

EpiCrossBorders: Helmholtz-Edinburgh International Research School

'EpiCrossBorders: International Helmholtz-Edinburgh Research School for Epigenetics' is an international graduate school and has a call for **PhD students** at the Helmholtz Zentrum München open for applications **until October 15th**.

EpiCrossBorders was launched by the outstanding epigenetics research hubs of the **Helmholtz Zentrum München** and **Edinburgh University** and is a unique international PhD program centered on epigenetics research.

This year we have projects covering many different aspects of epigenetics:

- Chromatin-Biochemistry
- Computational Biology & AI
- Stem cell development
- DNA Replication & Repair
- Epitranscriptomics
- Epigenetic reprogramming
- Mathematical modelling
- Statistical methods for spatial '-omics'
- **Stress and climate response in plants**
- Single cell and systems biology

All projects are collaborations between Helmholtz Zentrum München labs and partners in Edinburgh and include a stay in the partner lab. The project about "**Stress and climate response in plants**" is described below.

Redox-regulation of epigenetic mechanisms in response to future climate conditions

Global temperatures and harmful atmospheric gases will continue to rise in the decades to come and adversely affect plant physiology, e. g. photosynthesis. The photosynthesis can be termed as the most important physiological process as it enables the conversion of light energy of the sun to chemical energy in the form of carbohydrates, the basis for life on earth. To cope with stressful environmental conditions and to maintain an effective photosynthesis, plants are inducing stress-response mechanisms, including initiation of redox-signaling, epigenetic processes (e. g. histone modifications and DNA-methylation) and transcriptional reprogramming. Despite the recognized importance of cellular redox-mechanisms, the identity and function of the nuclear redox-signaling that is associated with epigenetic processes and stress tolerance mechanisms remains largely obscure.

Moreover, most environmental stress studies in plants have probed only a few climate parameters in isolation. Insights from these studies are difficult to extrapolate to realistic climate conditions. This project aims to address these limitations. We will simulate not only single stress conditions, such as enhanced temperature, drought, ozone or CO₂, but also a combination of

these conditions. Such a complex and more realistic climate scenario will represent anticipated future parameters. We will grow large number of *A. thaliana* wild type plants and plants with impaired redox homeostasis (*gsnor-ko*) under these conditions. The simulation of future climate conditions will be based on real data of the German Weather Service.

Our experimental set up promises to advance our basic understanding of how plant nuclear redox-signaling is functioning in response to changing climate conditions, how the plant epigenome responds to such different climate scenarios, how this response affects plant performance (photosynthesis) and if the redox system in general is a key player at the interface between environment and plant epigenome and phenotypes.

In detail, we want to identify redox-regulated chromatin modifier and analyse, at which genomic regions significant stress-related changes in DNA methylation and histone modifications occur and how these changes affect gene expression in order to adapt plants performance (photosynthesis) to the future climate conditions. In sum, the complex environmental conditions will allow a more realistic insight into plants' response to climate change and how redox-mechanisms coordinate epigenetic processes and transcriptional reprogramming under these conditions.

Questions about the project to:

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EpiCrossBorders offers:

- Fully funded PhD training program tailored to your scientific and professional goals
- Cutting-edge collaborative research projects in Epigenetics
- Munich-Edinburgh collaboration and mobility program as part of your project
- Individual career development support to develop your future career
- Additional funds for creative projects that bridge science and society
- International, vibrant and interactive research environments within the Epigenetics@HMGU and Edinburgh communities
- An interdisciplinary and dynamic professional network that will last beyond your PhD

Please visit our **website** (<https://www.helmholtzresearchschool-epigenetics.org/>) for more information about the program, all the available projects and to **apply**.