

PhD position in Epigenetic Control of Plant Stem Cell Formation at the University of Freiburg, Germany

We are seeking highly motivated candidates for a newly funded PhD position in plant embryo development. The goal is to investigate how the stem cells of the shoot meristem are formed during embryo development. This project is part of the German Excellence Program awarded to the University of Freiburg (<https://www.cibss.uni-freiburg.de>). The PhD position covers the entire length of the PhD (typically 3-4 years) providing a competitive salary, health care and additional benefits. The program includes participation in international scientific meeting and training courses.

Background: Unlike most animals where stem cells give rise specific cell types, stem cells in the plant shoot meristem give rise to new complete organs throughout their lifespan. Furthermore, many differentiated plant cells can undergo dedifferentiation and give rise to new meristems if necessary. These phenomena make totipotency of plant stem cells a fascinating area of study. We have previously shown that the stem cells of the shoot meristem are regulated by the homeodomain transcription factor WUSCHEL, which turned out to be a universal mechanism to control totipotency in plants¹⁻³. One longstanding question in stem cell research is: how are totipotent stem cells made in the first place and how are they organized into a functional meristem? We have recently shown that the initiation of shoot meristem stem cells during embryogenesis is controlled by a WUSCHEL-related transcription factor that fine tunes the balance of the phytohormones auxin and cytokinin⁴. During this process the precursor cells of the stem cells are epigenetically primed to become totipotent.

Goal: Understand the genetic and epigenetic networks that establish shoot meristem stem cells during embryo development in the model plant *Arabidopsis*:

- (1) Analyze the transcriptome dynamics and epigenetic changes during stem cell initiation.
- (2) Use synthetic biology to simulate stem cell formation.
- (3) Collaborate with international partners for the agricultural use of meristem formation.

Methods:

Genetics: crosses, segregation analysis. Developmental studies: phenotype analysis, confocal microscopy of gene expression, live imaging. Molecular biology: besides standard methods, the project will provide training in transcriptome and chromatin analysis. Bioinformatic: analysis of deep sequencing data, meta-analysis of different data sets.

Lab details: Our lively team has members of different countries and the lab language is English. German is not required. For further information, also on our publications, please visit our homepage (www.biologie.uni-freiburg.de/LauxLab). The University of Freiburg is routinely among the best German Universities in international rankings. The PhD program offers diverse courses and workshops for career planning and academic practices. Advanced facilities for systems biology, protein analysis, and imaging are available. Group activities include scientific (e.g. annual retreat) and recreational events (sports, hiking, BBQ). The city of Freiburg is located in the Black Forest, next to France, Switzerland, and the Alps, which provides many opportunities for outdoor activities.

How to apply: Please send your CV including your research experiences and your future interests to Thomas Laux (laux@biologie.uni-freiburg.de).

- The Position will be open until a suitable candidate has been found -

References cited: (1) Schoof, H. et al. *Cell* 100, 635-644 (2000). (2) Mayer, K. F. X. et al. *Cell* 95, 805-815 (1998). (3) Sarkar, A. et al. *Nature* 446, 811-814 (2007). (4) Zhang, Z. et al. *Dev Cell* 40, 264-277 (2017).