

# The stem structure

This is a 20 micrometers (0,0020 millimeters) thick cross section with a diameter of 1 cm, cut from a 3-years-old branch of a pedunculate oak (*Quercus robur* L.).

The stem of a tree connects the roots with the crown. Within the stem different tissues play different functions which are essential in tree life.

## The Bark

The bark structure can be very heterogeneous. It consists of many different cell types, arranged in various patterns according to plant species and age.

Main functions of the bark are transport and storage of carbohydrates, protection and mechanical support.

## The Wood

The wood structure is also very diverse according to plant species. Main functions of the wood are related to sap transport from roots to leaves, mechanical support, and storage of water and carbohydrates.

## The Pith

This primary tissue shows an incredible diversity in its structure in terms of overall morphology, variety of cell types, shape of the pith cell. Its functions still need to be deeply investigated!

## Fibres

Strong, thick cell walls that mainly serve to support and strengthen the stem.

## Ray parenchyma

Rays connect phloem (innermost bark) to the inside of the stem storing and moving carbohydrates.

## Axial parenchyma

Cells with various physiological and biomechanical activities.

## Vessel

A tube-like series of vessel elements which conduct the sap from roots to leaves.

## Phloem

Principal food conducting tissue which conducts the sap from leaves to roots.

## Cortex

The primary tissue between the phloem and periderm.

## ★ Tension wood

Tension wood is formed in response to a mechanical stress. It appears on the upper side of branches and leaning or crooked stems.

