Thursday seminar, Department of Experimental Plant Biology seminar room

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From the Cradle to the Grave - Endodermal CASP domains Coordination of a Subcellular Structure throughout a Tissue Layer

In terms of function, the root is recognized as a selectively absorbing organ for water and inorganic nutrients. *Arabidopsis thaliana* roots are formed by groups of dividing cells, in which certain cells in distinct positions continuously generate more cells of a distinct fate. The epidermis is the outermost cell layer, which is in contact with the soil and - by its root hair extensions - represents the major site of water and mineral uptake. The endodermis is an inner cell layer that surrounds the central vasculature of the root and acts as a diffusion barrier. In endodermal cells, a family of transmembrane proteins, called 'CASPs' (Casparian strip membrane domain proteins), specifically mark a membrane domain and predict the formation of Casparian strips, functional equivalents of junctional diffusion barriers in animals. CASPs, after being accumulated in endodermal cells, rapidly pass from a random distribution at the plasma membrane into a string-of-pearl stage that concatenates into a longitudinal ring. Although previous research described the importance of CASPs for Casparian strip formation in the endodermis, we are still lacking information on how the tight coordination of CASP rings between individual cells is achieved. In this study, we provide a comprehensive overview on CASP1 trafficking, polar localization and the necessity of cell-to-cell interactions important for CASP1 stabilization. Guided by CASP localization, the CS cell-wall impregnation is built and the highly stable CASP1 can subsequently become mobile again and be targeted to the lytic vacuole. This process depends on post-golgi trafficking, the actin cytoskeleton and the ubiquitin-dependent pathway. Our results provide novel insights into how synchronized protein trafficking contributes to the dynamic generation of multicellular patterns in plants.

Peter Marhavý has spent his postdoc in Lausanne in the group of Prof. Niko Geldner. He was focused on the mechanisms of CASPs proteins localization, as well as on the mechanisms by which internal and external signals are integrated into the distribution of them in order to generate a multicellular tissue. Soon, he is going to establish an independent group in the Umeå Plant Science Centre, Sweden. Peter obtained his bachelor (2006) and master (2008) degree in Comenius University, Faculty of Natural Sciences in the department of Molecular Biology with specialization on *Acetobacter* identification. He finished his PhD in 2012 in the group of Eva Benková in VIB Department of Plant Systems Biology, Ghent University, Belgium, identifying a novel pathway for cytokinin regulation of PIN1 auxin efflux carrier lytic degradation.