual versus perennial) and habitat characteristics. Genomic screening tools will include reduced representation bisulfite sequencing for DNA methylation analysis and RNA-seq for gene expression analysis.

The project will interact closely with bioinformatics and molecular research groups in the EpiDiverse network, with exchange visits planned to the labs of Etienne Bucher (INRA, Angers, France) and Ivo Grosse (Martin Luther University Halle-Wittenberg, Halle, Germany).

PhD project: Epigenetic contribution to phenotypic plasticity in *Populus nigra*

Supervisor: Koen Verhoeven
Host Institution: Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, Netherlands
Duration: 48 months
Start date: 1 April 2018

Project description: In long-lived sessile organisms such as trees, phenotypic plasticity is an important requirement for successful persistence in changing or variable environments. Epigenetic mechanisms have the potential to mediate long-term plastic responses to environmental change. However, the importance of epigenetic mechanisms such as DNA methylation as regulators of adaptive plasticity is not well known.

In this project we will experimentally evaluate effects of stress exposure on DNA methylation, transposable element activity and gene expression in black poplar (*Populus nigra*), with the aim to (1) identify genomic loci that show stress-induced epigenetic modification with functional consequences, and (2) evaluate the temporal stability of such loci, for example across growing seasons. Making use of clonally propagated trees that have grown in contrasting environments, we will also investigate to what extent environment-induced epigenetic differences are transmitted to offspring via clonal propagation (cuttings) versus via sexual reproduction through seeds, using allele-specific DNA methylation analysis.

Experiments will be carried out in close interaction with other *Populus nigra* projects within the EpiDiverse consortium at Marburg University, Germany (lab of Lars Opgenoorth and Katrin Heer) and at the Institute of Applied Genomics and Udine University, Italy (labs of Michele Morgante and Emanuele de Paoli). Exchange visits are planned to these groups, as well as to the lab of Peter Stadler (Leipzig University, Germany) for bioinformatics analysis.