

Introduction to Botany. Lecture 23

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Outline

1 Questions and answers

2 Leaf

- Anatomy of leaf
- Ecological adaptations of leaves

3 Stem and shoot

- Plant body



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Previous final question: the answer

Why do trees drop their leaves in the fall?



Previous final question: the answer

Why do trees drop their leaves in the fall?

- To conserve water which is not available from the soil
- To get rid of unnecessary secondary compounds

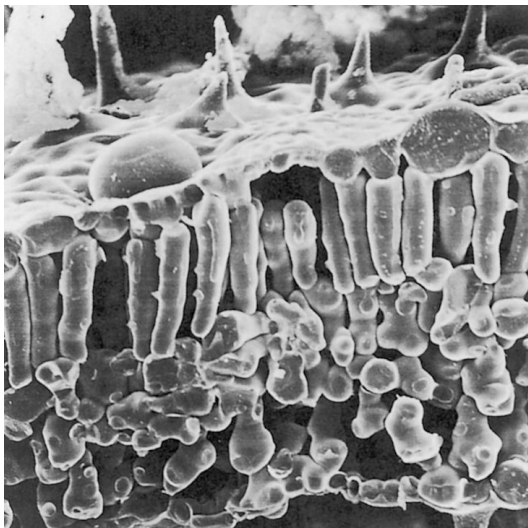


Leaf

Anatomy of leaf



Palisade and spongy cells



palisade
mesophyll

spongy
mesophyll

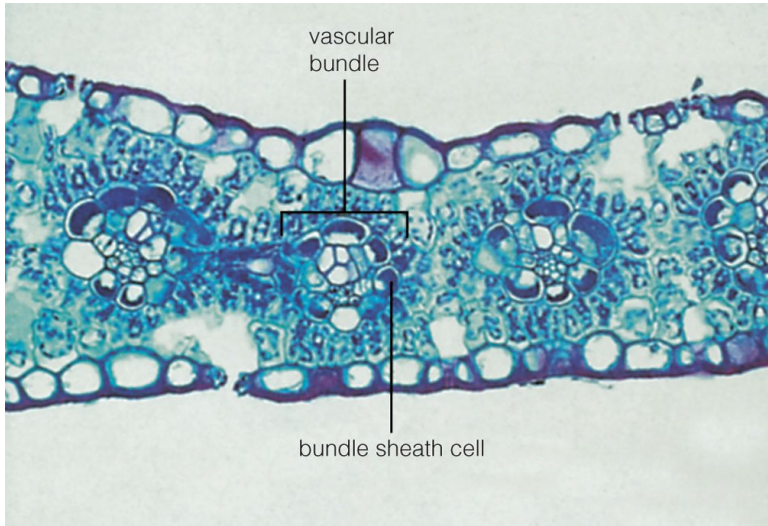


Veins/vascular bundles

- Phloem typically faces downwards, xylem—upwards
- Bundles of C₄-plants have additional bundle sheath cells



Bundle sheath cells



Leaf

Ecological adaptations of leaves



Plants and water

- Xerophytes: sclerophytes and succulents (stem and leaf)
- Mesophytes
- Hygrophytes
- Hydrophytes



Leaf succulent (*Crassula argentea*)



mesophyll
cells

Xerophyte leaf—needle of pine (*Pinus contorta*)

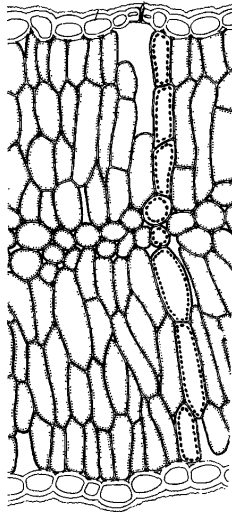
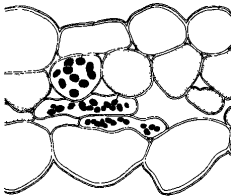


Plants and light

- Sciophytes
- Heliophytes



Sciophyte and heliophyte



Oxalis acetosella and *Sylphium laciniatum*

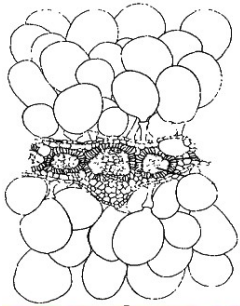


Leaves and soil

- Halophytes (accumulate, excrete or avoid NaCl)
- Nitrate halophytes (grow on soils rich of NaNO_3)
- Oxylophytes (grow on acidic soils)
- Calciphytes (grow on chalk soils rich of CaCO_3)



Leaf of salt-accumulating halophyte



Atriplex prostrata



Leaves and substrate

- Psammophytes (grow on sand)
- Petrophytes (grow on rocks)
- Rheophytes (grow in fast springs)



Rheophyte



Macarenia clavigera from Venezuela



River with rheophytes



They are flowering, too



Podostemum ceratophyllum (may be found even in ND!)



Leaves and metabolism

- Mycoparasites
- Hemiparasites
- Phytoparasites (root and stem)



Mycoparasite



Triuris hyalina from South America



Hemiparasite



Krameria parvifolia from southern Texas



Root parasite



Hydnora africana from South Africa



Stem parasite



Cuscuta europaea from Germany



Stem and shoot

Plant body



Structure of plant body: the first glance

- Shoot system (aboveground part: stems, leaves, buds, flowers, fruit)
- Root system (below-ground part: main roots and branches)
- Exceptions:
 - Some mosses and even ferns have only shoot system
 - Liverworts and hornworts frequently have only leaf-like thallus



Types of plant body

- **Thallus** (flat, with non-differentiated organs)
- **Shoot** body (roots are absent)
- **Bipolar** body (root and shoot systems)



Organs of bipolar plant

- **Leaf:** flat lateral organ with restricted growth
- **Stem:** axial aerial organ with continuous growth
- **Root:** soil organ modified for absorption
- **Floral unit (FU):** stable element of generative system



Summary

- Water deficit results in either sclerophyte or succulent adaptations
- Water excess results in hygrophyte or even hydrophyte adaptations



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2015.

Mode of access:

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

