Description for the general public

Despite complexity of a plant body that develops throughout the whole plant lifetime, its parts are highly iterative and predictable. Such forms have to be somehow specified. Although environmental signals can modify plant body development, the internal specification that ensures continuity and integration of the form, has to play a key role. Arrangement of organs (leaves or flowers) at the shoot and the vascular network are examples of these predictable ordered systems that are integrated with the existing plant body. The main idea of this project is that ***pre-existing structures guide emerging forms***. More specifically, we propose ***that vascular system provides clues for formation of new organs and their pattern at the shoot apex and establishment of various vein patterns at leaves.*** The central part of these clues would be related with a key plant hormone - auxin that is known to be a major regulator of plant organogenesis and vasculature formation.

Our project spans **empirical approach** to reveal signals for plant patterning including 3-D live imaging of plant structures of different monocot and dicot plant systems, quantitative analysis of gene expression and cellular processes (such as growth or divisions), microsurgery experiments and chemical treatments with **theoretical approach** including physical-mathematical models and computer simulations to explore relations between signalling and growth at the cell, tissue, and organ levels. In this **interdisciplinary** project we aim at finding mechanisms of auxin transport at the **multiscale levels** and providing general principles of plant patterning at the shoot apex and leaves.