

## Master's project - Plant Development and Evolution

In sharp contrast to most animals, plants are “born” only with a handful of organs and forms (and kills) new tissues and organs throughout their life in response to environmental factors, as well as predetermined genetic programs. This is largely a consequence of plants sedentary life style. A land plant needs to foresee and adapt to the changing environment of its growth location to survive. This continual re-design of an organisms body plan makes plants very interesting study organisms for developmental biologists.

The Lagercrantz and Eklund groups at the Evolutionary Biology Centre at Uppsala University want to understand the evolution of mechanisms regulating various developmental processes in land plants. For this, we currently use the emerging model species *Marchantia polymorpha*, a liverwort. The liverwort lineage separated from other land plants some 450 mya, about the same time as plants are believed to have colonized land, and there is evidence suggesting liverworts have retained many of the features of the ancestral land plants.

Ongoing research aims to compare developmental programs in *Marchantia* with those of flowering plants, to identify and characterize similarities and differences. A long term aim is to use *Marchantia* in plant sciences in a similar way as *Drosophila* or zebrafish are used as model species in animal sciences - as a low-complex system for studying fundamental biological problems common to all plants. Knowledge from *Marchantia* could subsequently be used in projects focusing on application of basic sciences, to improve e.g. crop quality.

The specific details of the project plan can be settled together with you, based on what is available at the moment and also based on your interests and competencies.

Projects available in 2017 may include 1) creating and phenotyping mutants of regulatory genes using CRISPR or TALEN-mediated genome editing, together with advanced microscopy, 2) study endogenous miRNA function using luciferase reporters, gain/loss-of-function alleles and other molecular tools, 3) use inducible gain-of-function alleles together with qRT-PCR and possibly RNAseq to study transcription factor function during growth, 4) genome assembly and comparative genomics of related *Marchantia* species, 5) investigations of light-regulated growth in *Marchantia*, 6) studying the roles of the circadian clock in *Marchantia*.

For more information on ongoing work and possible projects, please contact us.

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