Mögliche Msc-These am Insitut für Entwicklungsgenetik / Proposal for a Msc. Thesis at the Institute for developmental genetics

**Master thesis:**

**“Creation of a flexible toolbox for transcriptional gene regulation in plants”**

**Background**

Investigation of the role of specific genes in developmental processes relies heavily on our capacity to modify their expression or the activity of their product. Therefore, numerous tools have been developed, however many shortcomings exist, sometimes making the dissection of gene function difficult or impossible: low efficiency or specificity, constitutive modifications that show many effects throughout the plant’s life cycle.

The last few years have seen the rapid development of the CRISPR technologies, allowing targeted genome editing. One feature of special interest for us about this system is the possibility to use a deactivated version of the CRISPR-associated proteins to target selected protein domains to specific regions of the genome. This allows us to address transcriptional activation or repression domains to the promoter regions of genes of interest in order to modify their expression levels.

However, existing systems lack in flexibility. We therefore aim at creating a flexible expression system for CRISPR-associated proteins that would potentially allow direct transcriptional control of target genes with a high flexibility.

*Relevant literature: Schiml, S., and Puchta, H. (2016). Revolutionizing plant biology: multiple ways of genome engineering by CRISPR/Cas. Plant Methods 12, 8.*

**Objectives**

The project aims at establishing a proof-of-principle for the above-mentioned system and will build on work from previous students:

* Compare the regulatory capacities of various CRISPR-associated nucleases and protein regulatory domains.
* Assess the ability of the system to control gene transcription in a targeted and dynamic manner.

**Methods**

Molecular cloning, plant phenotyping, qRT-PCR, Western blot, confocal microscopy.

**Requirements**

Student in Biology, Biochemistry or related fields with an interest in plant biology, molecular biology and genetics.

Enthusiastic and motivated.

Able to work in partial autonomy.

Knowledge of molecular biology and experience with plants is a plus but not necessary.

**About us**

The AG Simon is a young and dynamic team focused on stem-cell signalling in the root and shoot of *Arabidopsis thaliana*. We use our strong skills on plant genetics, confocal microscopy, and spectroscopy to study peptide signalling through receptor-like kinases during plant development. More information here: <http://www.devgen.hhu.de/unser-team.html>

Applicant will join the Entwicklungsgenetik institute led by Prof. Dr. Rüdiger Simon and will be supervised by Dr. Grégoire Denay.

For questions or applications, please contact Grégoire Denay: gregoire.denay@hhu.de

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