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## **Plant Agc protein kinases orient auxin-mediated differential growth and organogenesis**

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## Stellingen

*Behorende bij het proefschrift*

### **Plant AGC protein kinases orient auxin-mediated differential growth and organogenesis**

1. The results showing that PINOID kinase activity and its subcellular localization are controlled by calcium and calcium binding proteins indicate that a regulatory loop facilitates alterations in PIN polarity in response to environmental signals.

*This thesis*

2. The observation that PDK1-mediated phosphorylation of PINOID acts as a trigger to activate and translocate PINOID to different subcellular compartments indicates that PINOID phosphorylates target proteins at other positions than the plasmamembrane.

*Zegzouti et al. (2006) PNAS 103, 6404-6409*

*This thesis*

3. The localization of PINOID at microtubules is in line with the possible involvement of microtubules in the regulation of intracellular trafficking of PIN proteins and the establishment of cell polarity.

*Boutte et al. (2006) J. Cell Sci. 119, 1255-1265*

*Kleine-Vehn et al. (2008) Molecular Plant 1, 1056-1066*

*This thesis*

4. The four members of the Arabidopsis AGC3 protein kinase subfamily act both redundantly and differentially in directing polar auxin transport by phosphorylating PIN proteins.

*Cheng et al. (2008) PNAS 105, 21017-21022*

*Michniewicz et al. (2007) Cell 130, 1044-1056*

*This thesis*

5. In silico modeling provides a useful tool to simulate how certain components in signaling might contribute to plant development, nevertheless one has to realize that this is limited by computing complexity, mathematical equations, and pre-established assumptions that might not reflect nature.

*Prusinkiewicz and Rolland-Lagan (2006) Curr. Opin. Plant Biol. 9, 83-88*

6. In contrast to what is stated by Dicks and coworkers, arrays of peptides that represent known protein kinase substrates are not reliable tools to establish the substrate specificity of a kinase.

*Diks et al. 2004 J.B.C. 279, 49206-49213*

7. Even in the Darwin year (2009) while it is well established that ‘The power of movement in plants’ resides in environmental signals modulating auxin transport surprisingly little is known about the signaling pathways involved.

*Darwin and Darwin (1880) London: Jonh Murray*

*Friml et al. (2002) Nature 415, 806-809*

*Luschnig et al. (1998) Genes Dev. 12, 2175-2187*

*Abas et al. (2006) Nature Cell Biology 8, 249-256*

8. Understanding how roots grow and develop when subjected to different abiotic stimuli is a challenging and essential question in plant biology and crucial in the discovery of new traits with potential for improvement of agricultural productivity.

*Mahajan and Tuteja (2005) Arch Biochem Biophys 444,139-58*

*Wang et al. (2003) Planta 218, 1-14*

*Sun et al. (2007) Plant Physiology 146, 178-188*

9. “By three methods we may gain wisdom: first, by reflection, which is noblest; second, by imitation, which is easiest; and third, by experience, which is the most bitter.” (*Confucius*). Science requires equal parts of each method.

10. A successful PhD student requires a good scientific question, good planning and hard work, but still have in mind that: “You can't always get what you want, and if you try sometime you find, you get what you need” (from Rolling Stones, 1968).

11. With his statement “The greatest reward for doing is the opportunity to do more.” Dr. Jonas Salk expresses exactly how it is to do scientific research.

12. A scientific career, as in life, is made up of many good and bad moments, but I can only feel gratitude for every single one which I have encountered.

Carlos Samuel Galván Ampudia, 2009