

Introduction to Botany. Lecture 20

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Outline

1 Questions and answers

2 Tissues

- Secondary cover: periderm
- Step five: pumps. Absorption tissues
- In addition: secretory tissues

3 Leaf

- Leaf in general
- Leaf morphology



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Previous final question: the answer

List two differences between phloem and xylem.



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List two differences between phloem and xylem.

- **State:** dead vs. living cells
- **Transport:** water vs. sugar
- **Direction:** up vs. various
- **Biomass:** big vs. small



Tissues

Secondary cover: periderm

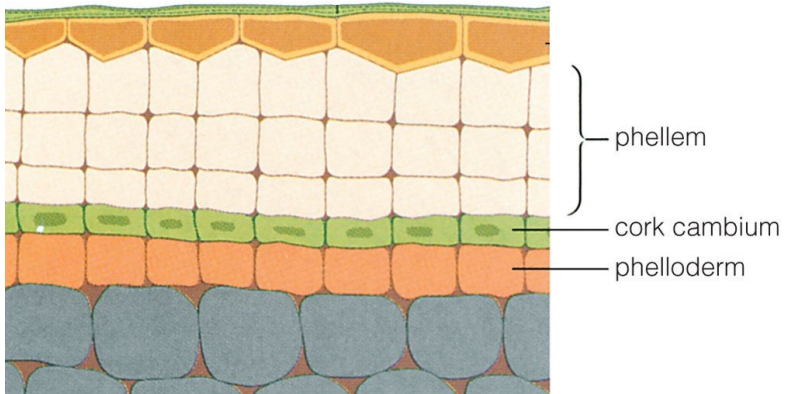


Secondary dermal tissue: Periderm

- Secondary dermal tissue
- Arises inside the stem ground tissue (cortex), closer to surface
- Complex tissue: includes phellem (cork in the strict sense), cork cambium (phellogen), and phelloderm
- Old periderm includes some other tissues and becomes a bark
- Cells of phellem are dead cells rich of suberin
- Main function is defense



Three cell types of periderm



Cork cambium is another lateral meristem; *phellem* and *phelloderm* are main components of periderm

Tissues

Step five: pumps. Absorption tissues



Poikilo- and homoiohydraulicity

- **Poikilohydric** plants do not save water, they survive even complete desiccation
- **Homoiohydric** plants save water, they always have similar water content and do not survive after desiccation
- Compare with poikilo- and homoiothermic animals (reptiles vs. mammals)

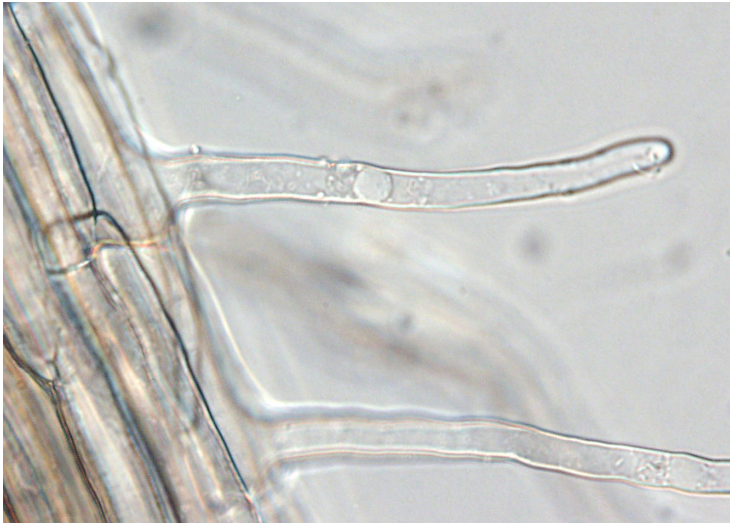


Absorption tissues

- Always primary, simple tissues
- **Rhizoderm**, or root hairs, originates from protoderm, but life span is much shorter than of epidermis
- **Velamen**, originates from root cortex



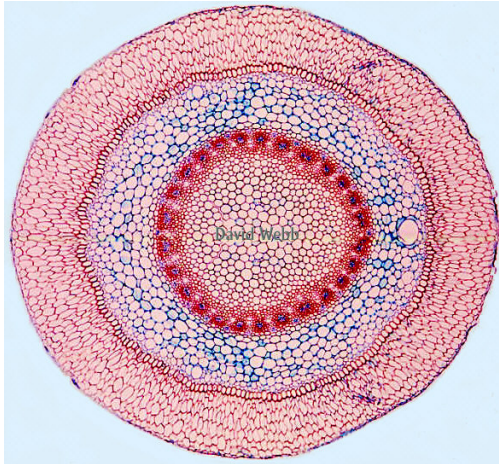
Rhizodermm



Root hairs of grass seedlings (LM)



Velamen



Outer cylinder is a velamen tissue of orchid root (LM, © D. Webb)



Tissues

In addition: secretory tissues

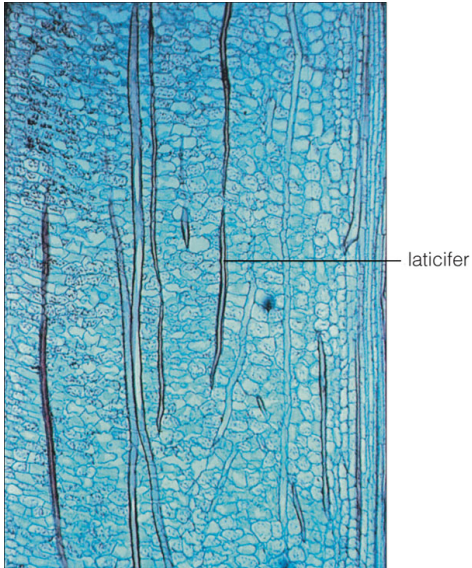


Secretory tissues

- Primary, simple or complex tissues
- Spreading across plant body, concentrating in leaves and young stems
- May secrete latex, volatile oils, mucus and other chemicals
- Functions vary: attraction or dis-attraction, communication, defense etc.



Laticifers



© 2006 Brooks/Cole - Thomson



Leaf

Leaf in general



Definition, functions and features

- Lateral flattened organ of shoot with restricted growth
- Functions:
 - Photosynthesis
 - Respiration
 - Transpiration
 - Synthesis of secondary chemicals
- Features:
 - Have bud in the axil (remember compound leaves)
 - Do not grow by apex
 - Do not produce new leaves
 - Have hierarchical morphology



Leaf

Leaf morphology



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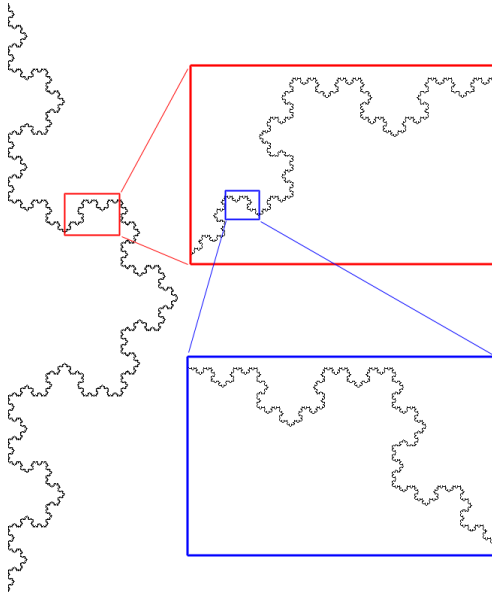
Hierarchy



Fractals

 $n = 0$  $n = 1$  $n = 2$  $n = 3$  $n = 4$ 

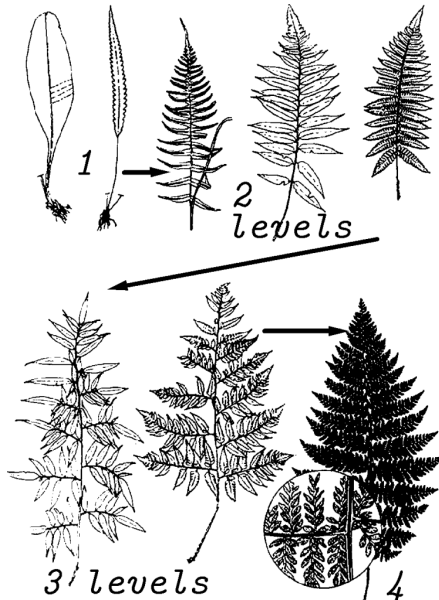
Self-similarity



Realistic tree-like fractal



Hierarchical levels in leaf morphology



Types of leaf characters

- General: applicable only to the whole leaf
- Terminal: applicable only to the terminals (e.g., terminal leaflets)
- Repetitive: repeating on each level of hierarchy



Summary

- Leaves have **general**, **repetitive** and **terminal** characters



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2015.

Mode of access:

http://ashipunov.info/shipunov/school/biol_154

