

# A KJELDGAARD LECTURE



**Thursday 21 May 2015 at 11:45**

AIAS auditorium (1632-201)

Same location for the PhD session



**Luis M. Rubio**

Centre for Plant Biotechnology and Genomics  
Madrid

## Nitrogenase Biotechnological Applications

Nitrogenase is one of the most heavily studied proteins. This is not only because it serves as model to study metalloprotein biosynthesis and catalysis, but also due to its enormous ecological and agronomical importance. Biological N<sub>2</sub> fixation, catalyzed by nitrogenase enzymes, is an essential part of the N cycle that accounts for about two-thirds of the total fixed N<sub>2</sub> (most of the remainder is due to the Haber–Bosch process) and can be split into a natural component of the biosphere and an anthropogenic component promoted for agricultural purposes.

The awareness that biological nitrogen fixation could be used as alternative to the synthetic N fertilizers in the implementation of modern sustainable agricultural practices is another underlying driving force of nitrogenase studies. The extensive use of synthetic N fertilizers in developed countries poses enormous environmental threats that must be addressed. In contrast, N fertilization is scarcely used in Sub-Saharan Africa deriving in very low crop yields, poverty and hunger.

An ambitious challenge of plant biotechnology is to increase cereal crop productivity by engineering plants to fix their own nitrogen, i.e. by functional expression of bacterial N<sub>2</sub> fixation (nif) genes in the plant. The apparent complexity of nitrogenase biosynthesis and its sensitivity to O<sub>2</sub> are the main barriers identified so far. However, recent advances in our understanding of nitrogenase biosynthesis offer a new perspective over this ambitious agronomical objective.

Nitrogenase is also regarded as a promising source of bio-H<sub>2</sub>. A new strategy to improve nitrogenase H<sub>2</sub> production by implementing high throughput selection of randomly generated variants with altered catalytic properties will be discussed.

**Host:** Simona Radutoiu, Plant Molecular Biology,  
Department of Molecular Biology and Genetics, Aarhus University

**The lecture will be followed a chalk-board session for PhD students**

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