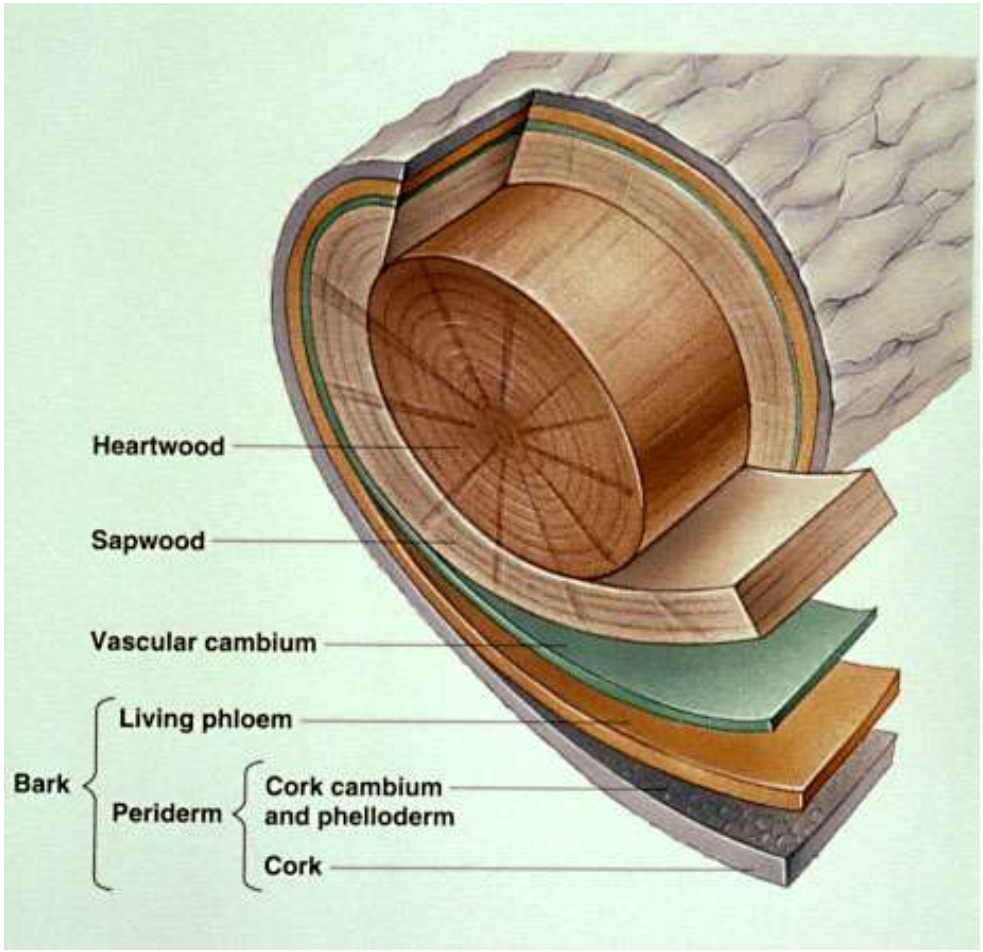
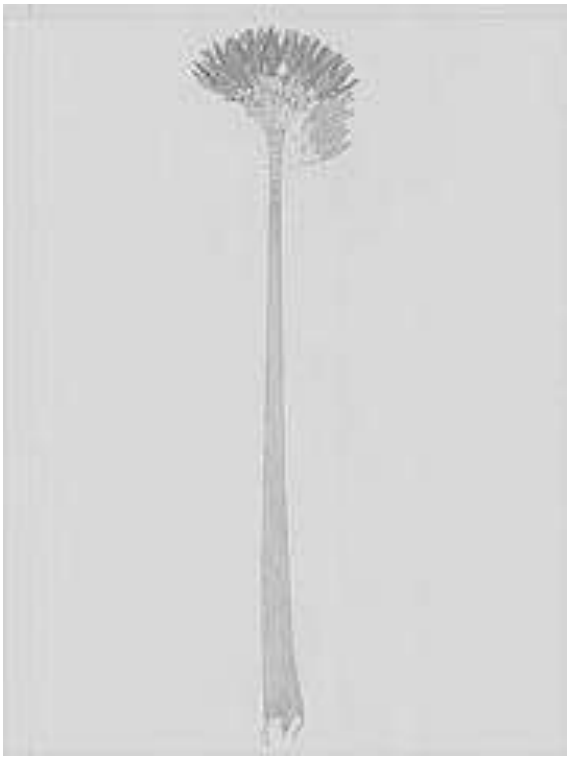
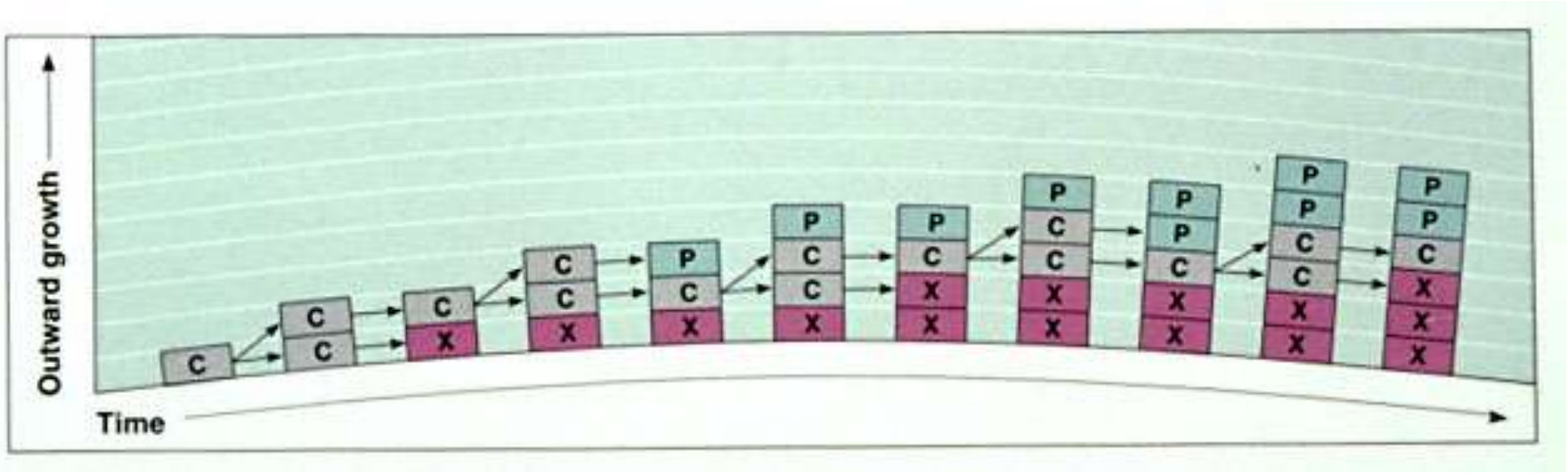
Wood

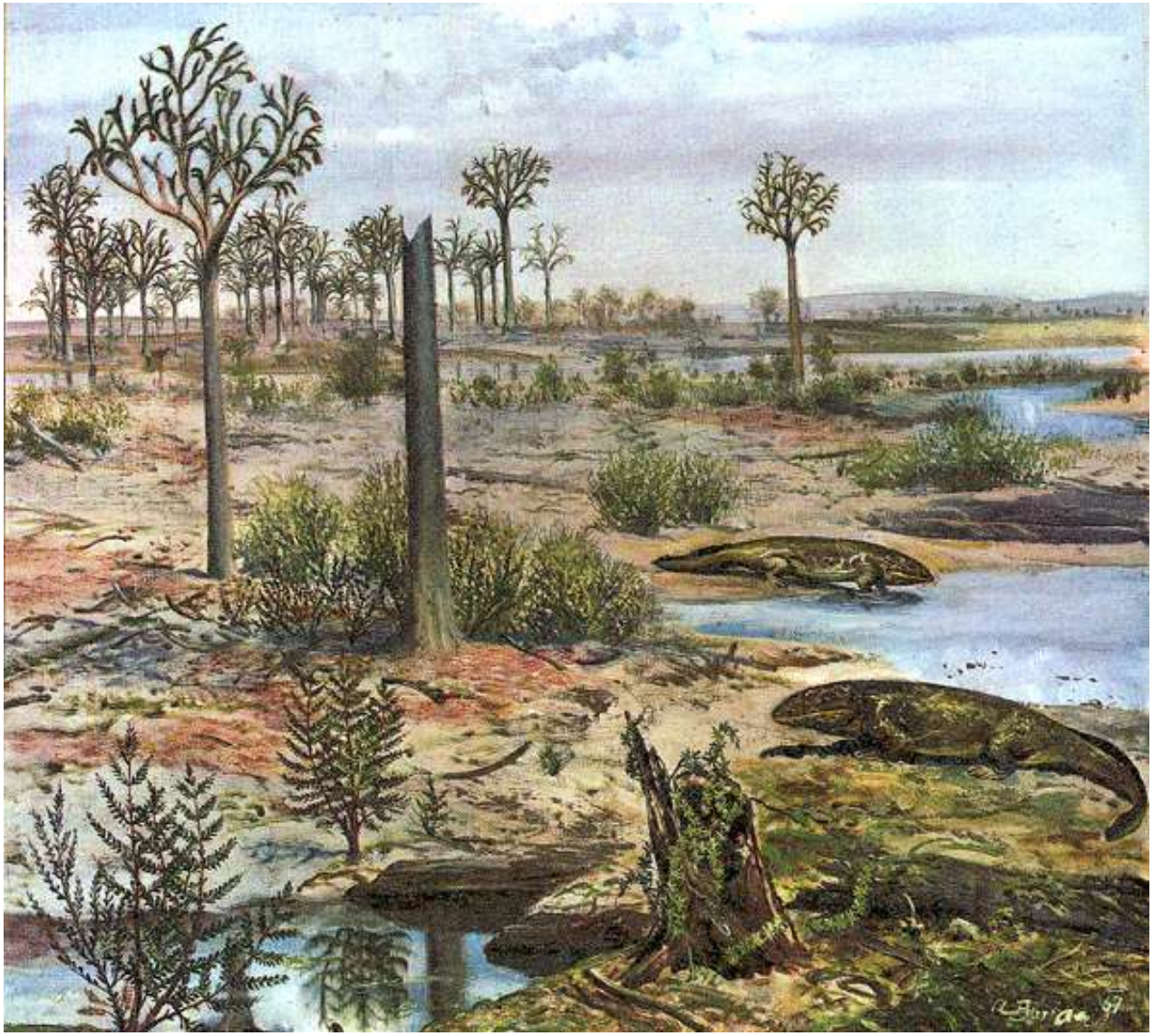

Heartwood
Sapwood
Vascular cambium
Bark
Living phloem
Periderm
Cork cambium and phelloderm
Cork

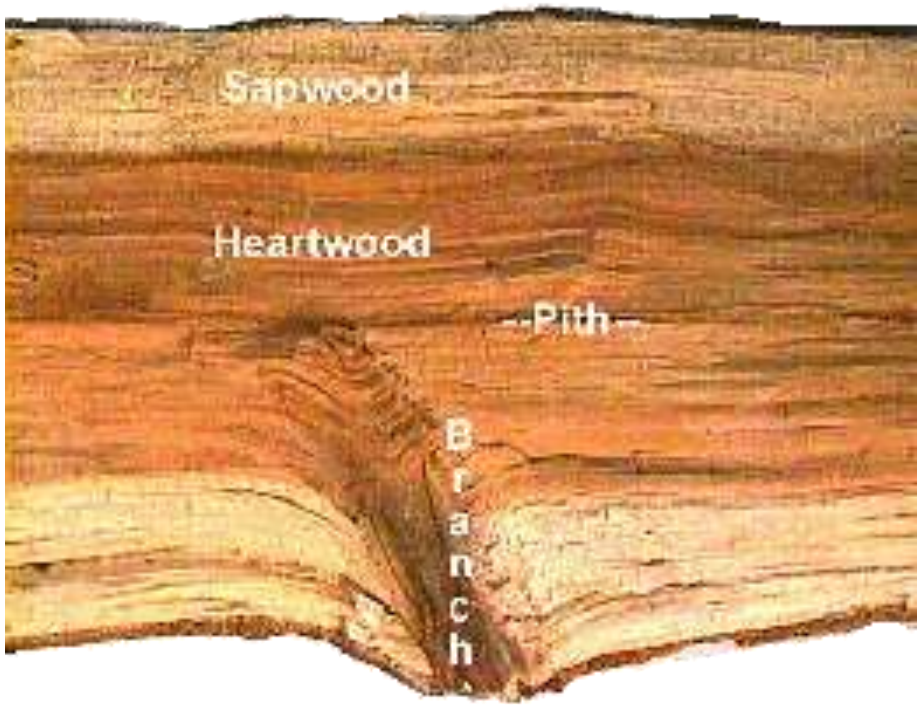
Eospermatopteris
Devonian
390 to 350 mya
Oldest known tree?



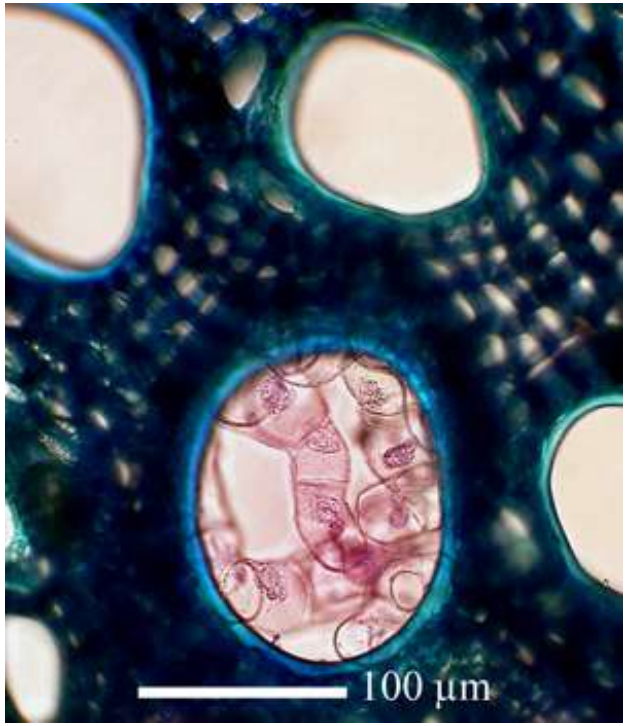


Devonian Landscape – 400 MYA

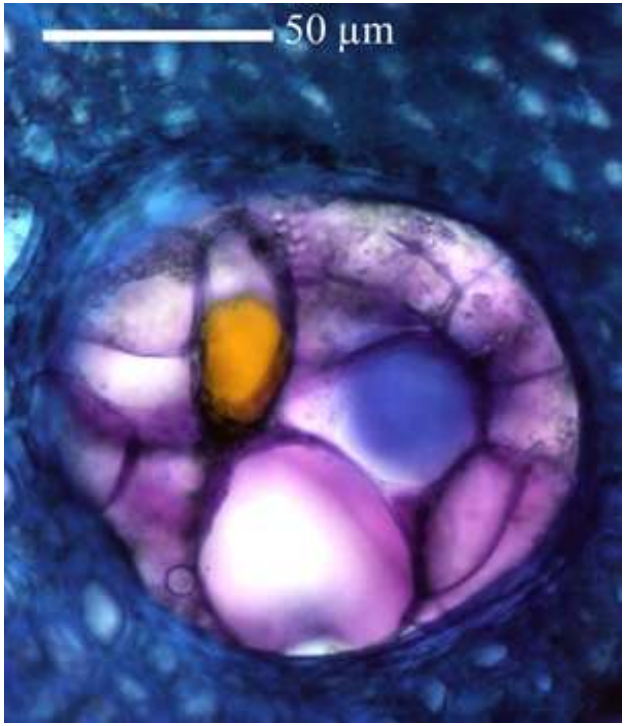



Sapwood
Heartwood
Pith
Branch

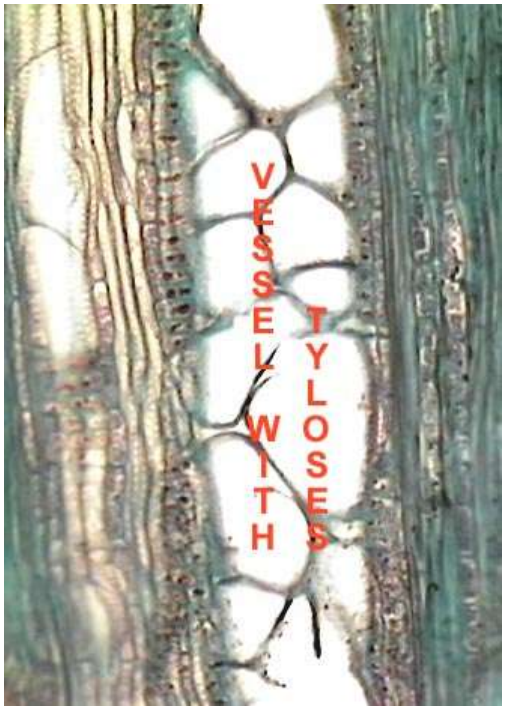
Tyloses – parenchyma cells that squeeze lumen of tracheary elements



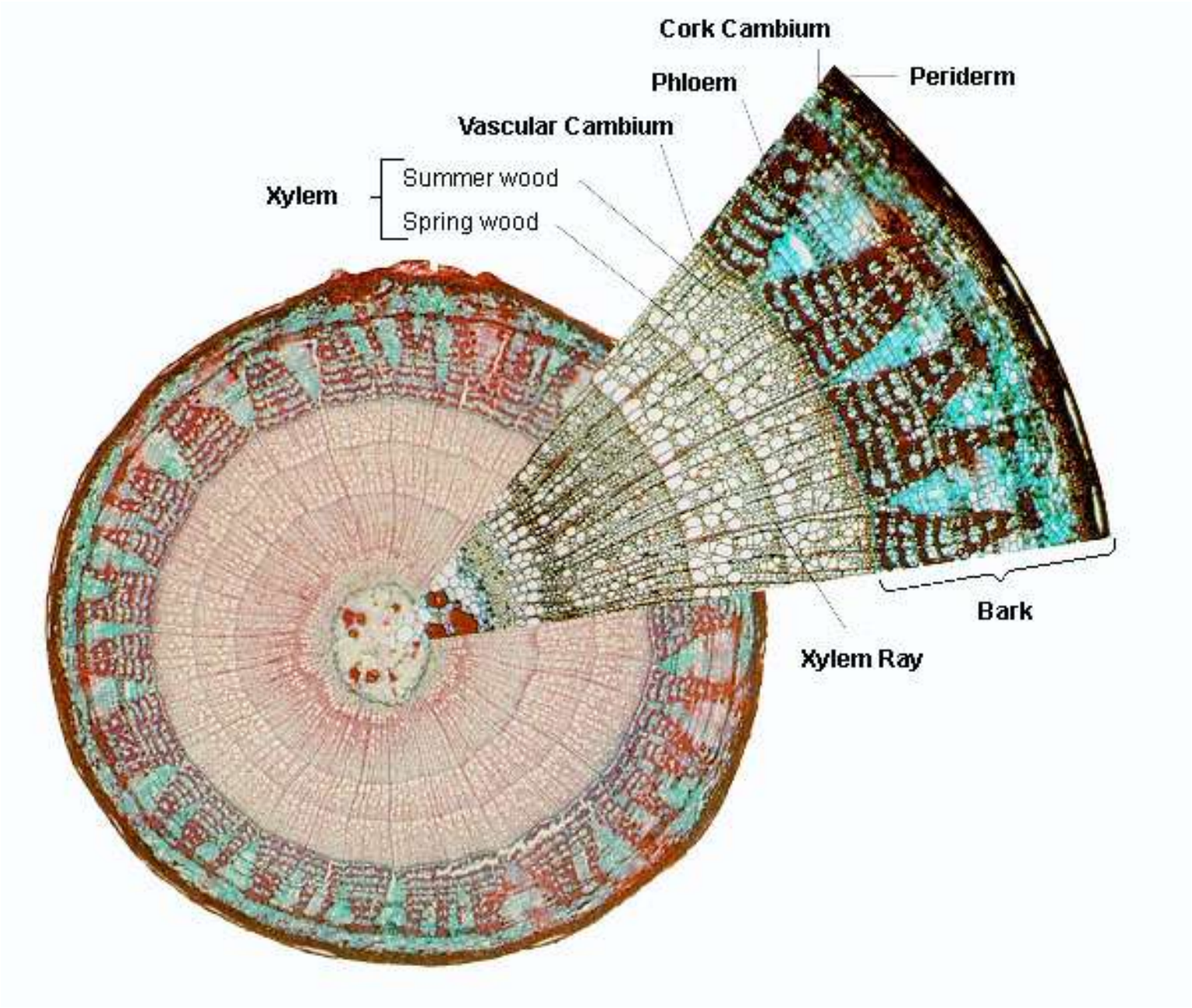
Ipomoea purpurea

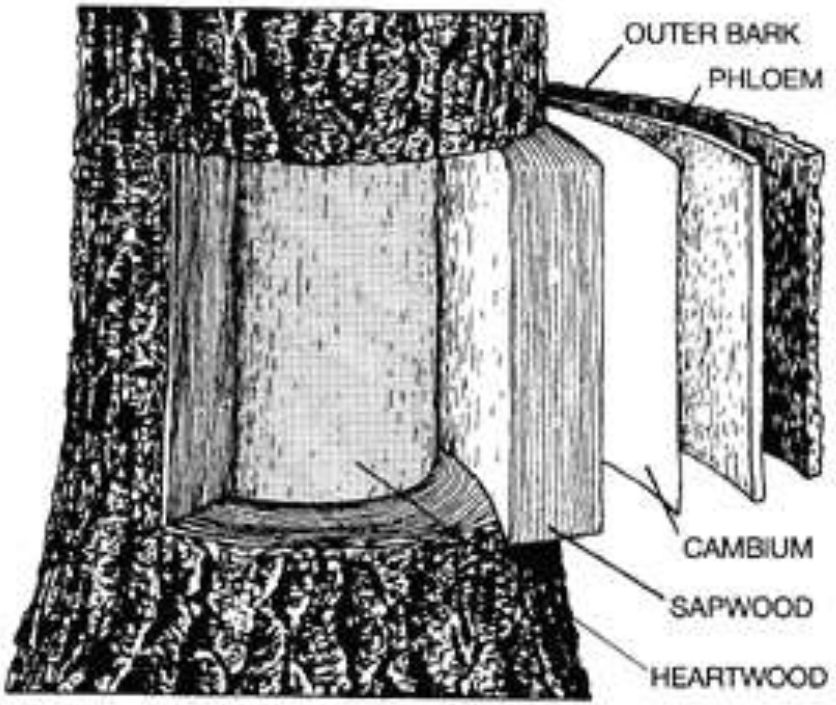


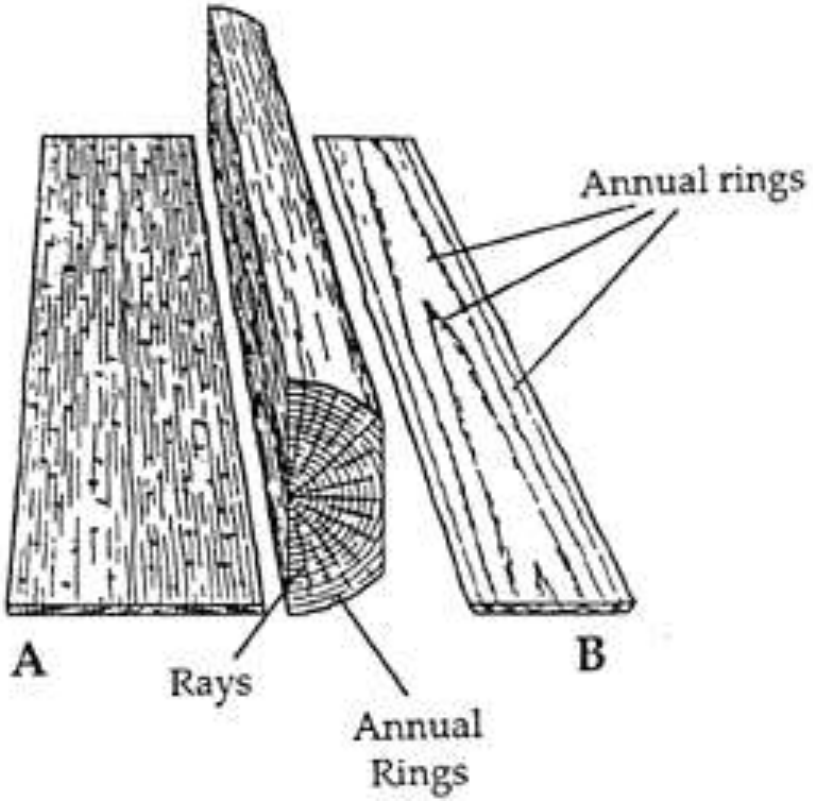
Aristolochia durior

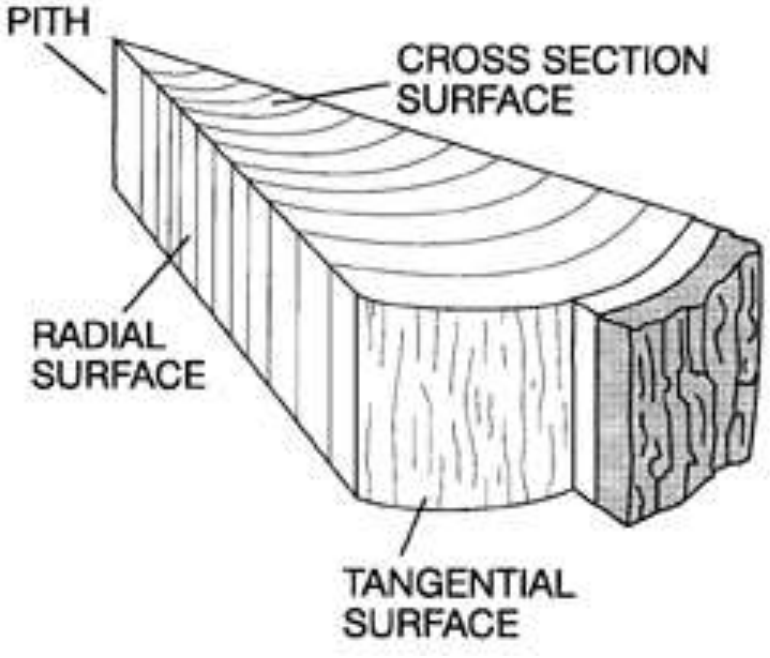


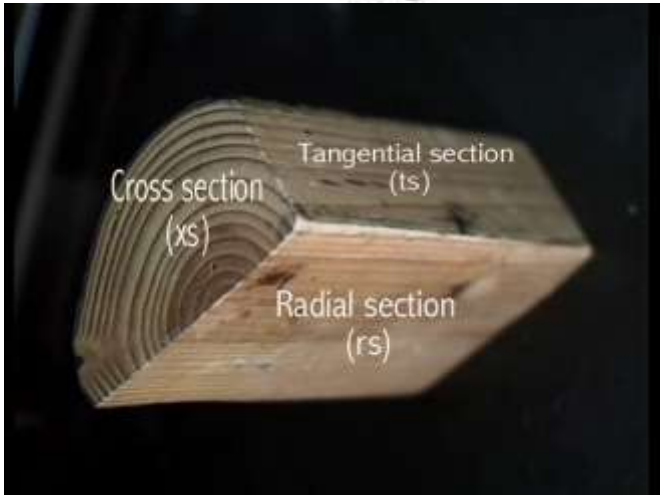
Quercus


Cork Cambium
Periderm
Phloem
Vascular Cambium
Xylem
Summer wood
Spring wood
Bark
Xylem Ray

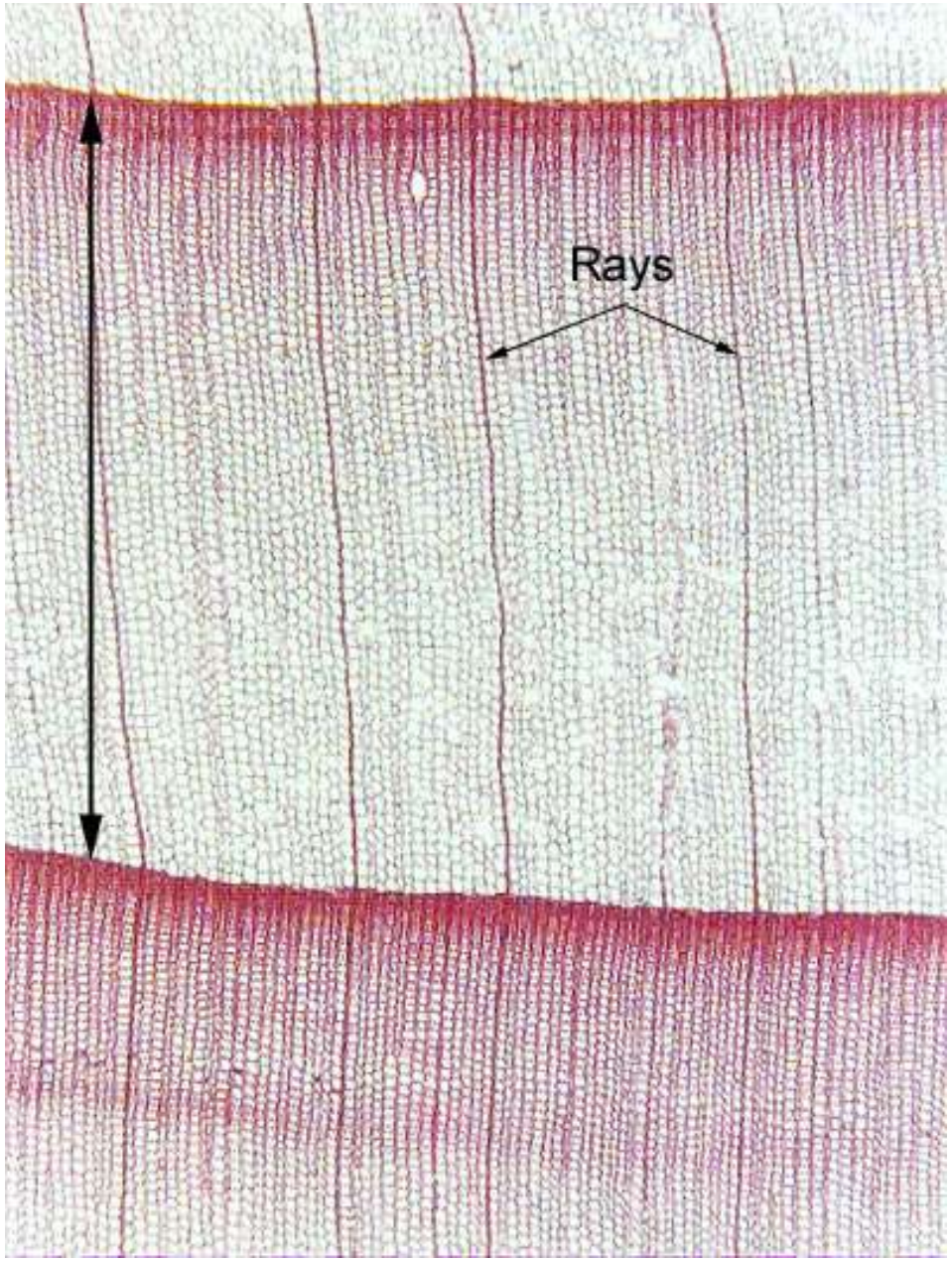

OUTER BARK
PHLOEM
CAMBIUM
SAPWOOD
HEARTWOOD


Annual rings
A
B
Rays
Annual Rings

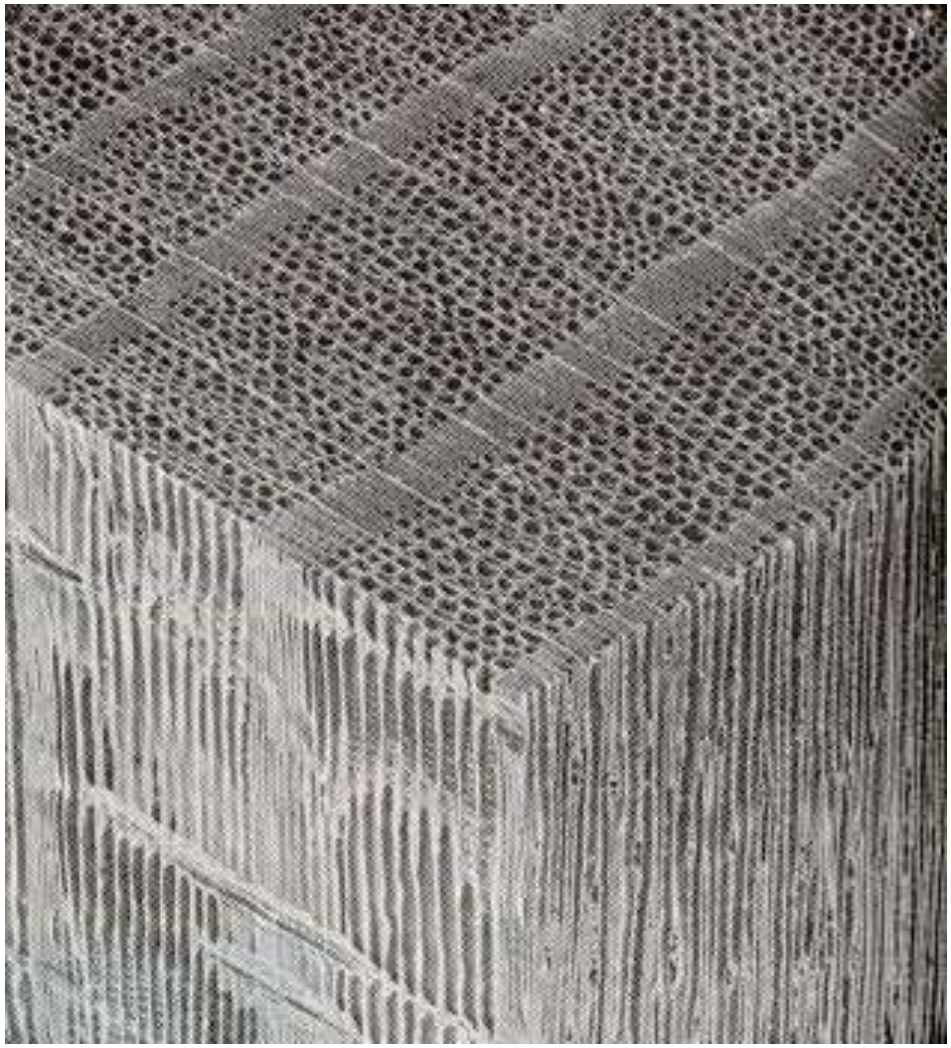

PITH
CROSS SECTION SURFACE
RADIAL SURFACE
TANGENTIAL SURFACE


Cross section (xs)
Tangential section (ts)
Radial section (rs)

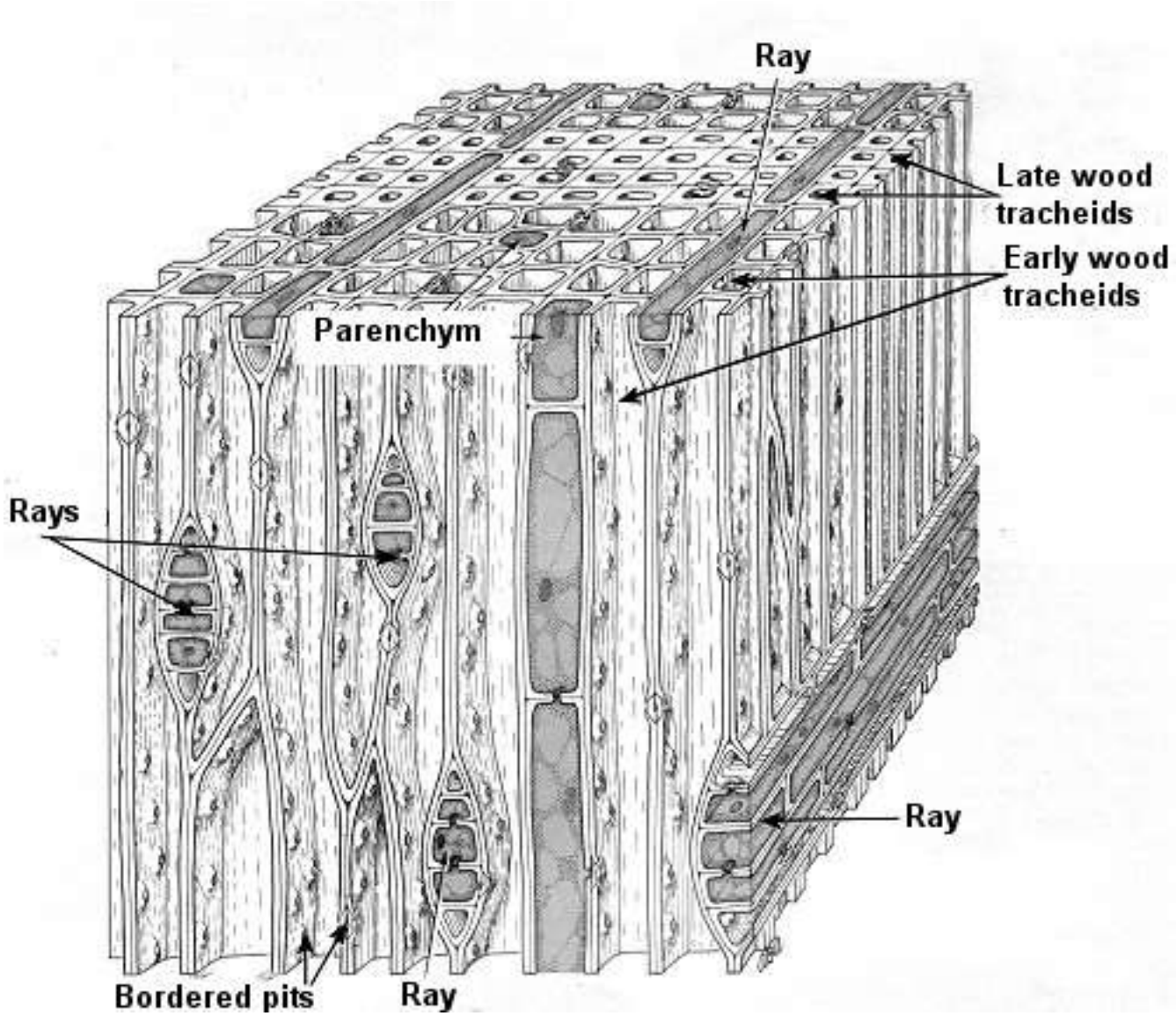
Thuja Wood



Conifer Wood

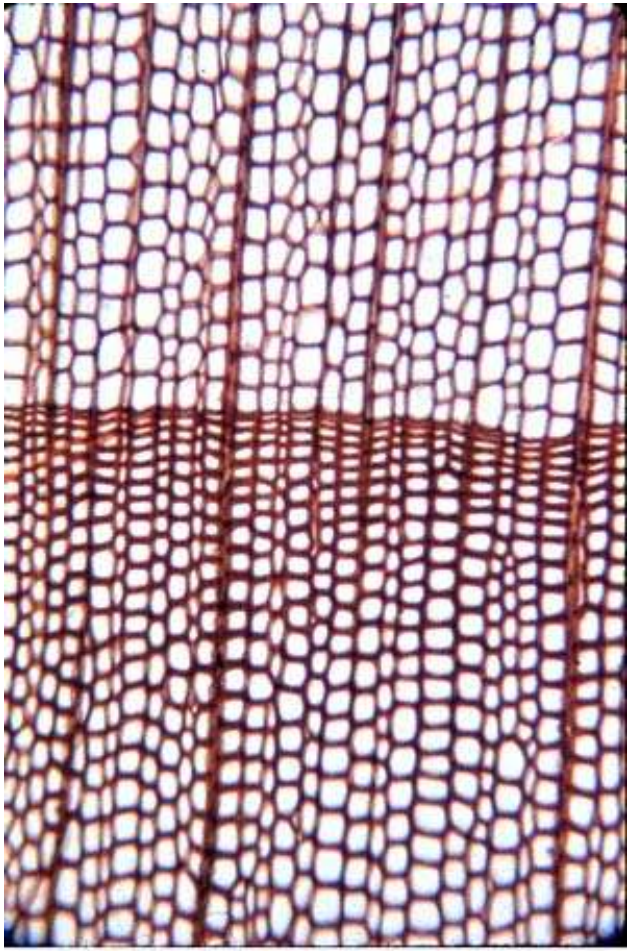


Sequoia


Ray
Late wood tracheids
Early wood tracheids
Parenchym
Rays
Ray
Bordered pits
Ray

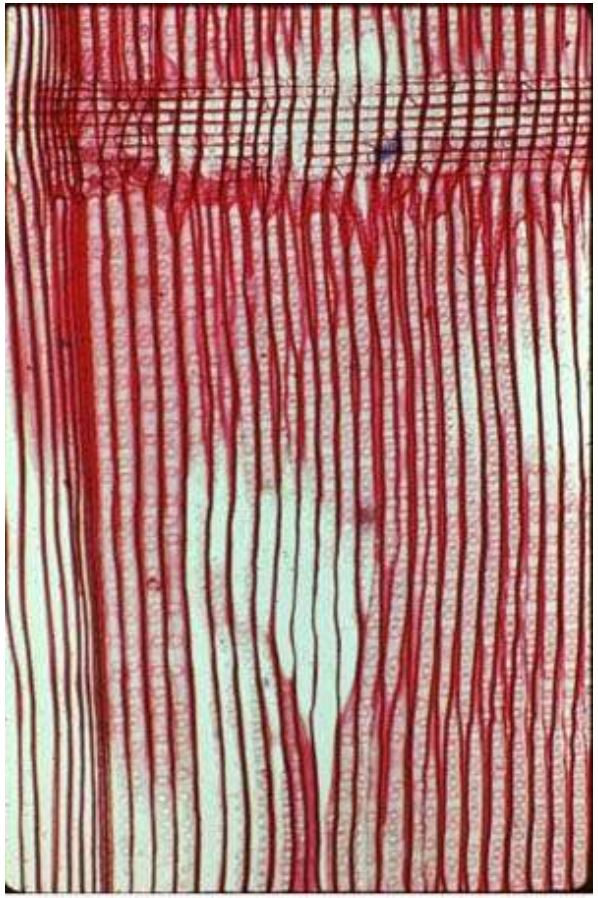
Pinus

transverse



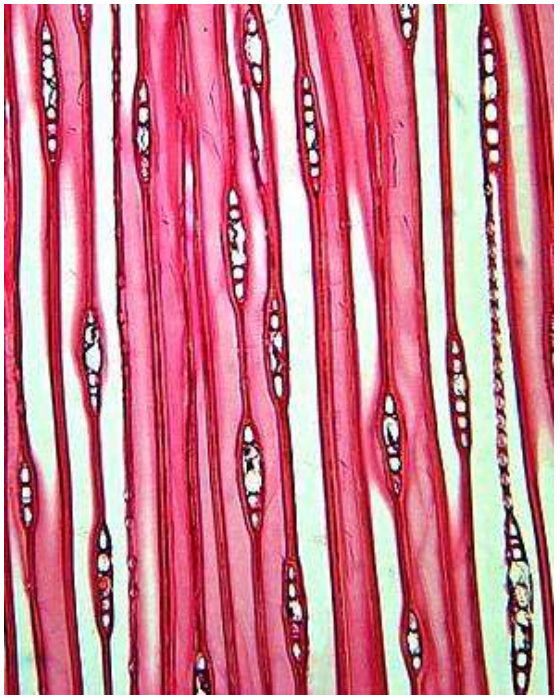
Pine wood cross section.

radial

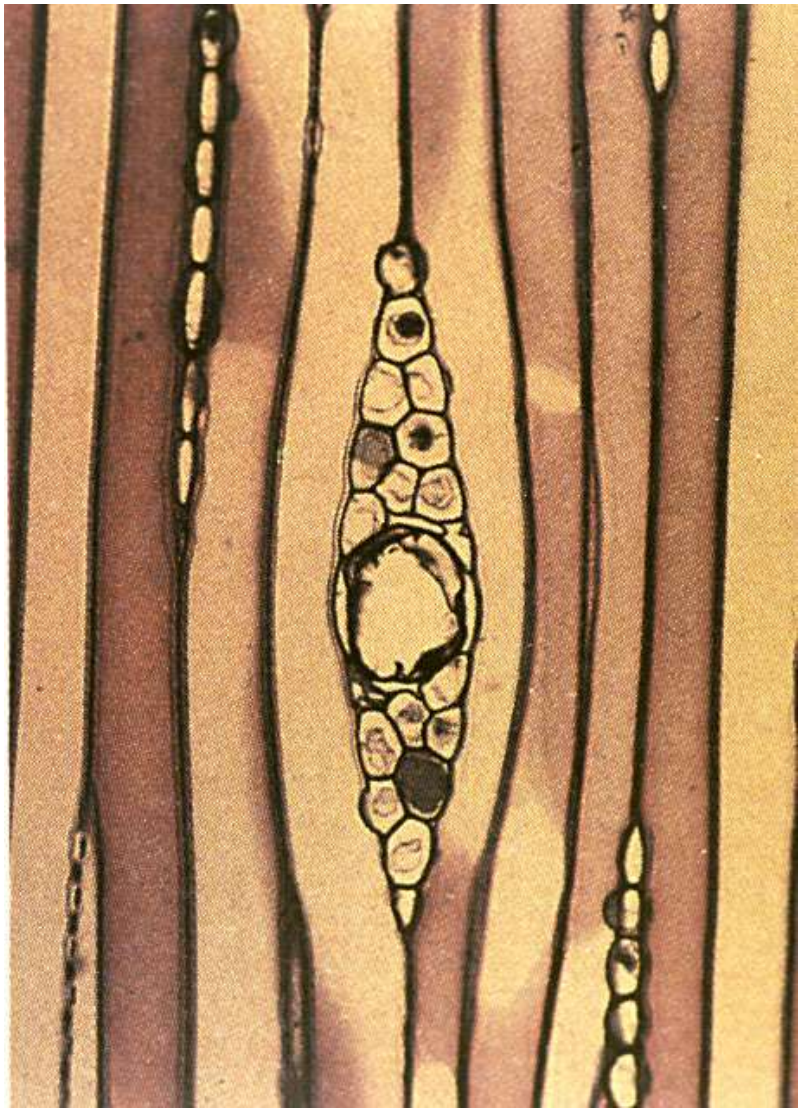


Pine wood radial section.

tangential

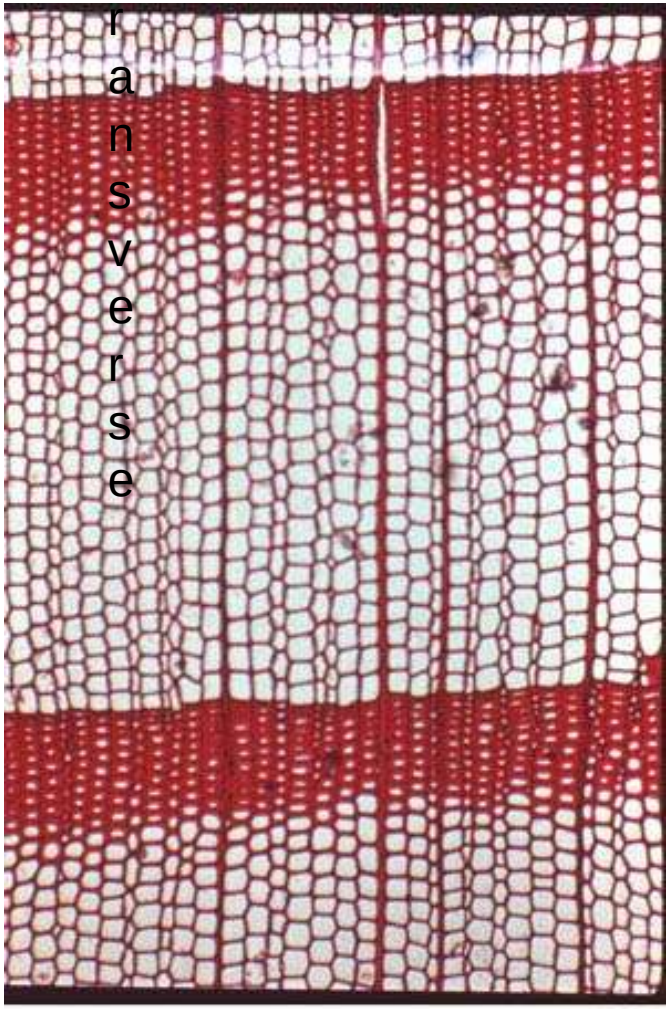


Resin Canals in Pine



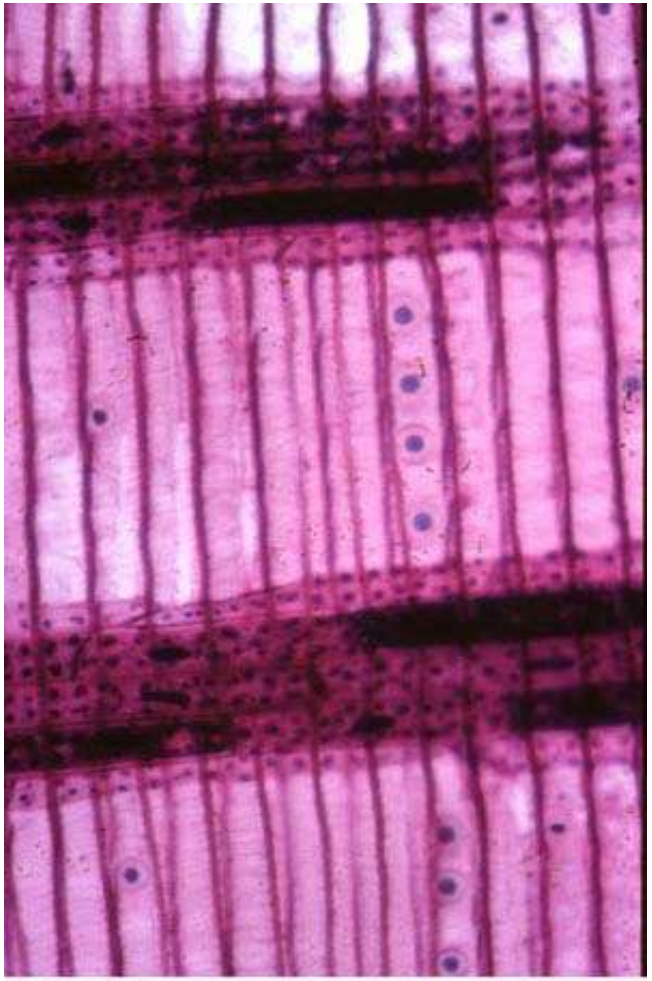
Pseudotsuga

transverse



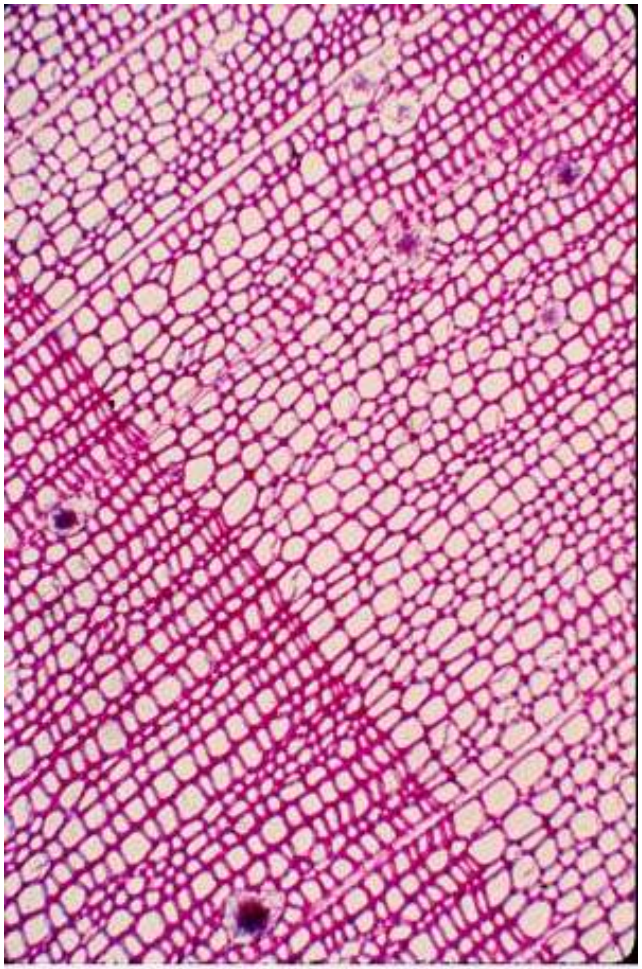
Pseudotsuga wood cross section.

radial

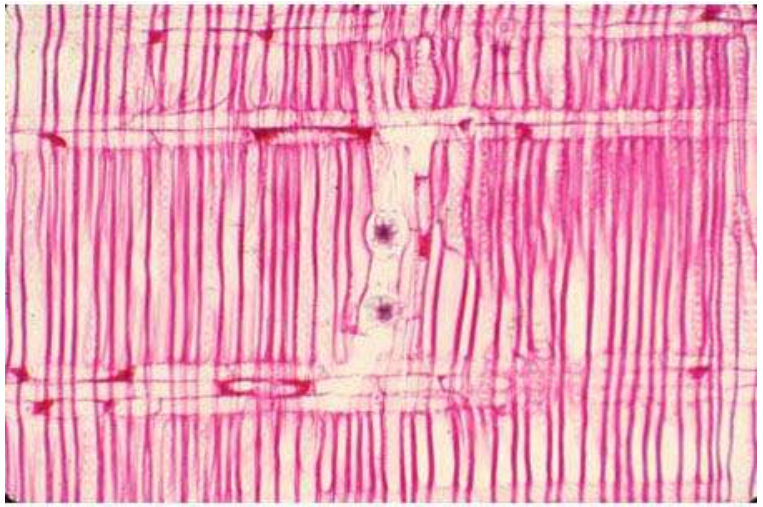


Pseudotsuga radial section.

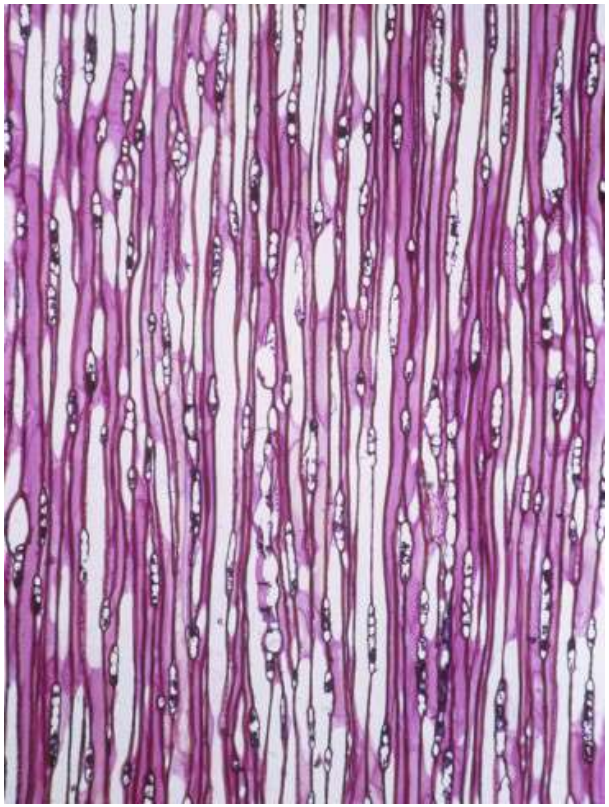
Ginkgo



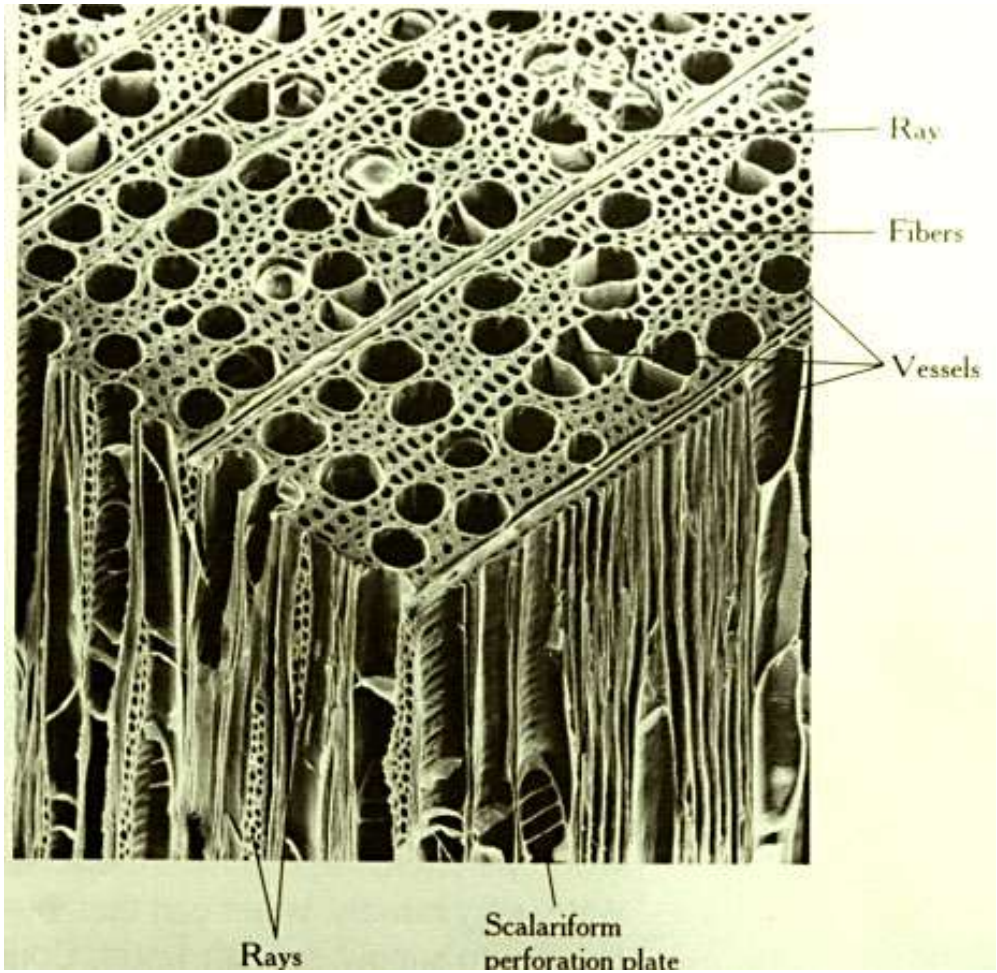
Ginkgo wood cross section.

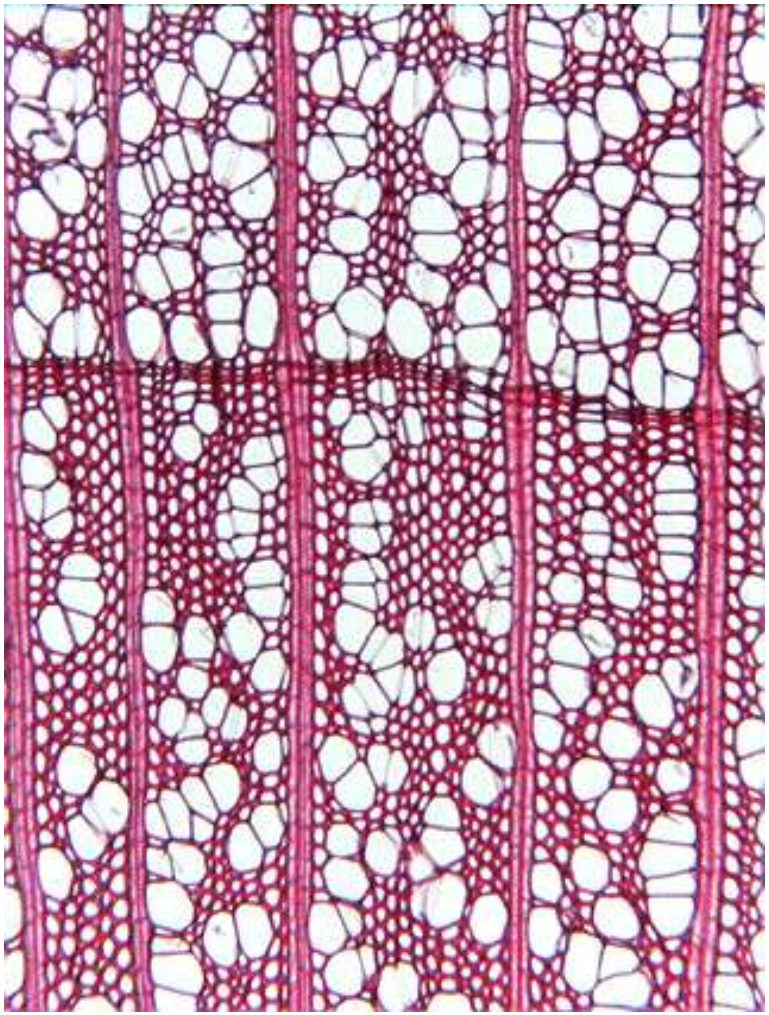


Ginkgo radial section.



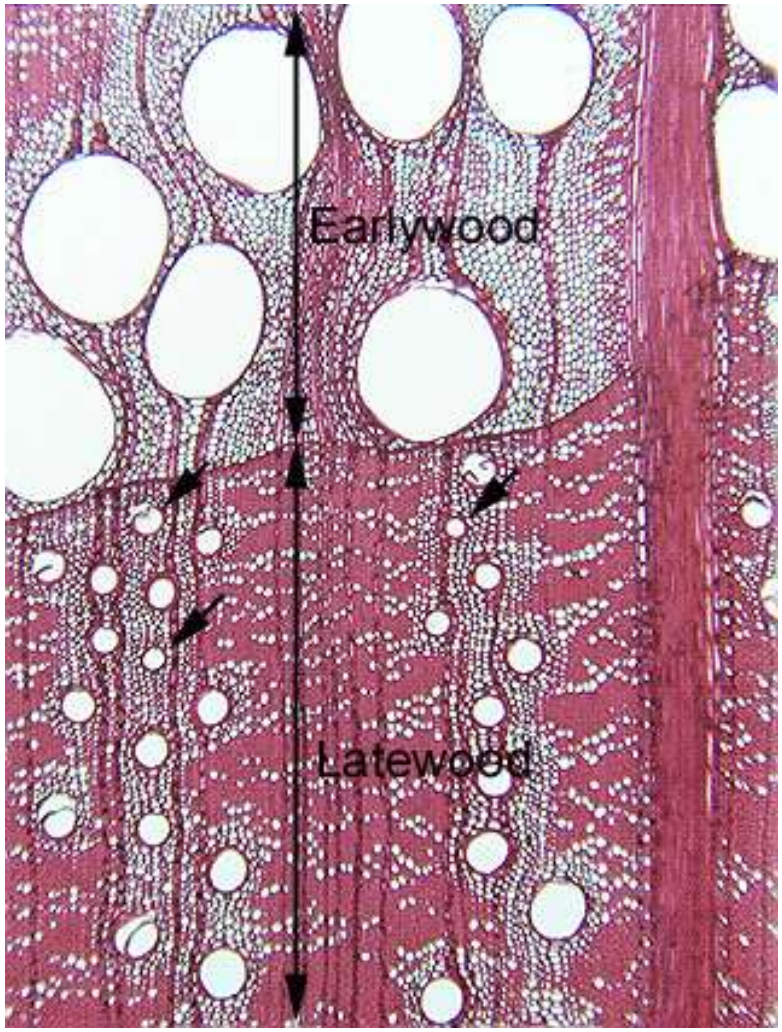
Dicot Wood

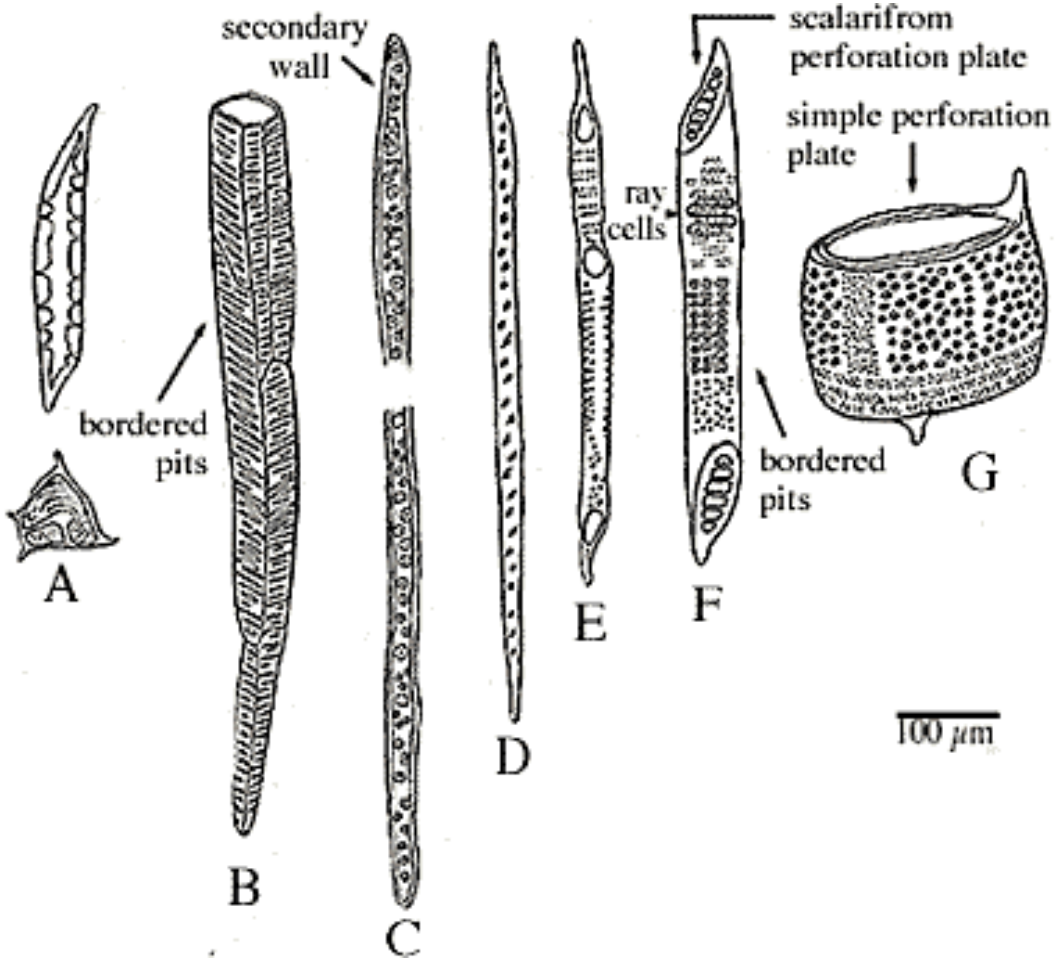




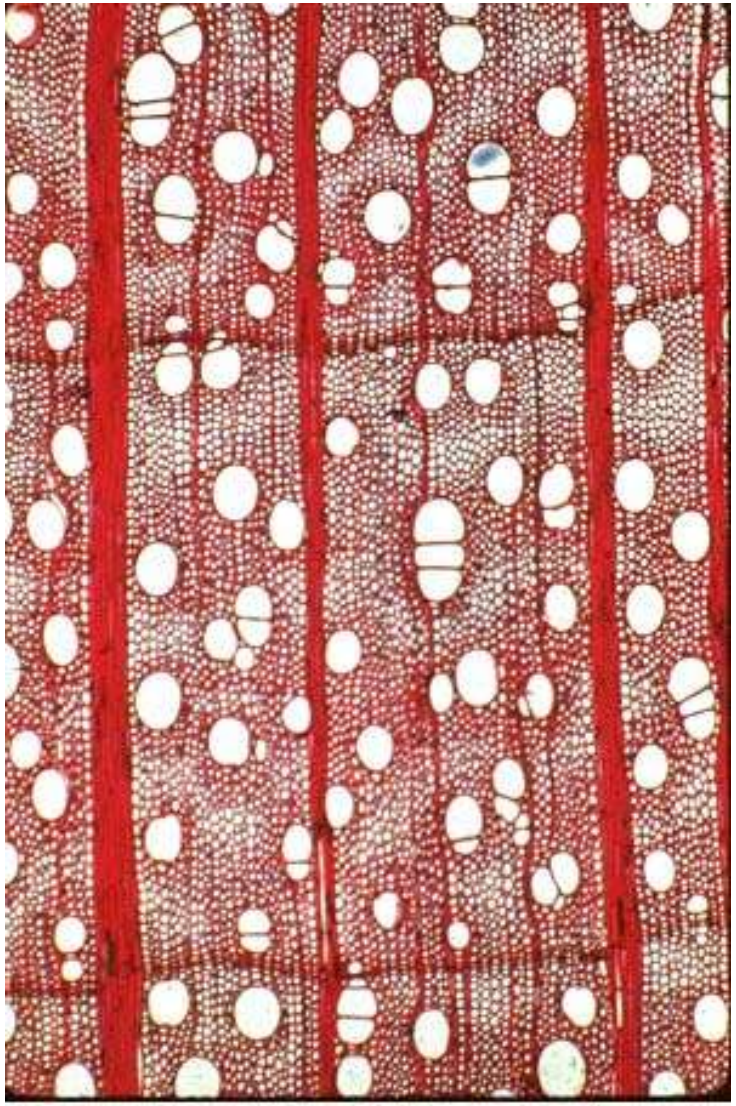
Magnolia

Dicot Wood - *Quercus*

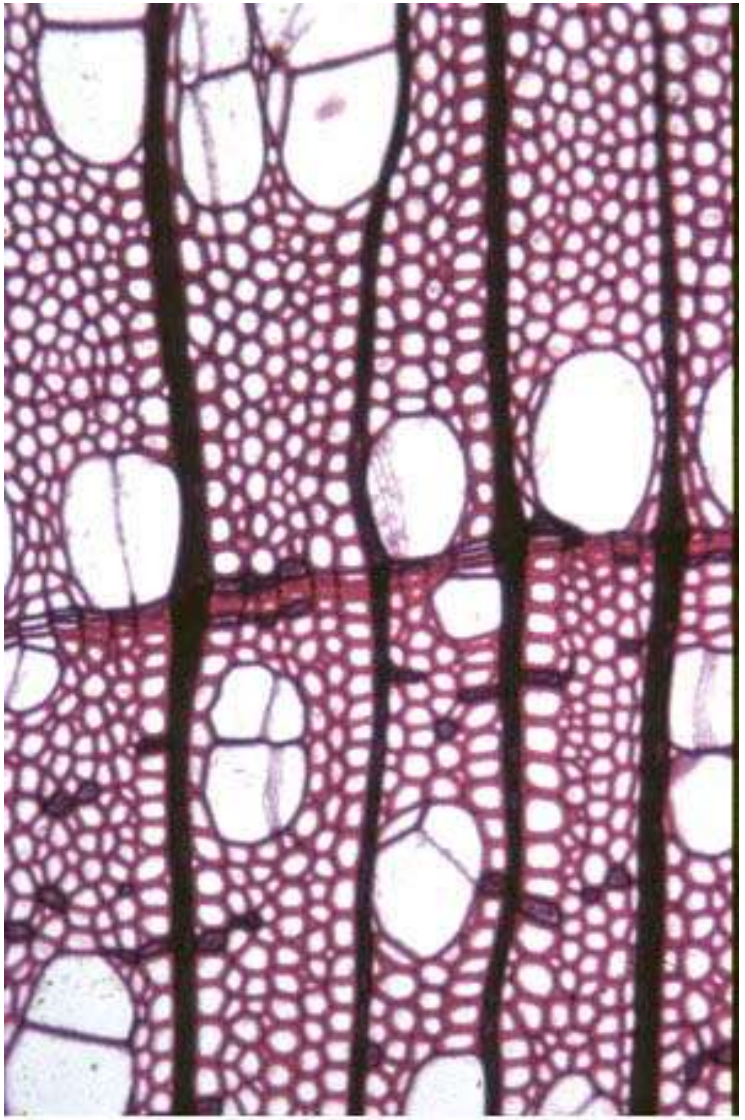




Dicot Wood



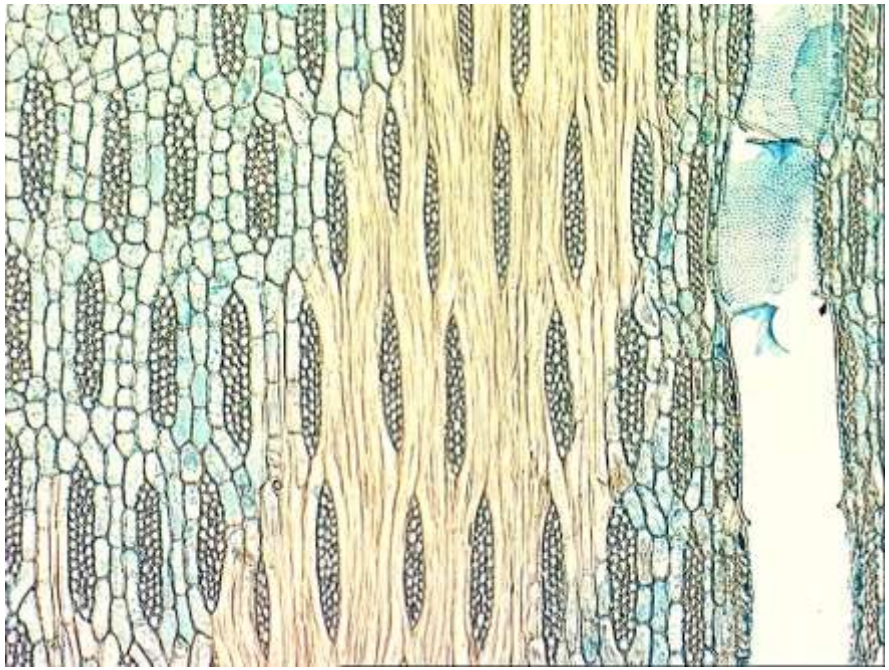
Acer saccharinum wood cross section.



Betula wood cross section.

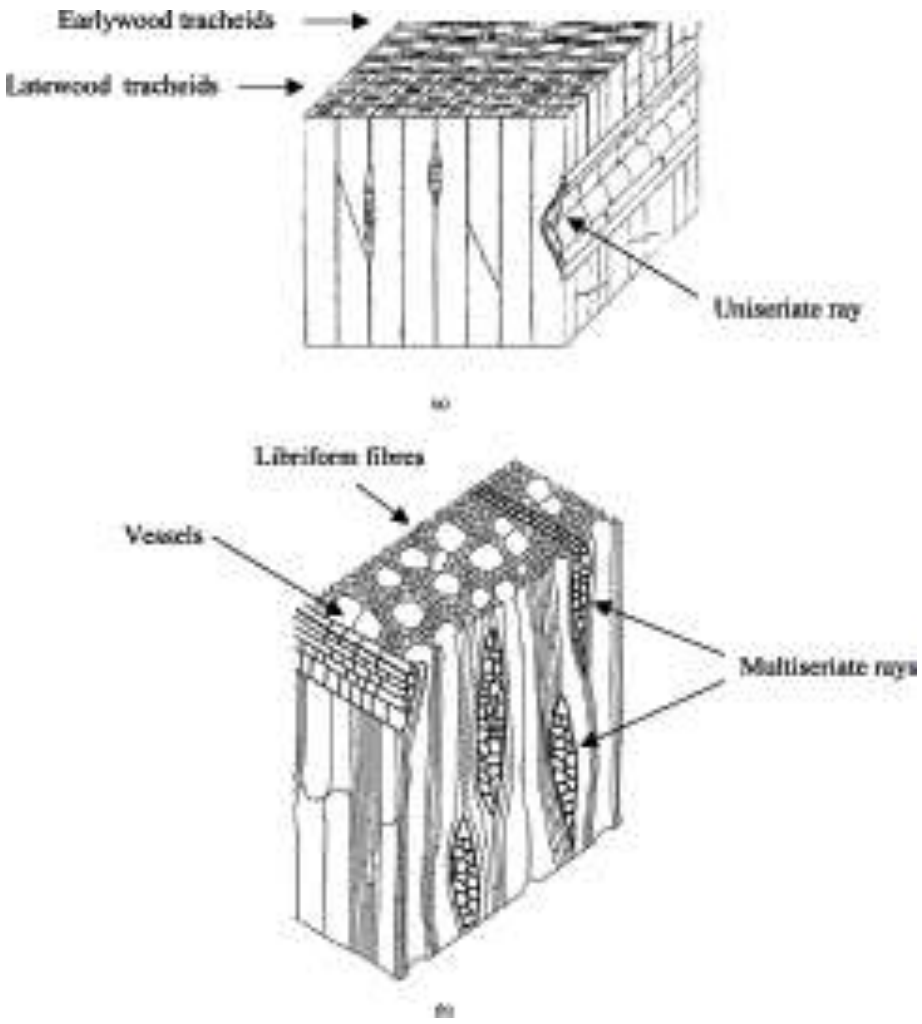
Rays - in Tangential Section

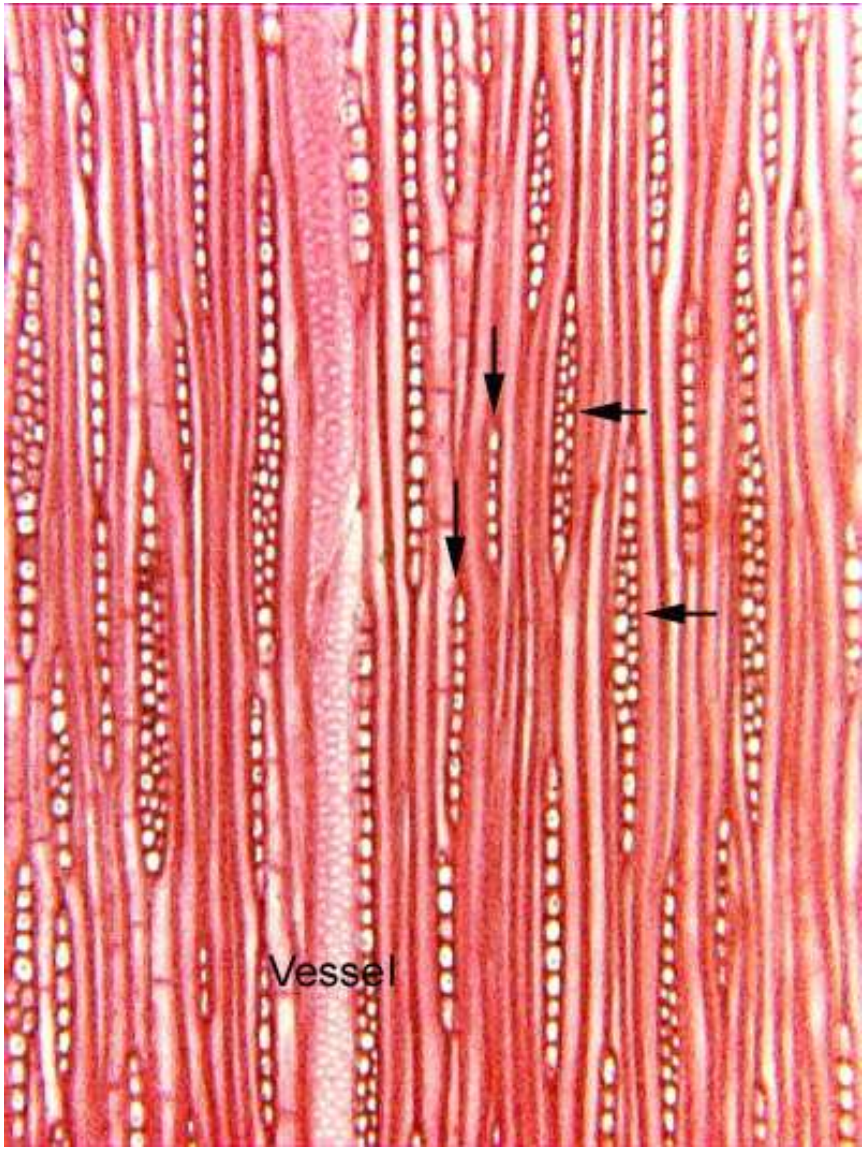
Storied



Unstoried

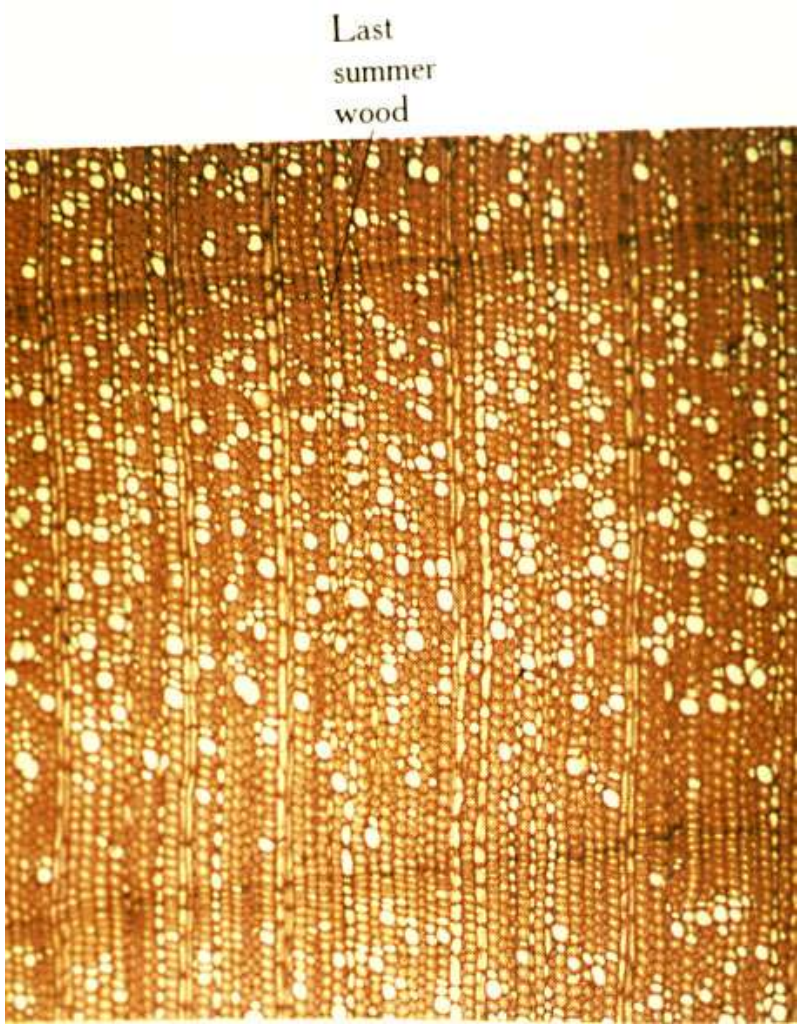
Rays – uniseriate and multiseriate - *Carpinus*



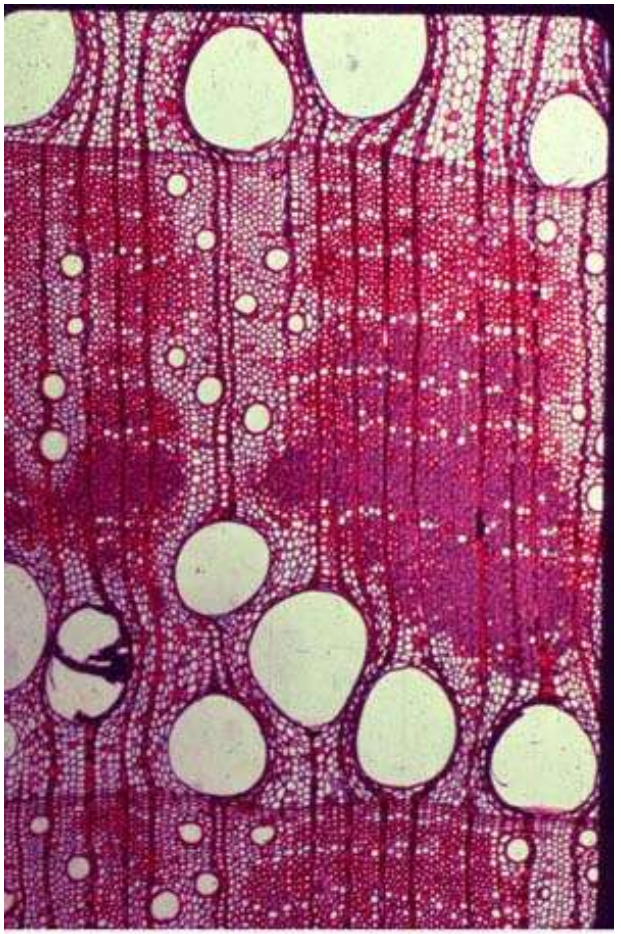


Vessel (Pore) Arrangement

Diffuse Porous



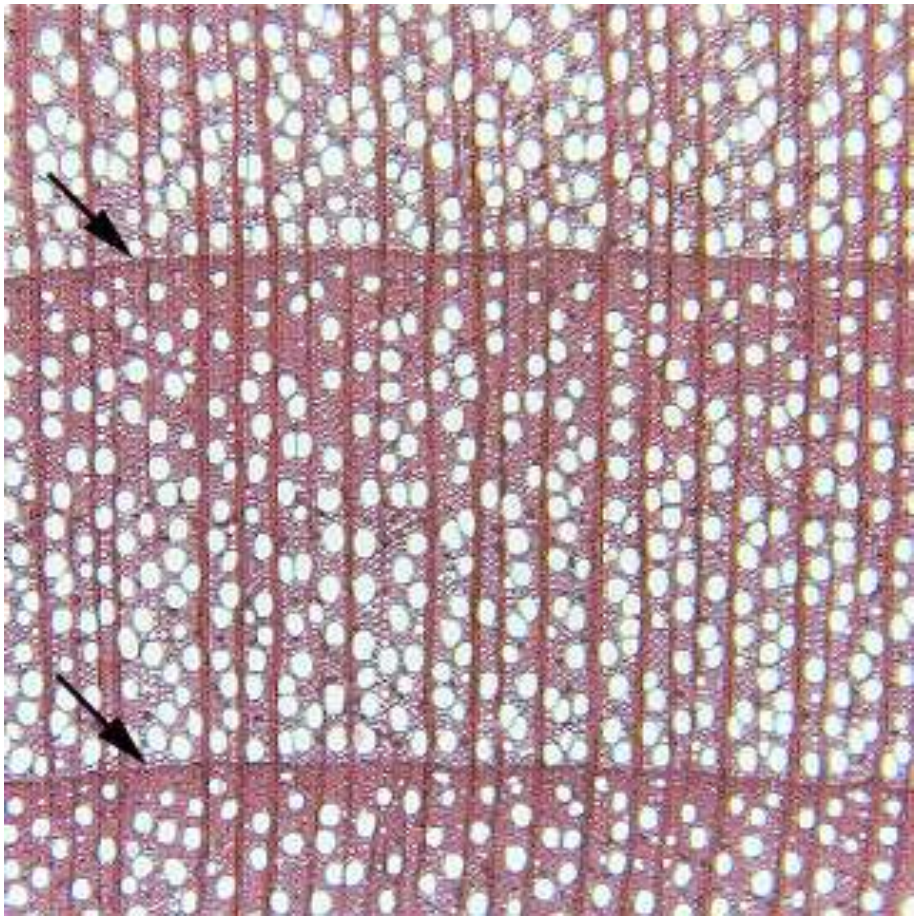
Ring Porous



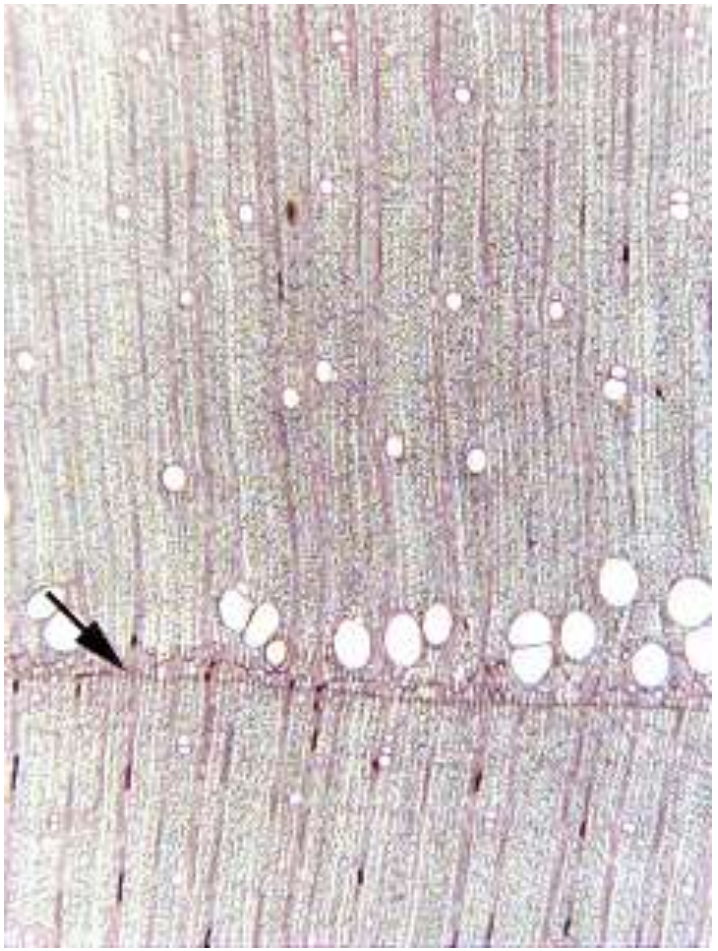
Quercus rubra wood cross section.

Vessel (Pore) Arrangement

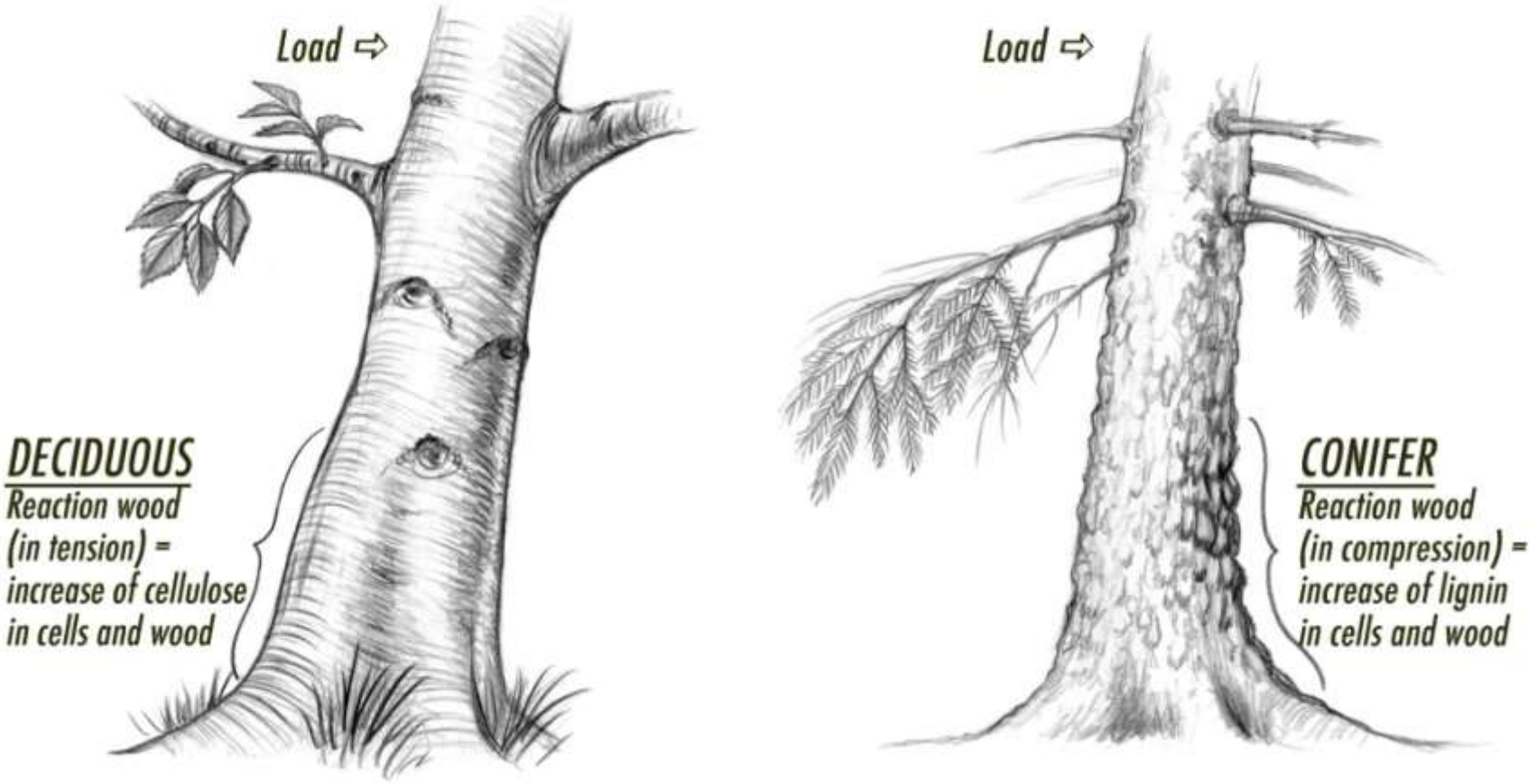
Diffuse Porous

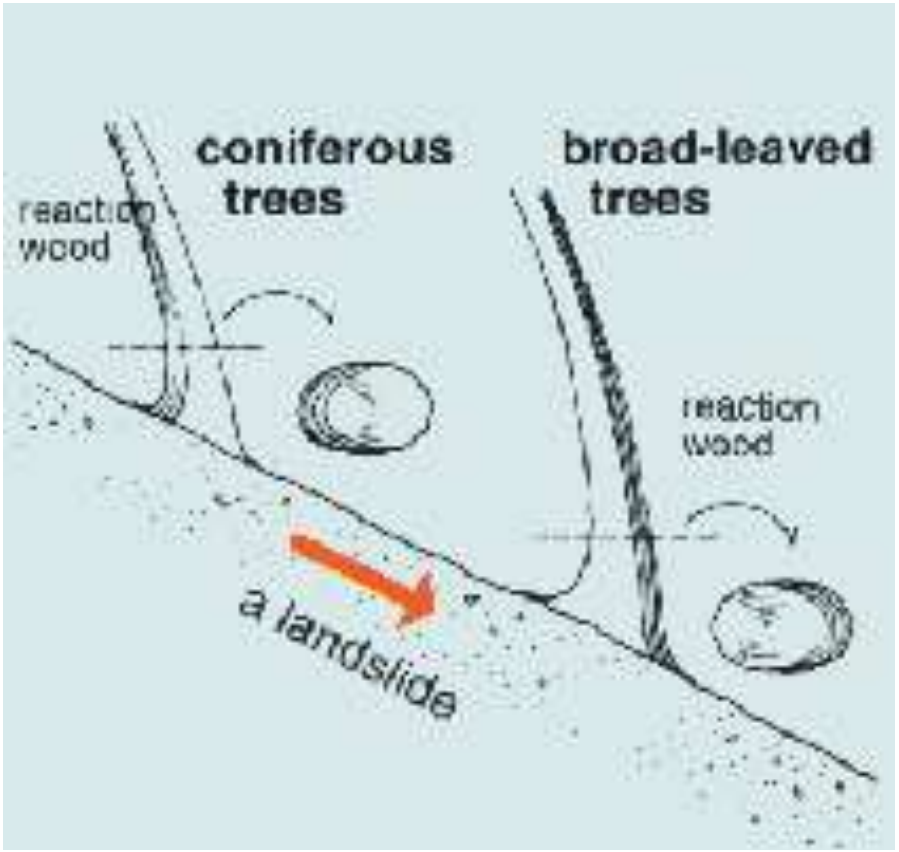


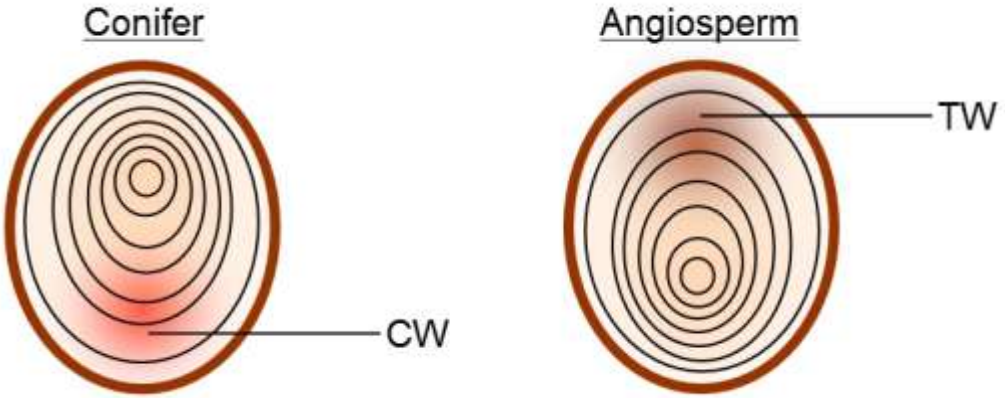
Ring Porous



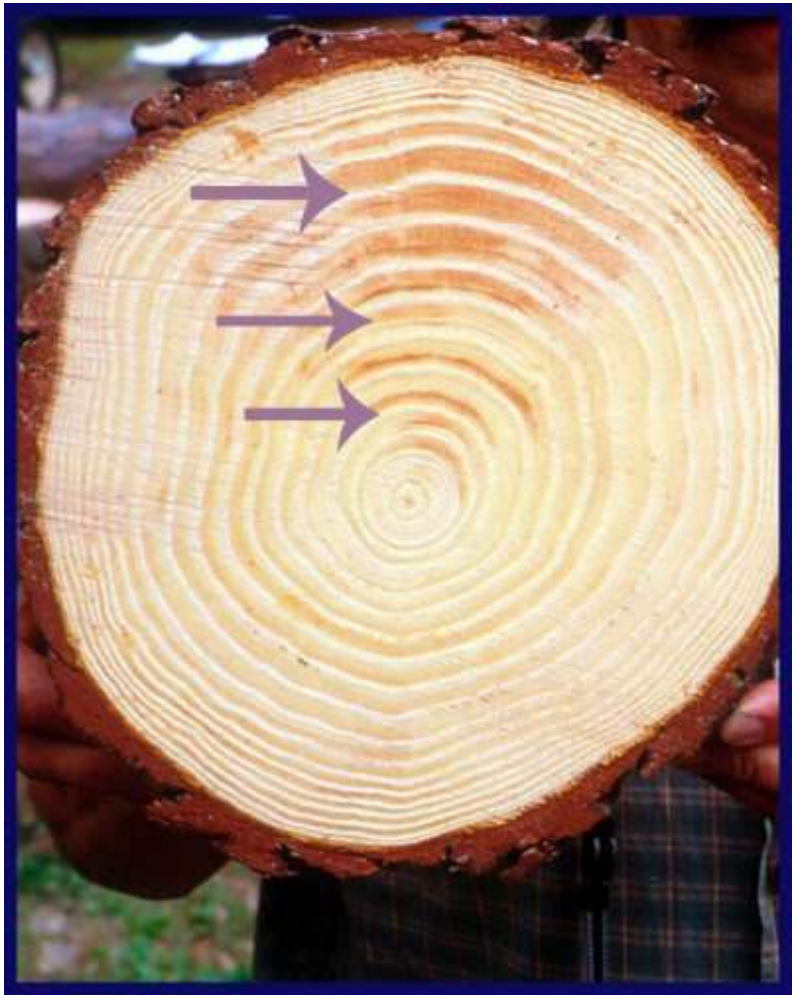
Reaction Wood

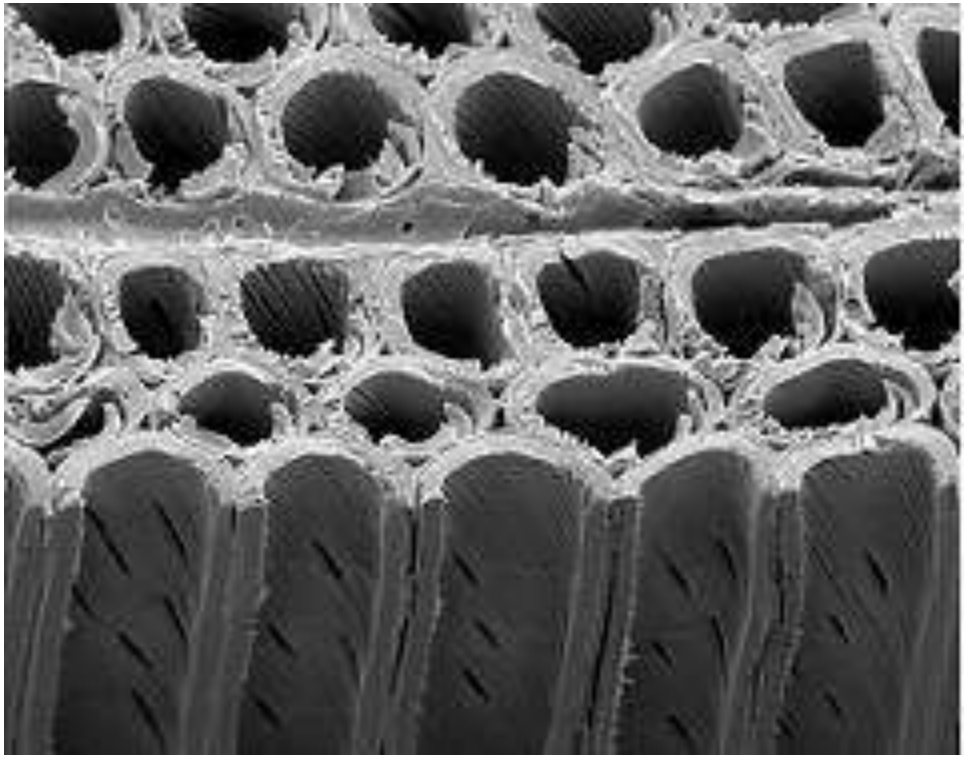



coniferous trees
broad-leaved trees
reaction wood
reaction wood
a landslide

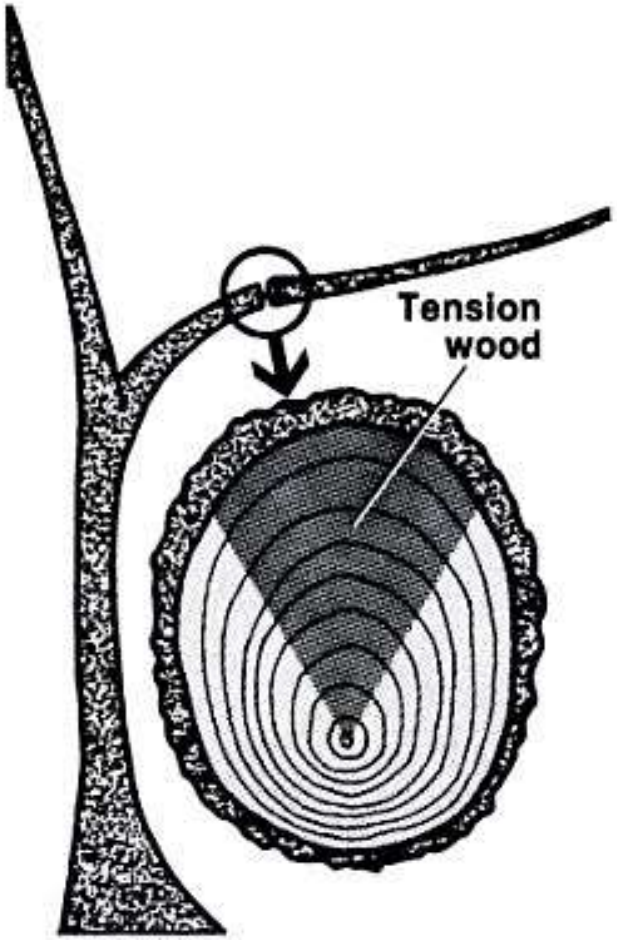

Conifer
Angiosperm
CW
TW

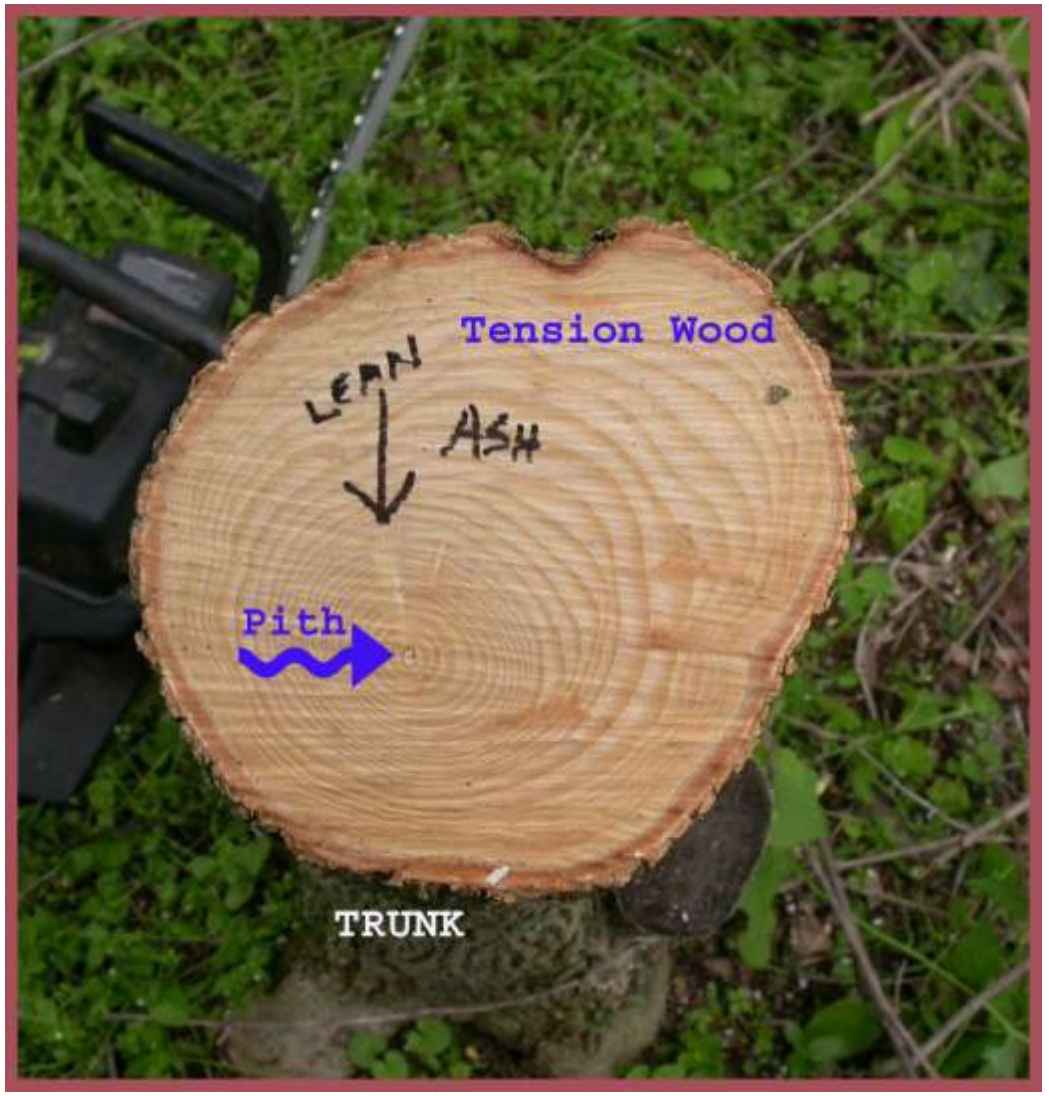
Compression Wood - *Pinus*



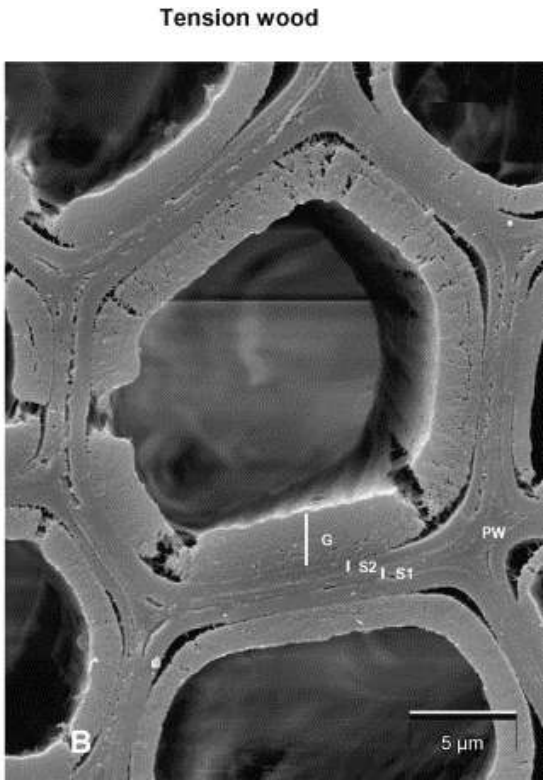


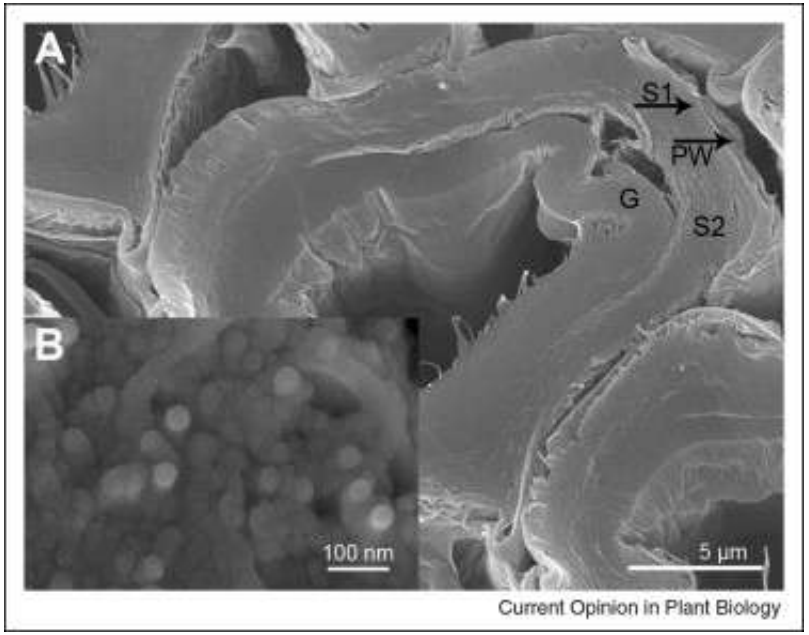
Tension Wood - Dicots



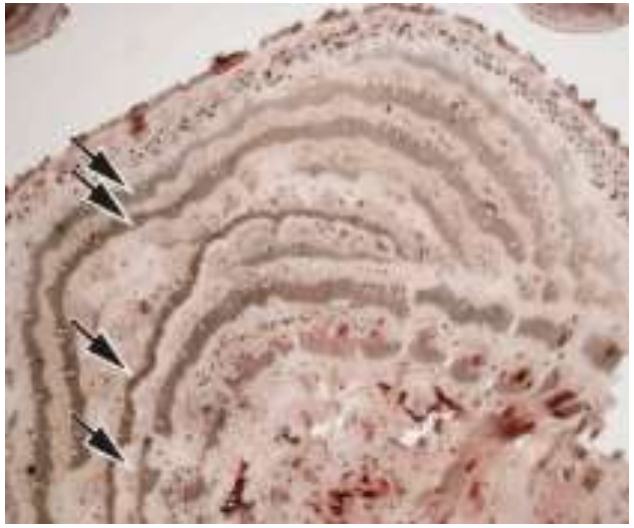


Gelatinous Fibers in Tension Wood

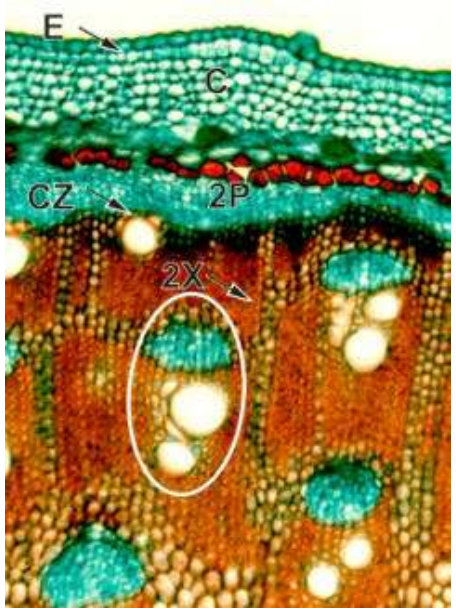




Anomalous Secondary Growth



Boerhaavia (Nyctaginaceae)
successive rings of xylem and phloem

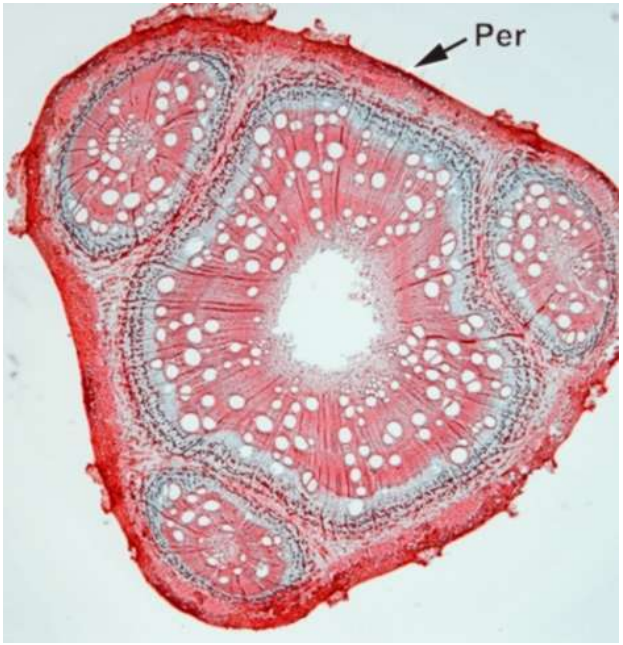


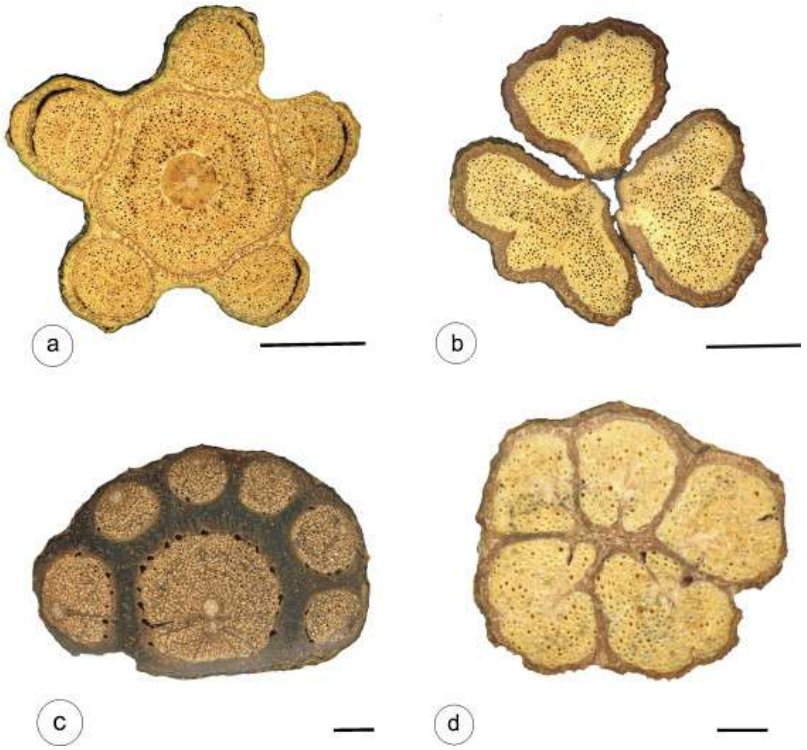
Bougainvillea (Nyctaginaceae) –
included vascular bundles
in secondary xylem

Anomalous Secondary Growth

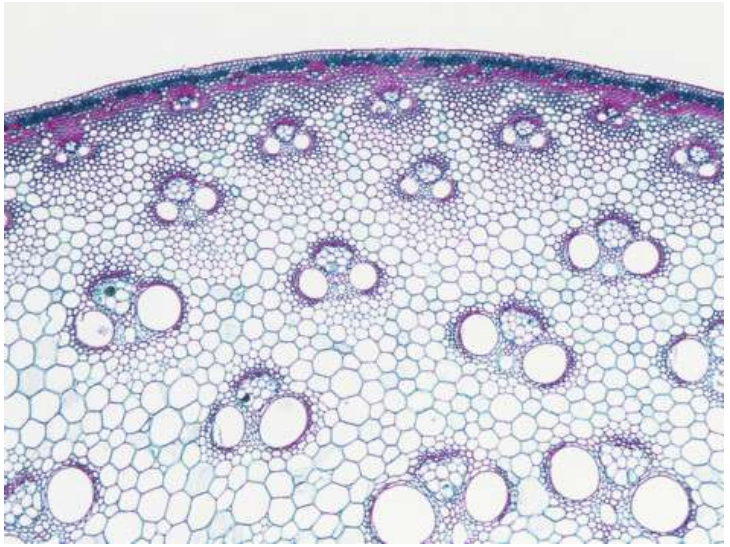
Compound Stems
Paullinieae: Sapindaceae

Serjania (Sapindaceae)
several vascular cylinders enclosed
in a common periderm

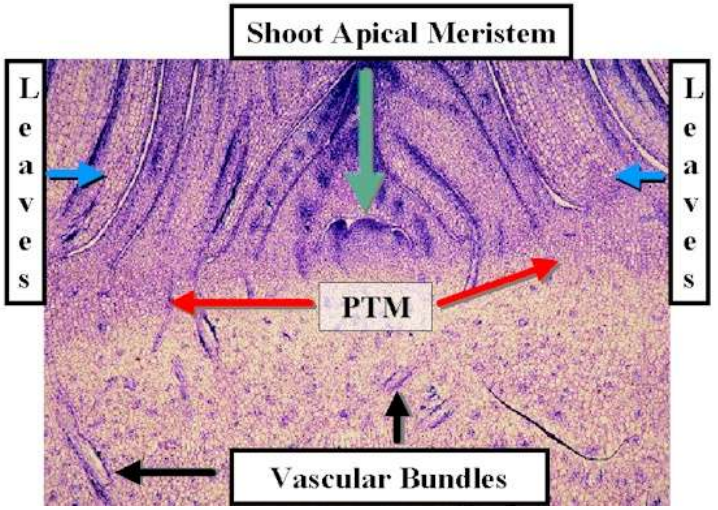




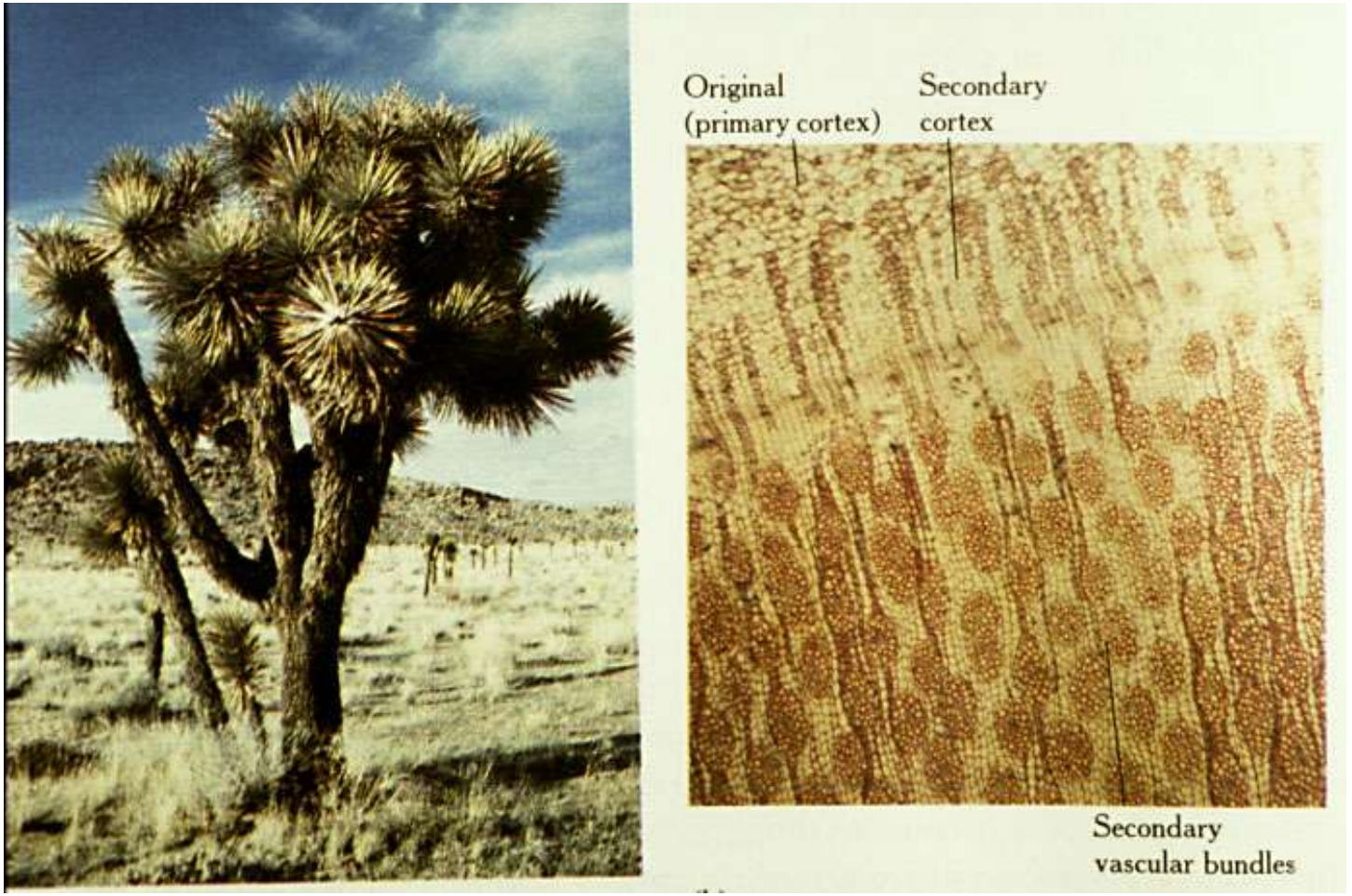
Bamboo “wood”

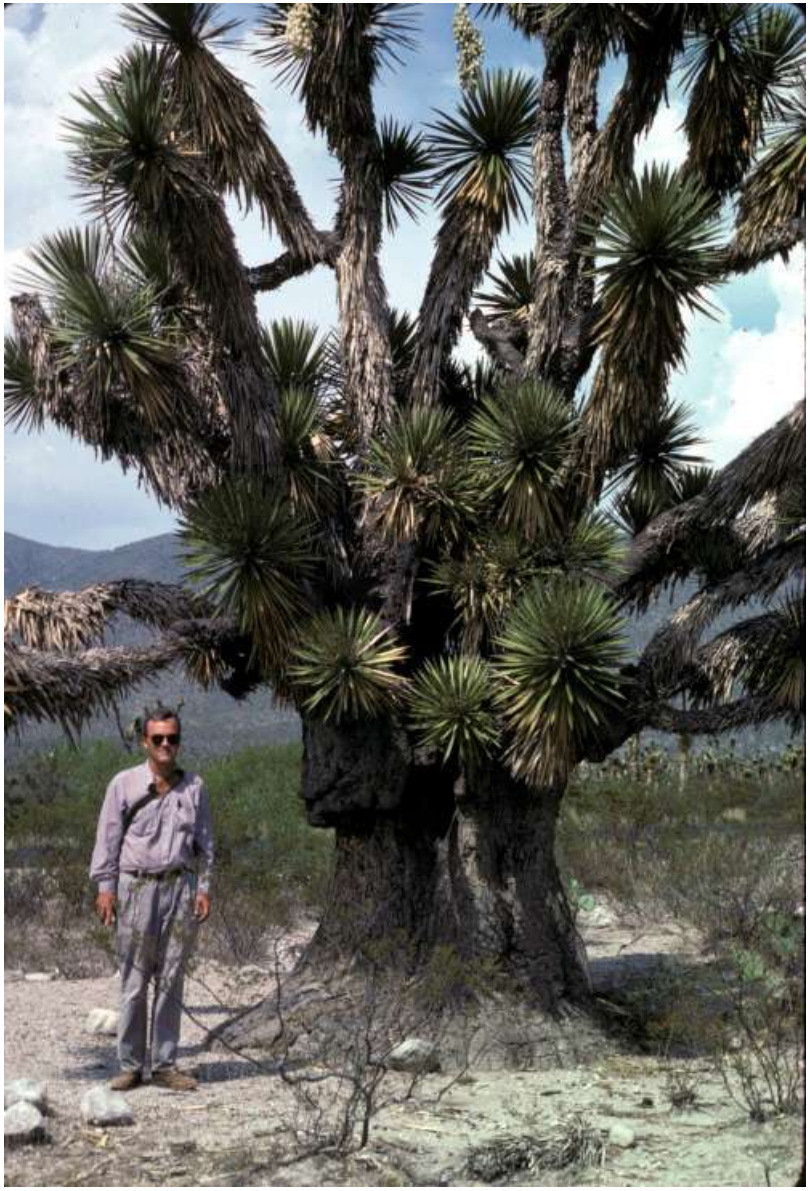


Primary Thickening Meristem - Palms

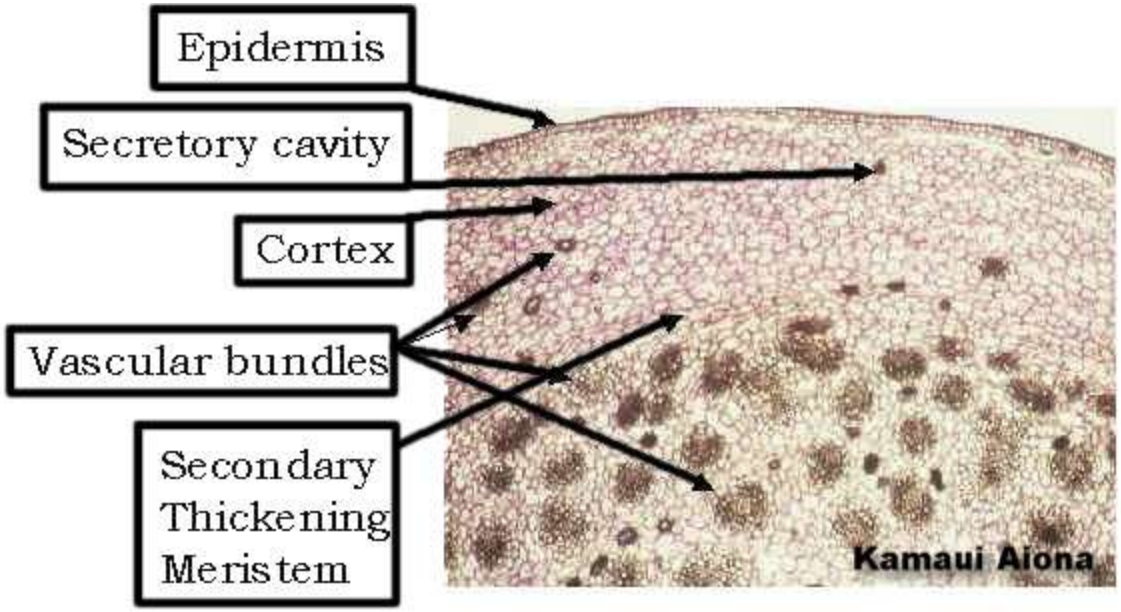


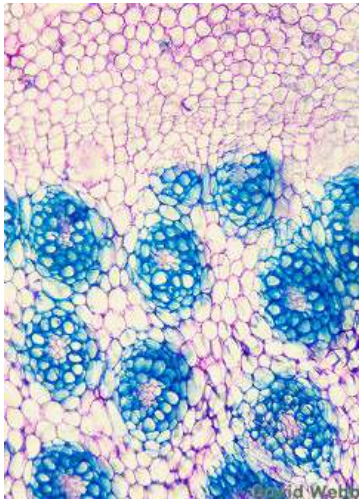
Monocot Wood



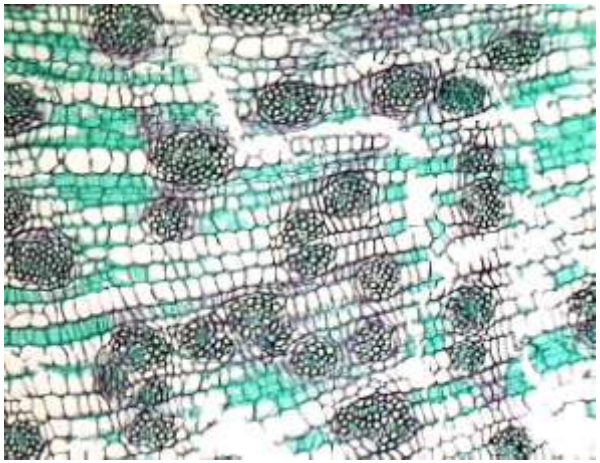


Secondary Thickening Meristem



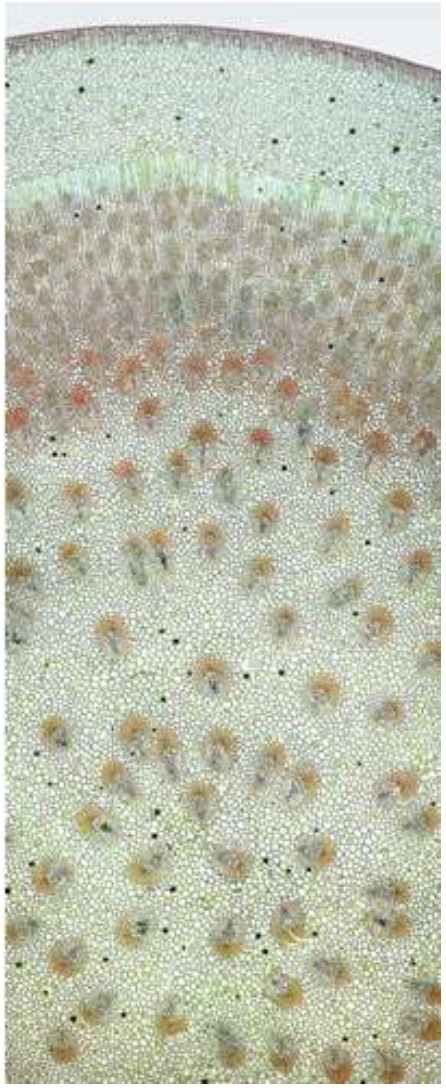


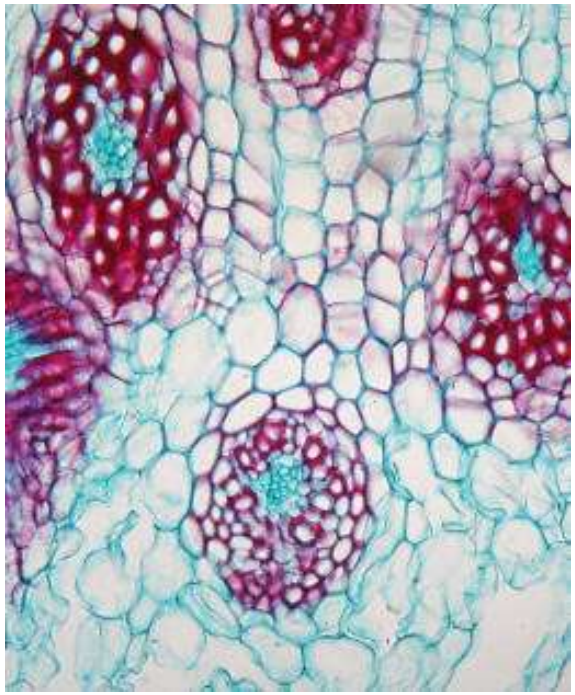
Cordyline



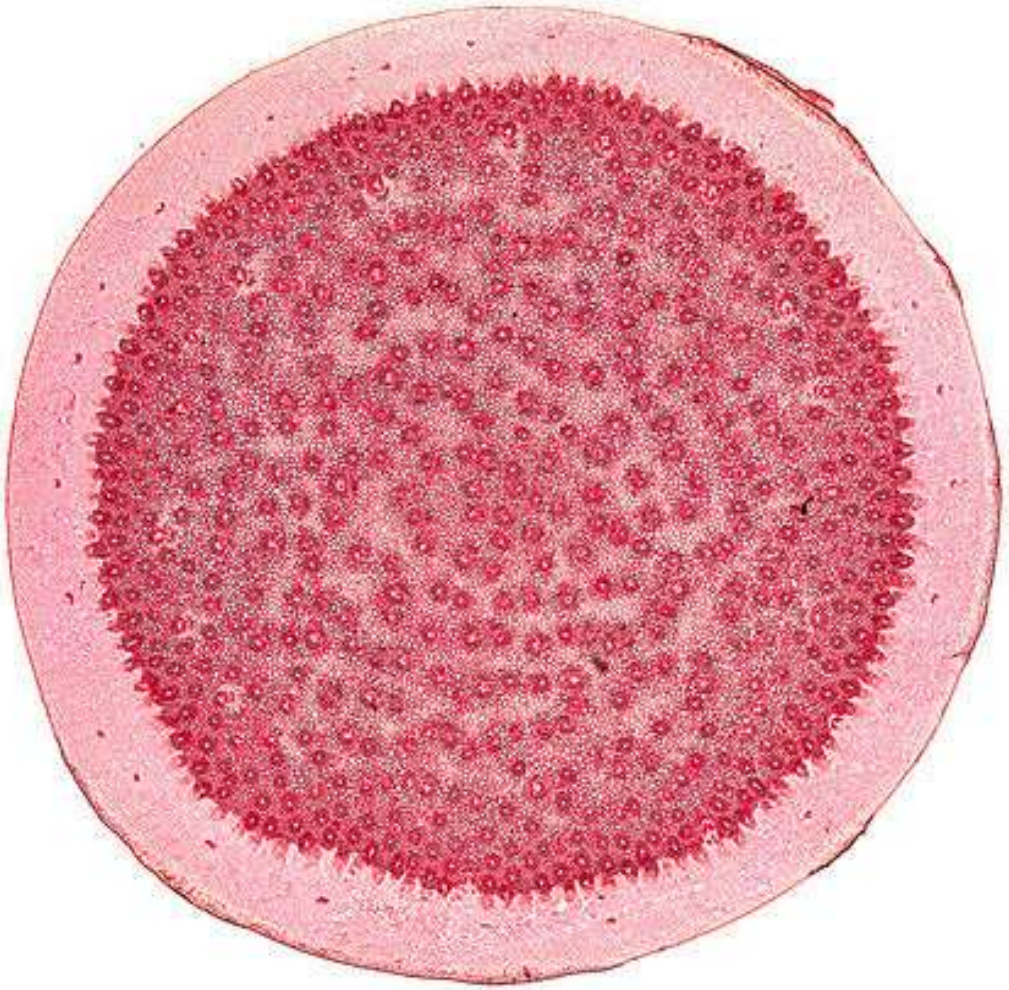
Beaucarnea

Dracaena wood





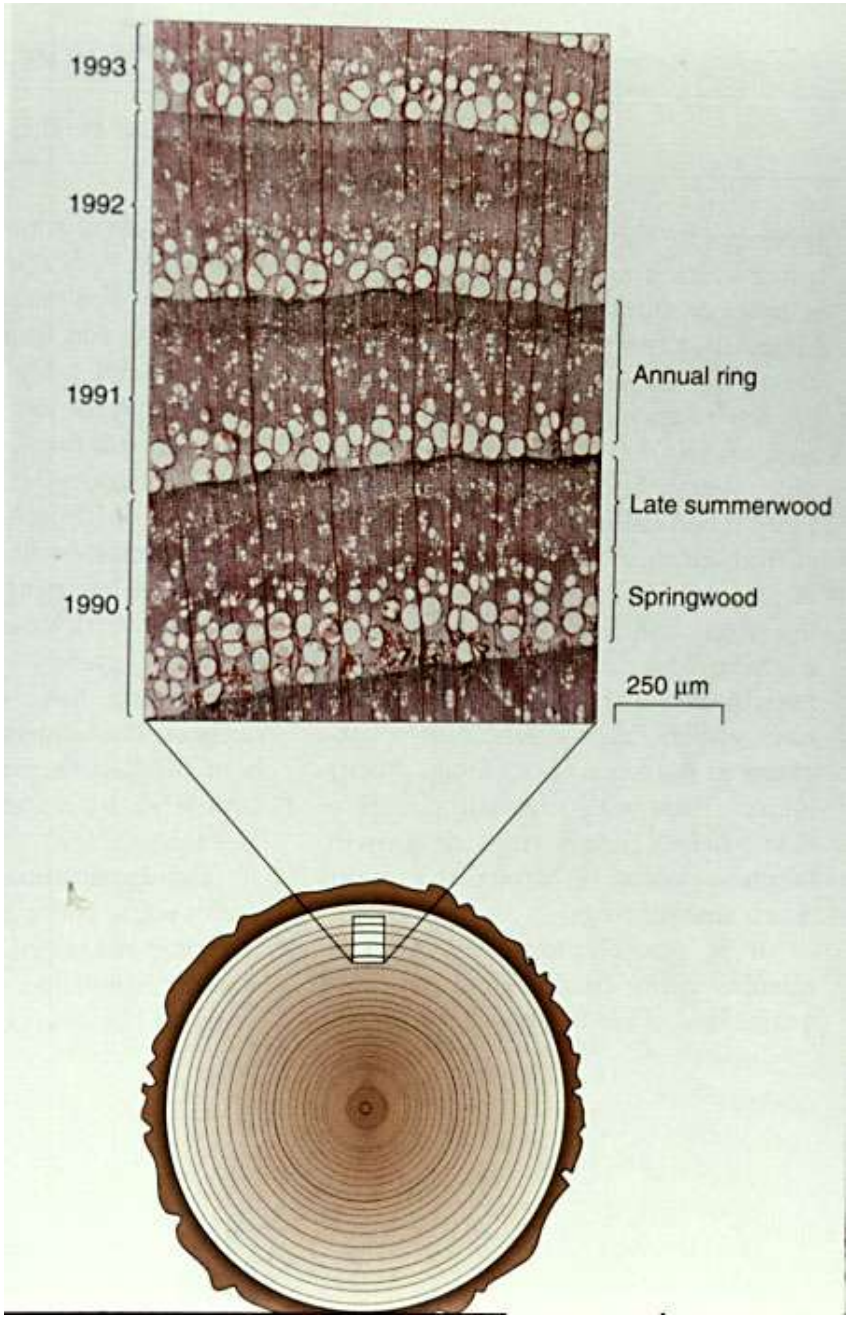
Stem of a Dracaena



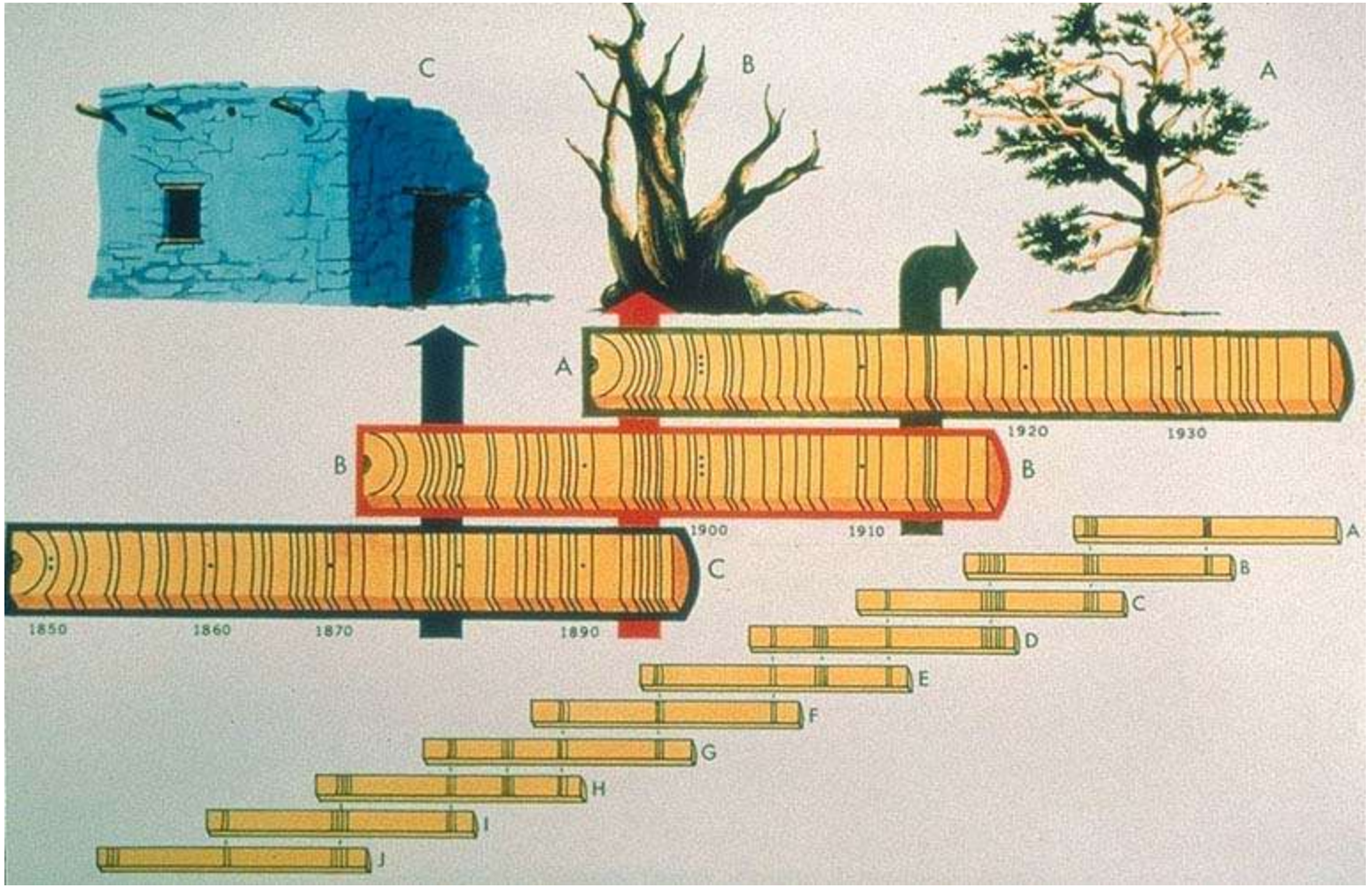
Dracaena cinnabari

Growth Rings

Dendrochronology

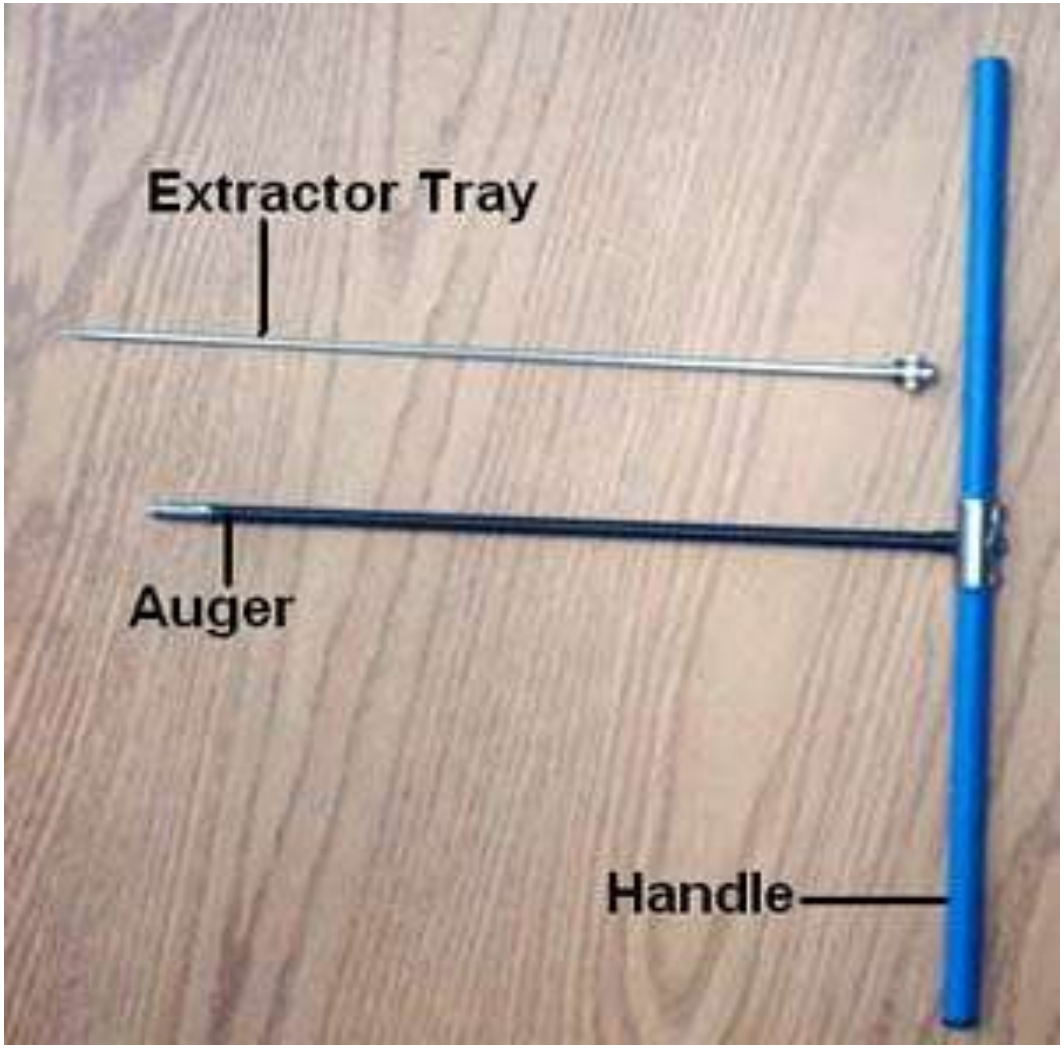


Dendrochronology - Growth Rings



Mesa Verde

Dendrochronology – Core Borer



Dendrochronology - Cores

Sledge Microtome

End