Evaluation of the PhD Thesis by Ivan Kulich:

**Conventional and Novel Functions of the Plant Exocyst Complex**

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PhD Thesis of Ivan Kulich is composed of 29 pages of the general text, including the *Abstract*, 12 pages of the *Introduction, Aims of the Project, Article Summaries*, and 10 pages of the *Discussion*, followed by the *Literature Cited*. The main part of the Thesis consists of 4 papers published in the internationally relevant journals. The central topic of his PhD Thesis, as well as of these four papers, is the role of Arabidopsis exocyst complex in polar secretion of plant cells. In two of these papers, Ivan Kulich is the first author and these represent the central part of his Thesis. One was published in 2010 in the New Phytologist and deals with polarized deposition of the seed coat pectin. The second first-author paper was published just recently in the Traffic and it reports on the participation of the exocyst complex in autophagy-related events in vacuoles. He is also co-author in two other papers, one focusing on plant-pathogen interactions (published in Journal of Experimental Botany in 2011) and another one dealing with PIN proteins recycling and polar transport of auxin in roots of Arabidopsis (published in Plant Journal in 2013).
All four papers report very important results which expand significantly our understanding of the exocyst complex in plants. Ivan Kulich accomplished his studies in the group headed by Viktor Zarsky and Fatima Cvrckova, which discovered and accomplished early studies on these very important proteins of eukaryotic cells some 10 years ago. This very stimulating and creative environment allowed Ivan Kulich to perform his very interesting and important studies. Both papers in which he is the first author report on surprising roles of exocyst in the seed coat formation and in the vacuolar autophagy. I am not exaggerating by stating that Ivan Kulich opened new avenues not only in plant sciences but also in general topic of eukaryotic exocyst complex. But also the two other papers, in which Ivan Kulich acted as the co-author, report on very important aspects of plant exocyst complex as related to the polar transport of auxin and to the plant immunity and defence based on the polar secretion driving papilla formation. The Thesis by Ivan Kulich fulfills all the criteria required from the PhD Thesis and I am very happy to suggest its acceptance after his public defense.

I have few questions and comments:

1/ Could it be that papilla formation bears some similarities to the vacuolar autophagy? It is know that papillae are composed of heterogeneous structures, often showing vesicular and membraneous structures.

2/ Autophagy in animal/yeast cells is often supported by endosomes. Can you exclude any role of endosomes in the vacuolar autophagy organized by EXO70B1?

3/ Could you imagine that EXO70A1 interactior ROH1 is acting, similarly as BPS1, also in the long-distance communication?

4/ As pectin is very important component for the polarized tip-growth, EXO70A1 / ROH1 might control the tip-growth not only via polarized secretion but also via recycling of cell wall
pectins, similarly as it is the case of root apex cells in the transition zone, or cytokinetic cells during cell plate formation.

5/ What might be the relevance of localization of EXO7B2 and EXO70H1 in nuclei?

6/ Why is only rootward, but not shootward, polar transport compromised in the \textit{exo70A1} mutant roots? As both PIN1 and PIN2 recycling is affected one should expect inhibition also of the shootward polar auxin transport.