Visualisation and identification of endophytic bacterial communities of *Phyllostachys* and *Fargesia*.

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Phytosphere is a complex multi-component niche
The endorhizosphere of tomato (*Solanum lycopersicum*) colonised with an artificial biocontrol community. CLSM, SYBR green staining: 1 – root hairs; 2 – rhizodermis; 3 – exodermis; 4 – secondary root.
Endophytes as a feature of biotechnology

- Endophytes are involved in maintaining internal plant homeostasis, keeping the stressors blow and the defence against possible pathogens.

- Modification of endophytes can be of use in designing phytotechnical solutions for environmental problems. Eg: soil cleanup, water purification.

- The main goal was to investigate the microbial community of certain bamboo plants.
There are few methodological approaches were used in order to catch endophytes.

- Microbiological: intact plants were used as a basis for the classic isolation strategy of the bacteria inside;

- Molecular: whole DNA was extracted (of plant and bacteria alike) to go for a direct identification.

- Plastic film sampling method after Cholodny: plastic film strips made with polyethylene terephthalate were used as a matrix for the attachment and direct growth of the bacterial communities, maintaining the original (in situ) spatial shape and structure of these communities.
Endophytes from the overground tissues are:

- *Bacillus* (*B. amyloliquefaciens*, *B. subtilis*, *B. mojavensis*);
- *Mycobacterium* (*M. palustre*, *M. lentiflavum*, *M. avium complex*, *M. arosiense*);
- uncultured bacterium clones

Endophytes from the underground tissues are:

- *Agrobacterium/Rhizobium*;
- *Burkholderia* (*spp.*, *B. cepacia complex*);
- *Pseudomonas* (*P. fluorescens*, *P. fuscovaginae*);
- *Paenibacillus* (*spp.*, *P. chondroitinus*);
- *Microbacterium* (*spp.*, *M. laevaniformans*);
- *Leifsonia*

Endophytes from *in vitro* tissues are:

- *Achromobacter*;
- *Acinetobacter*
A plastic film made with PET (polyethylene terephthalate) as a carrier for real microbial community formation *in situ*.

- chemically inert
- biologically neutral
- nontoxic
- transparent
- flexible
- more hydrophilic than other plastics
- permeable for oxygen and carbon dioxide
PET films were used to study the endophytic microbial communities of bamboo (Phyllostachys atrovaginata)
Microcolonies of endophytes formed on PET films under *in situ* conditions (in the plant tissues of *Phyllostachys atrovaginata*)

A lower part of a column.

CLSM, scale bar is 10 µm.
Microcolonies of endophytes formed on PET films under *in situ* conditions (in the plant tissues of *Phyllostachys atrovaginata*). A top part of a column.
Endophytic microcolonies formed on PET films and in the plant tissues directly (*Phyllostachys atrovaginata*).

SEM, scale bar is 10 µm.
Underground endophytes were more diverse than the aboveground endophytes.

• Low nucleic acid (LNA)-content bacteria were detected in the upper part of bamboo columns.

• Endophytic populations of plants grown in an artificial soil substrate were more diverse than those form in vitro agar-grown plants.

• Gram-positive bacteria of the Bacillaceae and Mycobacteriaceae families, as well as a variety of unculturable bacteria, were detected in the aboveground samples, while both gram-positive and gram-negative bacteria were found in the underground samples.

• Achromobacter sp. and Acinetobacter sp. were also isolated from in vitro grown plants.

• In total, 18 endophytic bacterial species identified from bamboos.

• For some bacteria, including Achromobacter sp., Acinetobacter calcoaceticus, Agrobacterium/Rhizobium sp., Bacillus amyloliquefaciens, B. mojavensis, B. subtilis, Microbacterium laevaniformans, Mycobacterium arosiense, M. avium complex, M. lentiflavum, M. palustre, Paenibacillus chondroitinus, Pseudomonas fluorescens, P. fuscovaginae, this is the first report of their isolation as bamboo endophytes.

• Finally, fungal hyphae were found in the endosphere of Phyllostachys atrovaginata L. and were frequently associated with bacteria cells.