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## Review about the Dissertation of Zdenka

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## Kubatova:

„FUNCTIONAL ANALYSIS OF SELECTED EXO70  
EXOCYST SUBUNITS IN PLANTS “

As topic for her research, Mgr Kubatova focused on cell wall formation and secondary cell wall thickening in plant cells. For this aim, she selected trichomes of Arabidopsis as models and studied the role of the exocyst complex in general and especially of the EXO70H4 subunit. Interestingly, not much is known about the basic characteristics of cell wall thickening during cell maturation, and especially also about the questions of callose deposition and the formation of the so-called Ortmannian ring.

Results of her investigations are presented as three published research articles and several additional observations which appear also very interesting and deserve further publication. In addition, she proves her vast knowledge about literature from the field by giving a concise introduction to the Thesis, and by publication of a comprehensive review about EXO70 in land plants in general.

In a multidisciplinary approach, Mgr Kubatova combined light and electron microscopy with molecular techniques and discussed her results critically. She thus contributed substantially to our understanding of cell wall formation and localized callose deposition:

(1) Trichome membranes are polarized: in apical and basal zones of the trichomes, two different plasma membrane domains were described with different lipid compositions. (2) Callose formation and a special thickened zone in the base, which they named the Ortmannian ring, co-localize with EXO70H4 microdomains which proves that exocyst is key player for callose synthase delivery to the plasma membrane. (3) Only where callose is deposited silicon can be added to the cell wall. (4) Cell wall thickening not only depends on EXO70H4, but in addition is also stimulated by UV-B irradiation. (5) ROS are localized to a zone above the Ortmannian ring and also in the apices of the trichomes, and also heavy metals such as zinc and cadmium are found there. Their deposition seems to depend again on EXO70H4.

Callose plays important roles in plant defence against pathogens and also against abiotic stress, wherefore the research of Mgr Kubatova may be of specific interest for agriculture to understand details about the regulation of callose synthase and the deposition of callose. In addition, the work

confirmed the trichomes of Arabidopsis as excellent models for the general study of the cell wall formation.

Results in the Thesis focus on the plasma membrane and the deposition of extracellular matrix. If I should ask a question beyond this topic, I would be interested about information of the organization of the cytoplasm inside trichomes during cell wall formation and cell wall thickening.

In summarizing, I may state that the Thesis of Mgr Zdenka Kubatova is of outstanding quality and very high scientific merit. The candidate is able to use a multitude of techniques in order to investigate structural, physiological and molecular questions, and she critically discussed her results. Her Thesis is definitely very suitable to award her a PhD title. I would rate it with "Excellent" or "Very Good", depending on the regulations of the Thesis Committee.

Sincerely



Irene Lichtscheidl

Head of the Core Facility of Cell Imaging and Ultrastructure Research