Characterization of Nod factor receptor LYK3 protein-interaction networks during early symbiotic signaling in Medicago truncatula

From 2011-06-01 to 2014-05-31, closed project

Objective

Legumes are able to enter nitrogen-fixing symbiosis with rhizobial bacteria. The use of legumes in agriculture offers a number of advantages, including improvement of soil quality and the avoidance of chemical nitrogen fertilizers, which makes them a key element in sustainable agricultural systems. The rhizobium-legume symbiosis provides a unique experimental system in which to interrogate a signal transduction pathway which affects many fundamental aspects of plant biology. Host perception of rhizobial elicitors, called “Nod Factors”, trigger fluctuations in calcium, alterations in the cytoskeleton, and membrane trafficking. These processes culminate in the formation of a new plant organ specialized in nitrogen fixation called nodule. In recent years, genetic screens in the model legume Medicago truncatula have led to the identification of a number of mutants affected in early signaling responses. Among the genes identified are NFP and LYK3, which encode Nod factor receptor kinases essential for nodulation. Nevertheless, how these receptors perceive and relay the Nod factor signal to each other and to unidentified, downstream effectors of nodule development remains to be established. The main research objective of SymBioSignal is to identify novel elements of the Nod factor signal transduction pathway by analyzing the proteins that interact with the Nod factor receptor kinase LYK3 in M. truncatula. This will involve: (1) the identification of protein targets using tandem affinity purification approaches in combination with mass spectrometry; (2) the characterization of the functional relevance of the interacting proteins and their relationship to early symbiotic responses by means of reverse genetic, cell biological and biochemical studies. Knowledge gained in this project will be beneficial not only for the rhizobium-legume research community, but also for the community investigating cellular signalling in other systems.

Related information

Molecular signature of plant–bacteria symbiosis

Final Report Summary - SYMBIOSIGNAL (Characterization of Nod factor receptor LYK3 protein-interaction networks during early symbiotic signaling in Medicago truncatula)
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**Subjects**

Education and Training - Life Sciences

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