

Anatomical-morphological identification of fine roots of the common European tree species

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Characteristics of the fine root system that can potentially be used for identification purposes

- Anatomy of wood and bark (anatomy of roots can differ significantly from the anatomy of stem!)
- Morphology: → diameter of lateral branches
 - branching pattern
 - colour
 - texture of the root bark or epidermis
 - type of mycorrhiza

Selected tree species:

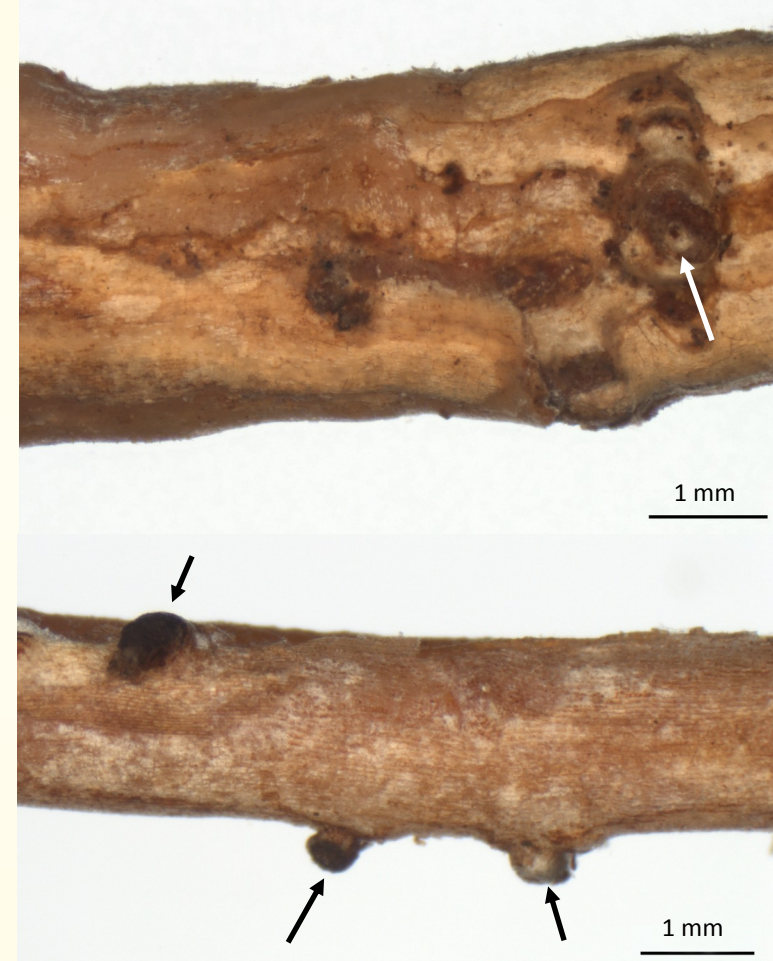
- *Fagus sylvatica* L.
- *Picea abies* (L.) Karst.
- *Abies alba* Mill.
- *Pinus sylvestris* L.
- *Larix decidua* Mill.
- *Prunus avium* (L.) L.
- *Carpinus betulus* L.
- *Populus nigra* L.
- *Quercus petraea* (Matt.) Liebl.
- *Castanea sativa* Mill.
- *Fraxinus excelsior* L.
- *Acer pseudoplatanus* L.

Methods:

Anatomy: transversal and radial/tangential sections of roots of diameters 5, 3, 1 mm and the most distal fine roots, 3-5 individuals for each species → observation under Zeiss Axio Imager Z2 microscope

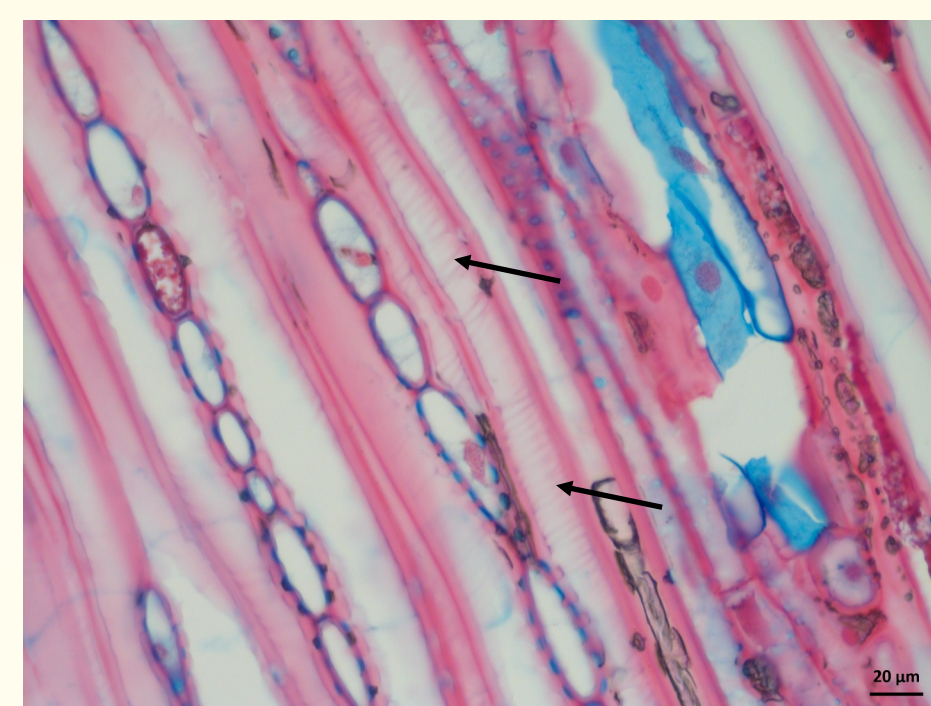
Morphology: scanning of roots on Epson Perfection V700 Photo Scanner, photographing of roots under Zeiss Stereo Lumar V12 microscope

Case study: *Picea abies*

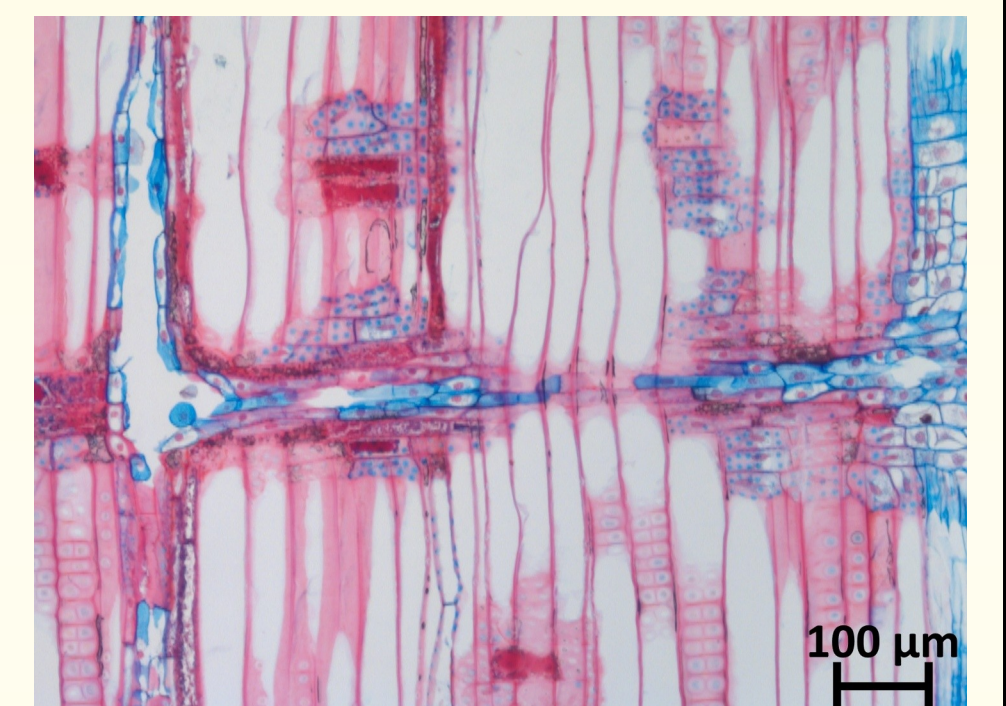


Above: Bark of fine roots of *P. abies* is middle brown to whitish and comes off in flakes, typically branch scars are observed (arrow)

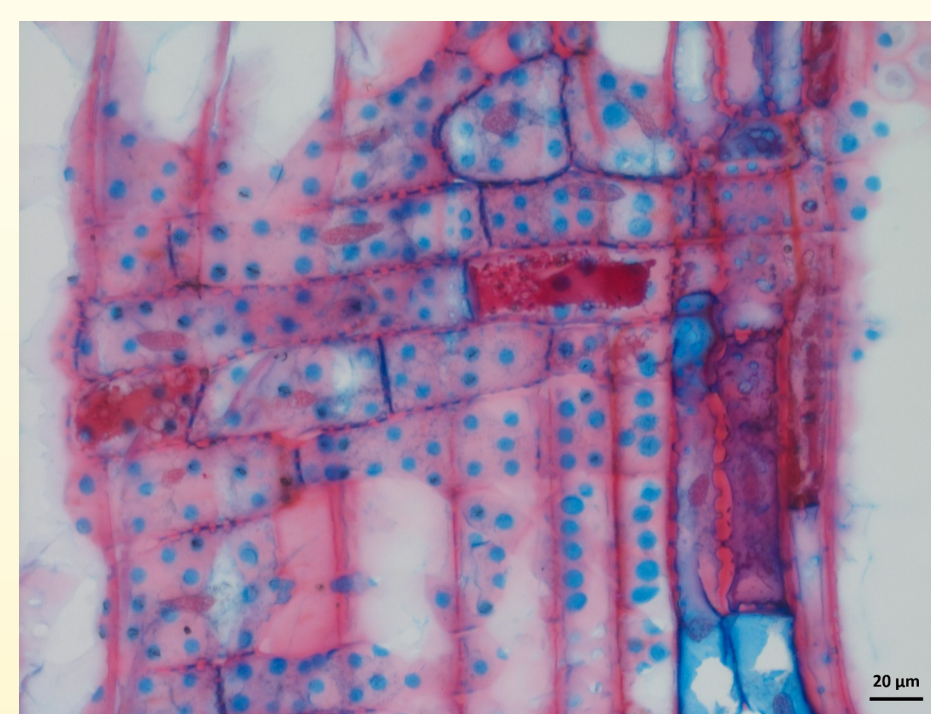
To the left: Part of the fine root system of *P. abies* with different types of mycorrhiza



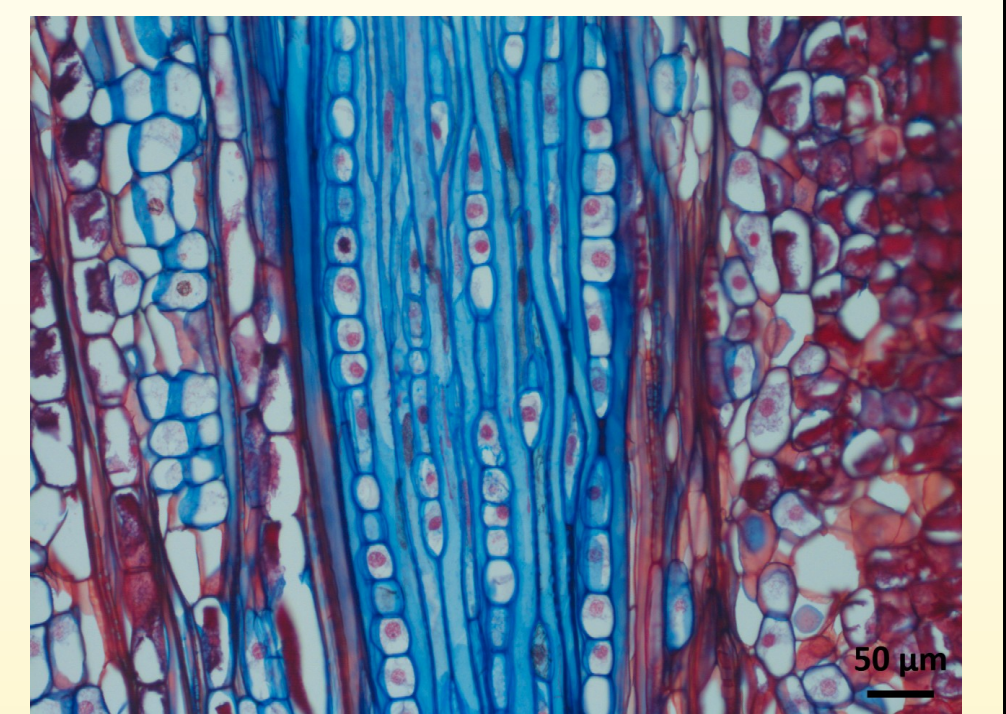
Spiral thickenings in earlywood of *P. abies* (tangential section of 3 mm root)



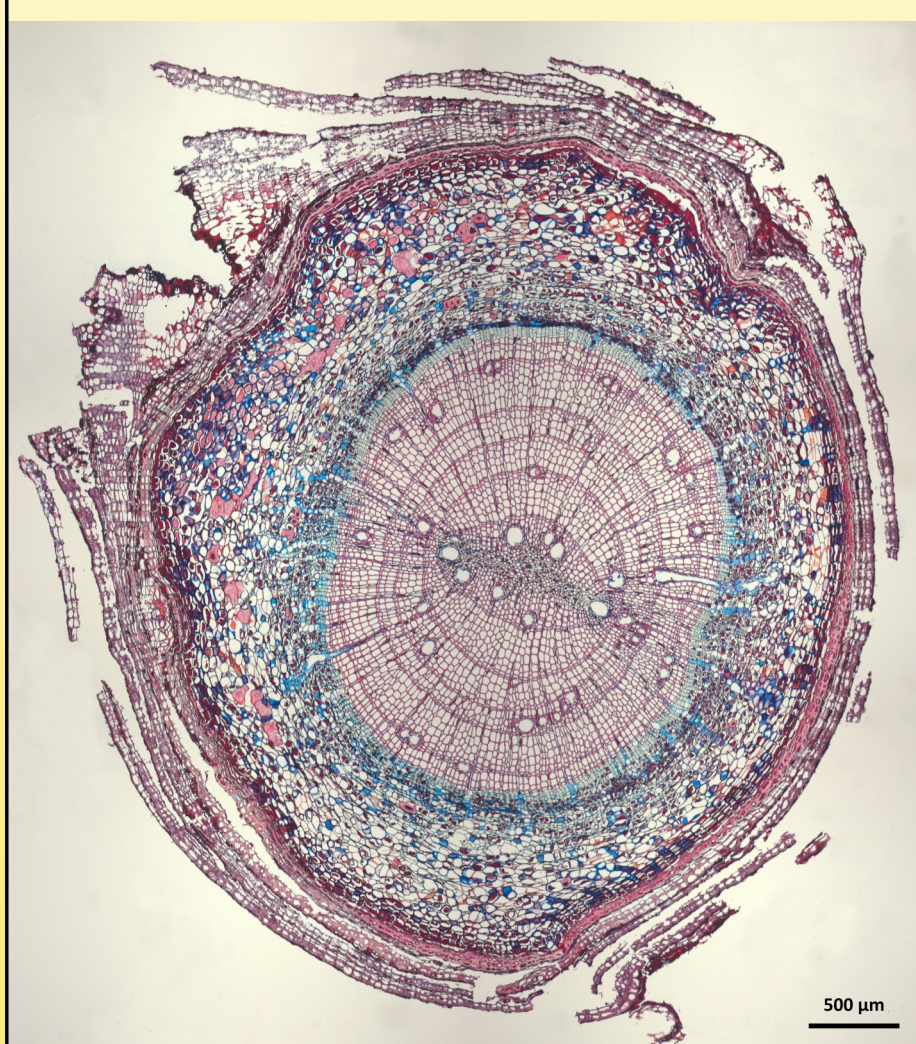
Connection between vertical and horizontal resin ducts (radial section of 3 mm root)



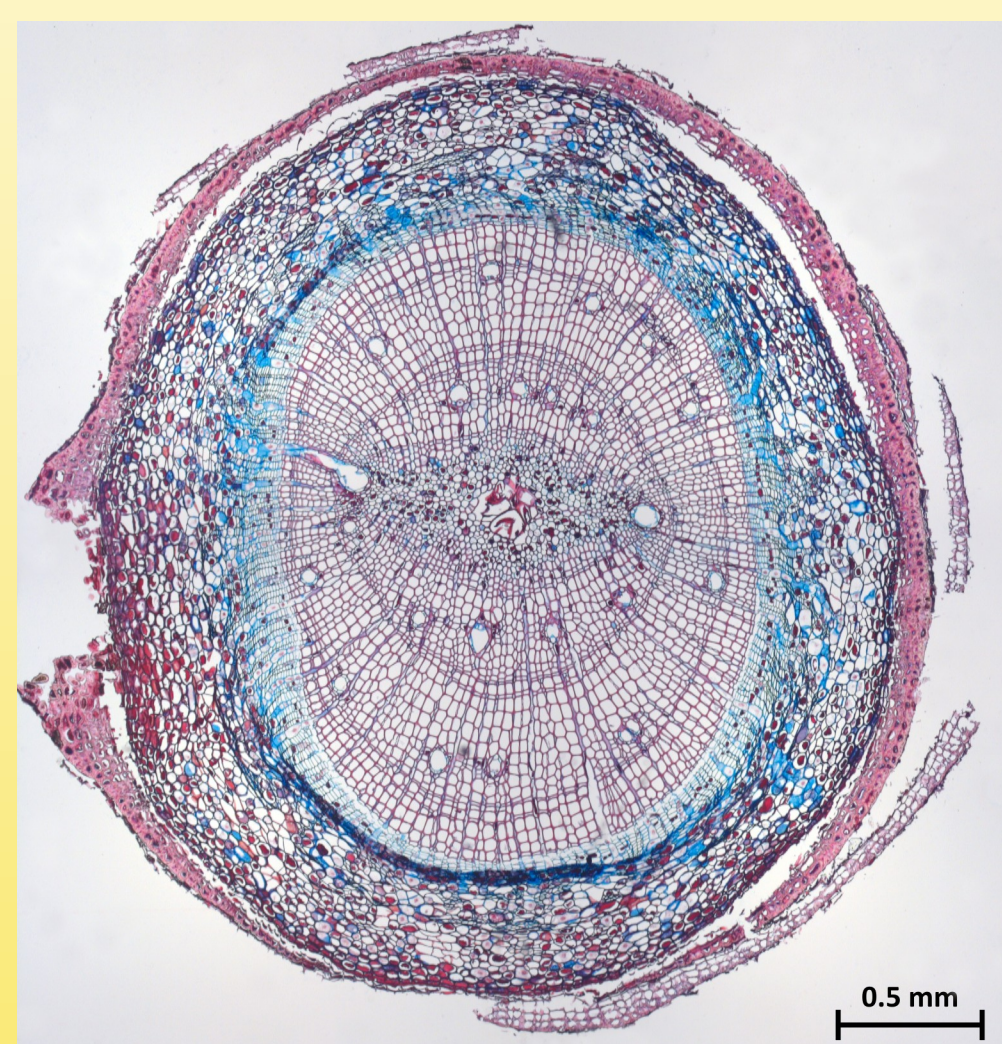
Piceoid cross-field pits in rays of *P. abies* (radial section of 5 mm root)



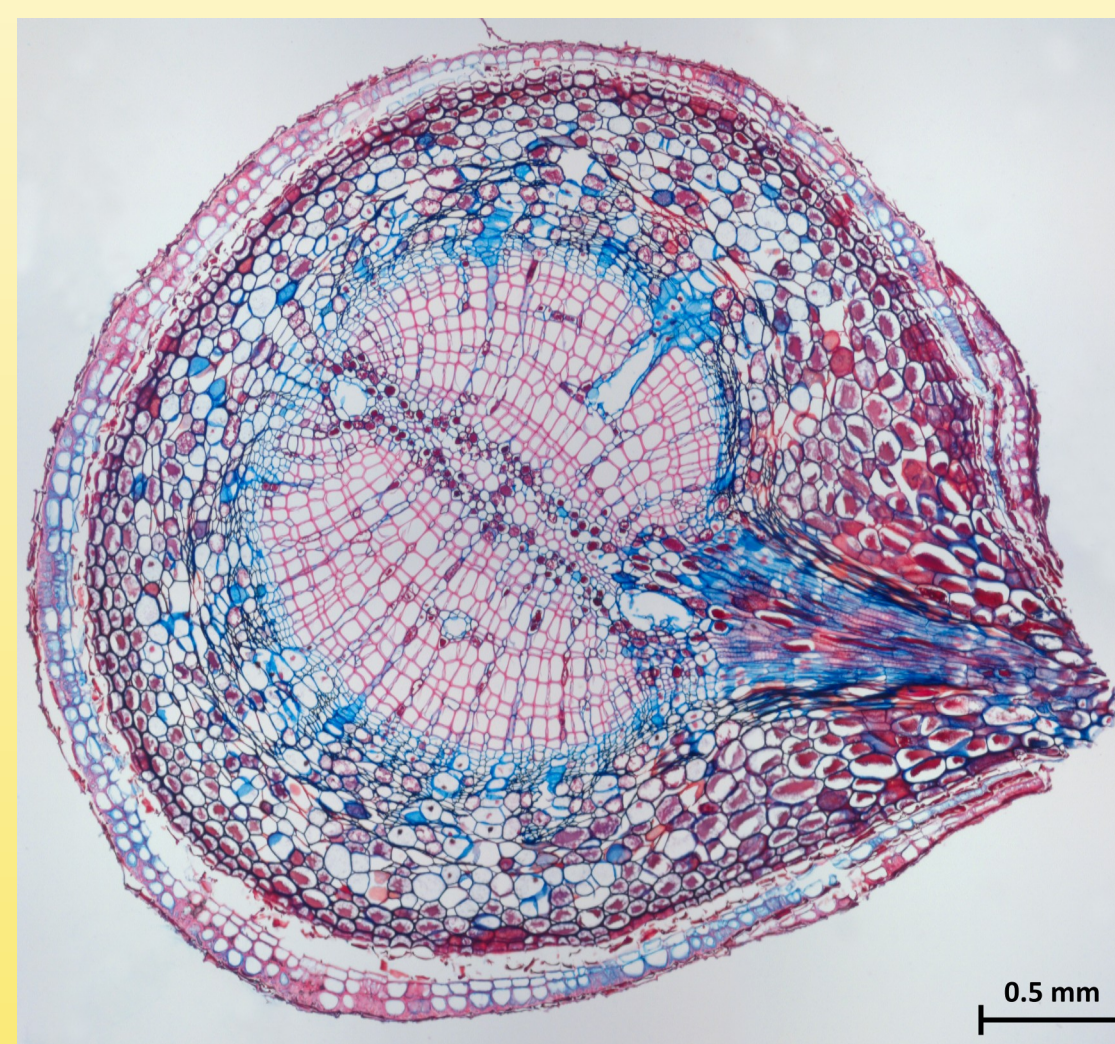
Rays are already developed in 1 mm roots of *P. abies* (tangential section)



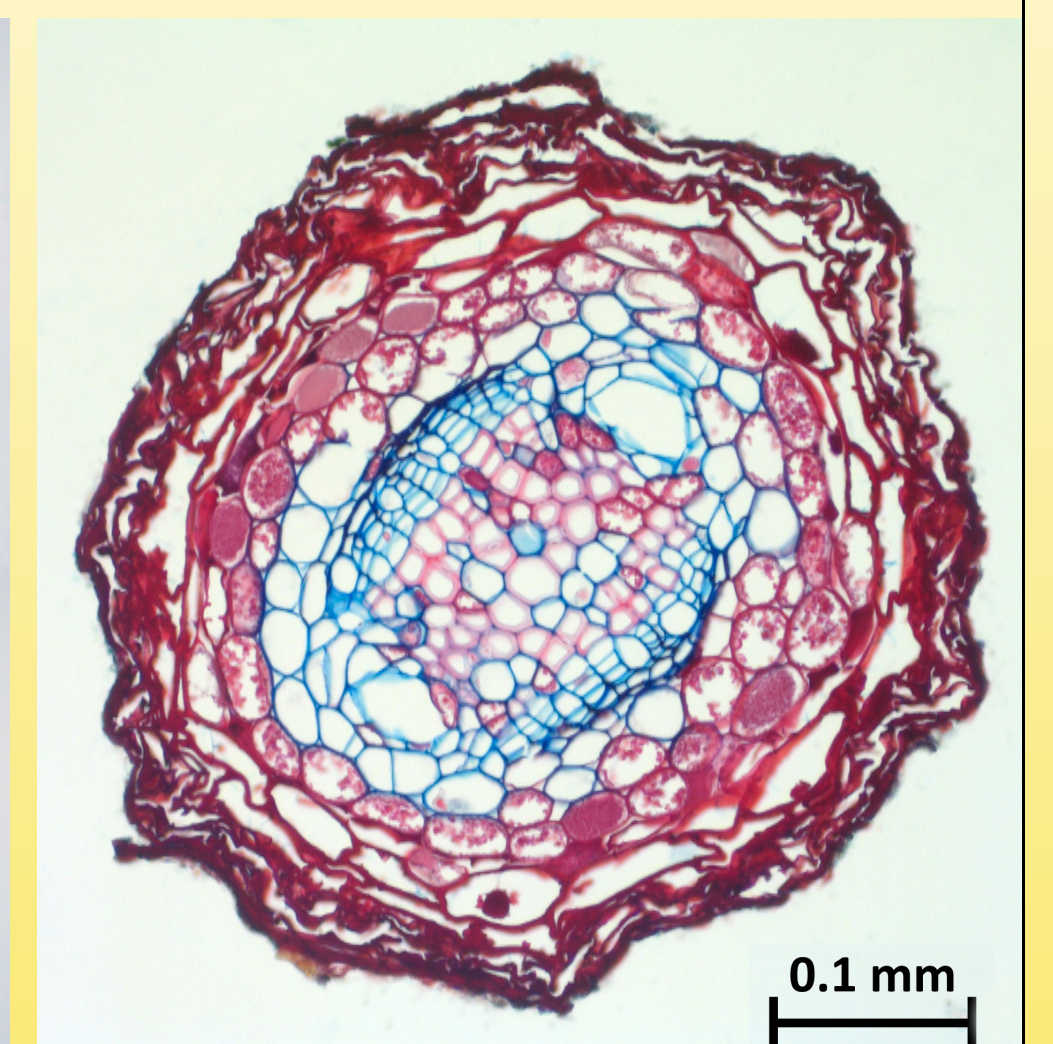
5 mm



3 mm



1 mm



The most distal fine roots

Transversal sections of *P. abies* roots of different diameter classes. In the most distal fine roots, resin ducts are already recognizable.

References:

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