

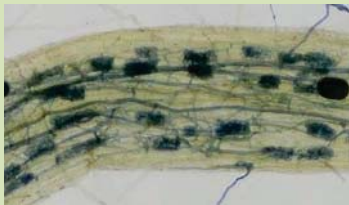
# Underground cooperation - Symbiosis of mycorrhiza fungi and plants



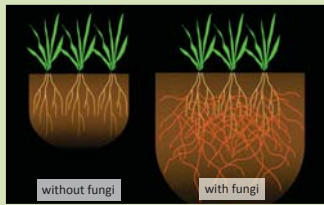
Principal contacts: Sebastian Schornack, Sainsbury Laboratory, ss2123@cam.ac.uk; Uta Paszkowski, Department of Plant Sciences, up220@cam.ac.uk; Presenter: Clement Quan, Sainsbury Laboratory

## Almost all land plants have fungi in their roots

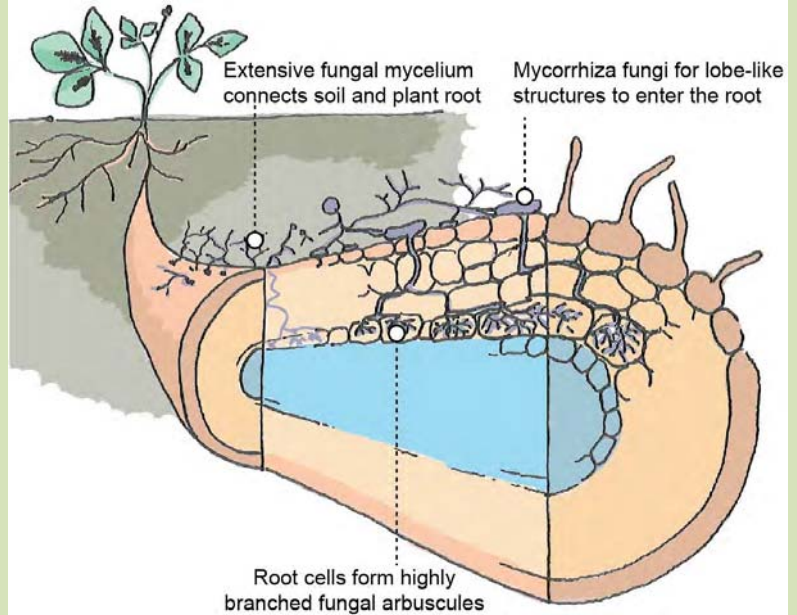
- Plants are able to perceive beneficial fungi.
- Fungi follow plant signals to find and enter roots.
- Fungi increase the root surface, they source phosphate from the soil and deliver it into the root, in return they get sugars from the plant produced by photosynthesis.



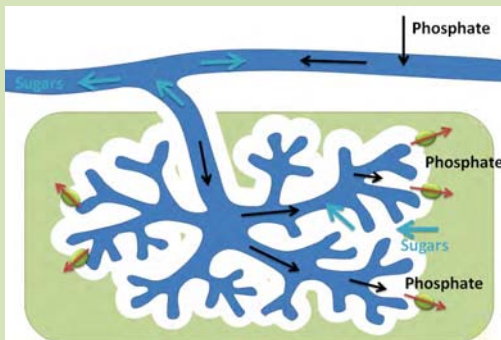
Pen ink stains fungi in the root, some cells are filled with highly branched arbuscules



Fungal mycelium increases root surface 500x



Schematic illustration displaying root colonisation by arbuscular mycorrhiza fungi



Schematic drawing of an arbuscule



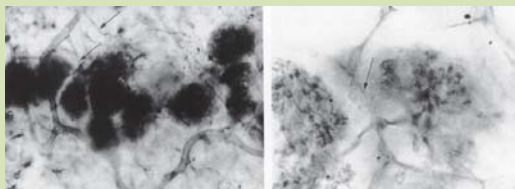
Electron microscopy of arbuscule containing cells

## The fungus-plant "synapse"

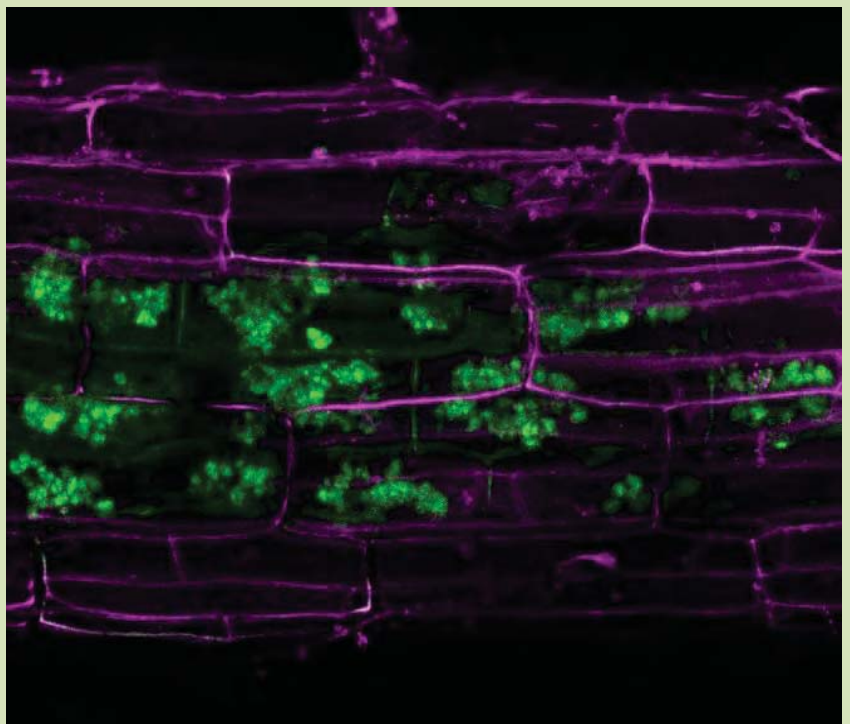
- Plant root cells allow the fungus to grow a tree-like structure which is surrounded by a plant envelope membrane.
- This membrane is spiked with specific proteins to import the phosphate offered by the fungus.

## Important questions!

- How do plant roots perceive symbiotic fungi and allow them in, but defend against parasites?
- How do the fungus-plant synapses form?
- Can mycorrhiza substitute for artificial phosphate fertiliser?
- Why do arbuscule synapses only form in some root cells?
- How did this ancient symbiosis evolve over time?



450 mill. year old fossils from the Rhynie chert with fungal structures inside plants



Green fluorescently labelled proteins at the fungus plant synapse