

# Sujet de stage Semestre 4 - Master 2<sup>ème</sup> année

## IBMP | 2025-2026

### Titre/Title

*English* : Temporal Dynamics of AGO3 Induction by Bacterial Infection and Proteasome Inhibitors

### Contacts

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### Project Description (20 lines max.)

*English* :

This project will investigate the temporal dynamics of AGO3 induction during bacterial counter-defense mechanisms in *Arabidopsis thaliana*. Plants have evolved sophisticated epigenetic defenses involving DNA demethylation to activate resistance genes during pathogen attack. However, bacterial pathogens deploy virulence factors like Syringolin A (SylA) to counteract these defenses by inducing reproduction-specific epigenetic machinery, particularly AGO3. This project will characterize AGO3 protein accumulation and expression patterns using time-course Western blots and live confocal imaging following treatment with proteasome inhibitors and infection with different *Pseudomonas syringae* strains. The student will compare AGO3 induction kinetics between chemical inhibitors (Bortezomib, Epoxomicin, MG132) and bacterial strains varying in effector production capacity (Pst DC3000, Pst HrcC-, Pss B728a, Pss SylC-). Using transgenic reporter lines (pAGO3:FHA-AGO3, pAGO3:GFP-AGO3, pAGO3:GUS), the project will map tissue-specific and subcellular localization changes of AGO3 during infection. This work directly contributes to understanding how bacteria hijack plant reproductive epigenetic machinery to suppress immune responses, revealing novel mechanisms of pathogen counter-defense.

**Methodes:** Western blot, confocal microscopy, bacterial infection assays, GUS staining, time-course analysis.

#### Références :

1. Bonnet DMV, Tirot L, Grob S, Jullien PE: Methylome response to proteasome inhibition by the *Pseudomonas syringae* virulence factor Syringolin A. *Molecular Plant-Microbe Interactions* 2023.



2. Jullien PE, Grob S, Marchais A, Pumplin N, Chevalier C, Bonnet DMV, Otto C, Schott G, Voinnet O: Functional characterization of Arabidopsis ARGONAUTE 3 in reproductive tissue. Plant Journal 2020.
3. Yu A, Lepère G, Jay F, Wang J, Bapaume L, Wang Y, Abraham AL, Penterman J, Fischer RL, Voinnet O, et al.: Dynamics and biological relevance of DNA demethylation in Arabidopsis antibacterial defense. Proc Natl Acad Sci U S A 2013, 110:2389–2394.

Illustration (1 photo ou 1 schéma, petit format)

**Parcours de Master** (cochez le ou les parcours souhaités) :

Master « Sciences du Vivant », Faculté des Sciences de la Vie, Université de Strasbourg

- 1- **Biologie et génétique moléculaire** : X
- 2- Microbiologie : X
- 3- Plantes, biologie moléculaire et biotechnologies : X
- 4- Plantes, environnement et génie écologique :
- 5- Plantes, molécules bioactives et valorisation : X
- 6- Virologie :
- 7- Autres masters équivalents en France ou à l'étranger : X