



Me2

Microbiota Experimental Evolution under plant selection

Project leader: Cyril BONTEMPS / Pierre LEBLOND, UMR Dynamique des génomes et adaptation microbienne (DynAMic)

LabEx partners: Claire FOURREY, UMR Interactions Arbres/Micro-organismes (IAM)

Collaborations:

- Dominique Schneider (Prof.), TIMC-IMAG, Génomique et Evolution des Microorganismes, Université Grenoble Alpes
 - Michiel Vos (Senior lecturer), European Center for Environment and Human Health, University of Exeter, Great Britain.
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Context —

It is now increasingly recognized that the health and resilience of trees and forests crucially depend on their associated microflora. By studying bacteria from a plant microbiota, we recently showed that these latter can massively exchange genes by horizontal transfers at the population level¹. If those fast-evolving processes are a key to adaptation, little is known, on the other hand, regarding the biotic factors that influence them.

Objectives —

This project aims to decipher the evolutionary and adaptative responses occurring between plants and their microbiota. This will shed light i) on the genomic changes (*e.g.* gene fluxes) occurring in a bacterial population under the plant selection and ii) the pay back return that could benefit the plant from these evolutionary processes.

Approaches —

We will mimic evolutionary processes with Long-Term Evolution Experiments (LTEEs) that consist in propagating microorganisms under controlled conditions over many generations. LTEEs will be performed using recombinogenic strains (*i.e.* able to exchange genes) isolated from a *Streptomyces* rhizospheric population and plants (or their exudates) will be used as selective pressures. After several generations, evolutionary innovations will be detected by genomic comparisons of the evolved populations with the ancestral strains. The impact on these processes on plant health (growth promotion, pathogen inhibition, mineral solubilization...) will be tested with physiological tests.

Expected results and impacts —

This project will enable (i) to determine whether the plant stimulates genetic exchanges among the rhizospheric community, (ii) to test if the plant rather selects a particular genotype or a diverse population, and (iii) to test whether the evolved bacterial strains provide an advantage, individually or collectively, to the plant in terms of health and growth. This overall project will thus shed light about the interplay existing between plants and their microbiota, a key factor regarding the forest functioning.

¹ Tidjani et al. 2019, mBio. 2019 Sep 3;10(5)