Extracellular small RNAs in host-bacteria interactions

Lionel Navarro

Institut de Biologie de l'École normale supérieure (IBENS), 75005 Paris, France.

Abstract

Extracellular plant small RNAs (sRNAs) act as triggers of RNAi in interacting fungal and oomycetal pathogens. However, whether these extracellular RNA species direct gene silencing in plant-associated bacteria, which are thought to lack a canonical eukaryotic-like RNAi machinery, remains unknown. Here, I will present recent findings from the lab demonstrating the occurrence of a cross-kingdom RNAi phenomenon implicating the trafficking of sRNAs from plant cells towards bacterial cells. In particular, I will report on the vesicular and non-vesicular extracellular sRNAs that are causal for this gene regulatory process. Finally, I will touch upon approaches that are currently developed to translate these discoveries towards novel solutions to control bacterial infections in plants and mammals.

Biosketh

2001-2005: PhD at The Sainsbury Laboratory (TSL) sudying flagellin-triggered signaling in Arabidopsis
Major findings:

. Tight interconnection between PTI and ETI transcriptional responses
. Role of DELLA proteins in controlling SA-JA cross-talk signaling and plant immunity
. Identification and characterization of the first miRNA implicated in antibacterial defence

->Irene Manton Prize (from the Linnean Society of London)

2005-2009: Post-doc at IBMP, Strasbourg, France.

Seminal work on the identification and characterization of bacterial suppressors of RNA silencing (from a phytopathogenic Pseudomonas syringae strain).

- 2010: Group leader at the Institut de Biologie de l'Ecole normale supérieure (IBENS, Paris), as part of an ATIP-Avenir grant funded by the "Fondation Bettencourt Schueller"
- 2011: ERC StG Laureate
- 2011: Laureate of the "Fondation Shlumberger pour l'éducation et la recherche".
- 2014: EMBO YIP laureate
- 2016: Research Director at CNRS
- 2024: Laureate of the "Palmarès des inventeurs 2024".

Current research topics in the lab:

1) Active DNA demethylation in plant immunity
2) How bacterial effectors suppress miRNA activity and how host cell counteract this effect
3) exRNAs in host-bacteria interactions