



UNIVERSITÉ
DE LORRAINE

SIReNa



Host laboratory: UMR 1136 Tree-Microbe interaction, team “Stress response and redox regulation”

PhD supervisors: Rouhier Nicolas (Univ. Lorraine) - Olivier Keech (University of Umeå, Umeå Plant Science Centre)

Grant type : Lorraine University excellence (LUE) International program

Assembly of the respiratory complex I in plants

Iron-sulfur (Fe-S) clusters ensure electron transfer reactions, activate substrates for catalytic reactions, or provide sulfur atoms for the biosynthesis of vitamins among other functions. Mitochondria are organelles where the Fe-S cluster demand is high, notably because the respiratory electron transport chain relies on the correct assembly and functioning of 8 Fe-S clusters in complex I, 3 in complex II and 1 in complex III. While the function of these complexes is universally conserved, differences exist when comparing their composition in fungi, animals and plants.

In plants, the complex I is composed of ~40-50 proteins that form a membrane-embedded arm and a matrix arm that protrudes into the matrix. In this complex, the 8 Fe-S clusters are bound by 5 subunits localized in the peripheral arm. The assembly of complex I is a sophisticated, stepwise process; and strong growth defects are observed in plants (severe disease in humans) when assembly is impaired. Building blocks (or assembly intermediates) are initially formed and later assembled together to form the whole complex. While many assembly factors (proteins that will not be retained in the final complex) have been identified in plants, both for the insertion of Fe-S clusters into apoproteins and for the insertion of subunits themselves, their exact roles remain mostly unknown.

In this project, the incumbent will employ genetic and physiological approaches (expertise of Dr O. Keech) as well as biochemical and structural approaches (expertise of Pr N. Rouhier) in order to delineate the function of some putative selected complex I assembly factors in the model plant, *Arabidopsis thaliana*. This project aims at better understanding the molecular mechanisms coordinating and regulating the assembly of this complex, and at assessing the extent to which these mechanisms can affect the mitochondrial energy metabolism under steady-state and stress conditions.

Since this work is in collaboration between two universities, the incumbent will be carrying out research both at the University of Lorraine (Nancy, France) and at the Umeå Plant Science Centre (Umeå, Sweden). However, the PhD student will be officially enrolled at University of Lorraine. The position is (initially) limited to three years. We are looking for a motivated person who has obtained a master in biochemistry, molecular biology, plant biology or any other relevant field and should demonstrate basic skills in bio-informatics and statistics.

Please send the here below documents (all in one PDF file) by e-mail to: Nicolas.Rouhier@univ-lorraine.fr, olivier.keech@umu.se, before July 1

1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed.

For non-EU candidates: Copy of your passport page where your personal details are presented.

2) Curriculum Vitae including previous experience and technical skills.

- 3) Letter of motivation relatively to the position (1 page).
- 4) Copy of your Master degree and/or Engineer degree if already available.
- 5) Copy of your final marks and ranks.
- 6) Coordinates of reference persons (maximum 3, among which your master thesis supervisor):
Title, Name, organization, e-mail.