

澳大利亚昆士兰大学 Peter M Gresshoff 教授学术报告

题目: *Molecular Genetic Control of Nodule Development in Legumes*

时间: 2014年6月15日上午10:00

地点: 西南大学蚕学宫报告厅

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Summary

Legumes can enter into a symbiotic relationship with rhizobia resulting in the formation of nitrogen fixing root nodules. Legumes regulate the number of nodules they form via the Autoregulation Of Nodulation (AON). AON commences following rhizobia-inoculation or nitrate-treatment with the production of a root-derived signal called Q, which is perceived in the leaf resulting in the production of the Shoot Derived Inhibitor SDI. Using induced mutagenesis of soybean we isolated stable plant mutants either with increased (supernodulators) or zero (non-nodulators) nodules. We positionally cloned the mutated genes and identified the two LysM receptor kinase genes *NFR1a* and *NFR5a*, as well as the Leucine-rich repeat (LRR) receptor kinase gene *GmNARK* for supernodulation control. We have identified and characterized soybean root-to-shoot Q candidate genes encoding CLAVATA3/ESR related (CLE) peptides that exhibit increased expression following rhizobia inoculation or inhibitory nitrate treatment. Overexpression of these genes greatly reduces soybean nodule numbers, but not in *GmNARK* mutants. One factor produced in the shoot following CLE perception by *GmNARK* is a novel signaling compound called the Shoot-Derived Inhibitor (SDI). Once synthesized, SDI is subsequently transported from the shoot to the root where it inhibits continued nodule development. We found SDI to be NARK- and Nod factor-dependent, heat stable, small, and likely not a peptide or RNA molecule. Findings regarding our progress in identifying and characterising the abovementioned nodulation factors will be presented.

Biography

Peter Gresshoff obtained a BSc in Biochemistry and Genetics from the University of Alberta (1970), a PhD in Plant Somatic Cell Genetics from the Australian National University (1973), and a DSc for Nodulation Genetics from ANU (1989). He was appointed as endowed Racheff Chair of Excellence for Plant Molecular Genetics in 1988 at the University of Tennessee Knoxville, then (1999) Head of Botany, The University of Queensland. Since 2003, he is Director of the Centre for Integrative Legume Research (CILR) at UQ. Gresshoff is a plant developmental geneticist, using molecular and genetic tools to understand complexities of gene networks during the control of nodule formation in legumes (c.f. Ferguson et al, 2010, JIPB). Recently he engaged translational biology focusing on sustainable production of biofuel from the legume tree *Pongamia* (c.f., Scott et al, 2008 BioEnergy Research; Biswas et al, 2014 IJMS). He is a Fellow of AAAS, Indian NAAS, Russian AAS, and was nominated for the Australian Academy of Science. He was awarded twice the German Alexander von Humboldt Fellowship. Professor Gresshoff has published over 350 peer-reviewed papers, edited 10 books, and holds 12 patents. His h-index is 54, with over 13,000 citations.