

Introduction to Botany. Lecture 17

Alexey Shipunov

Minot State University

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Outline

1 Questions and answers

2 Leaf

- Modifications of leaf
- Anatomy of leaf

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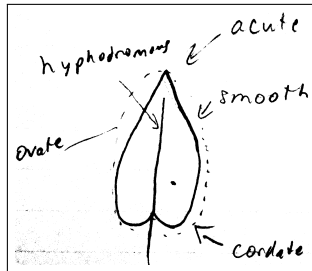
Previous final question: the answer

Please draw the **entire** (*whole*, not dissected), **ovate** leaf with **acute** apex, **cordate** base, **smooth** margin and **hypodromous** venation.

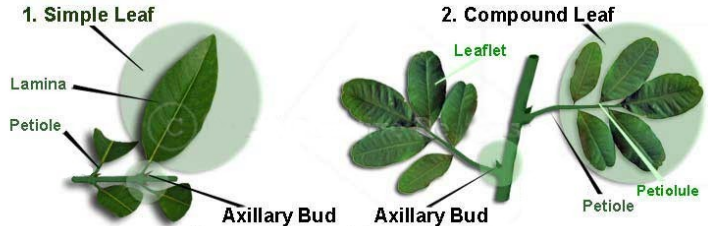


Previous final question: the answer

Please draw the **entire** (*whole*, not dissected), **ovate** leaf with **acute** apex, **cordate** base, **smooth** margin and **hypodromous** venation.



The remainder: simple and compound leaves



Leaf

Modifications of leaf

Leaf modifications

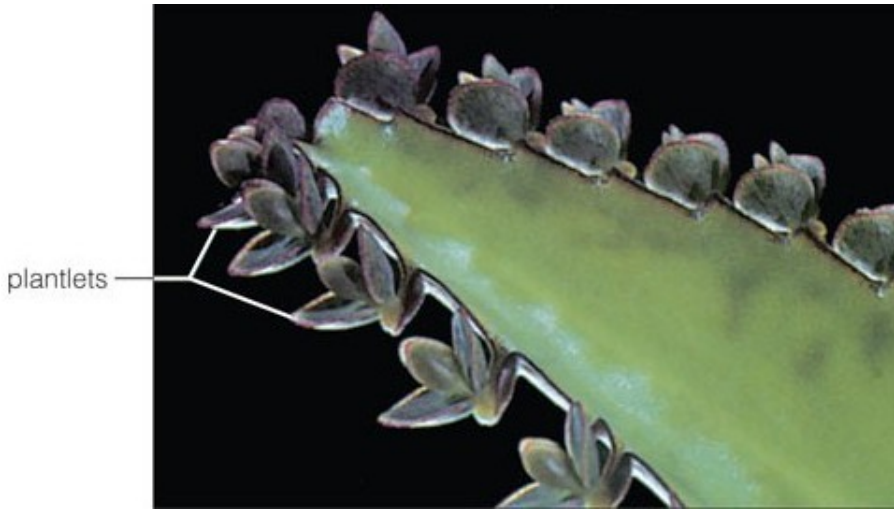
- Spines
- Tendrils
- Succulent leaves
- Traps
- Plantlets



Tendrils of sweet pea (*Lathyrus odoratus*)



Plantlets on the leaf of *Kalanchoe pinnata*



plantlets

Leaf of Venus flytrap (*Dionaea muscipula*)



Everything is possible when plant needs nitrogen!

Venus flytrap in work



Urn leaf of yellow pitcher plant (*Sarracenia flava*)



Prey in the urn



Urn leaf of purple pitcher plant (*Sarracenia purpurea*)



Hairs prevent insects from climbing out of leaf

Sticky tape leaf of butterwort (*Pinguicula* sp.)



Leaf margins are slowly rolling

Sticky tape/trap leaf of sundew (*Drosera intermedia*)



Leaves are constantly open and close and finally digest the
glued insects

Table of modifications

<i>Function</i>	Stem / shoot	Leaf	FU	Root
Expansion	Rhizomes, stolons	Plantlets	...	Ratoons
Storage	Bulbs, corms, tubers	Succulent leaves	...	Storage roots
Photosynthesis	Cladophylls	DEFAULT	...	Green aerial roots
Defense	Thorns	Spines, scales	...	Root spines
Support	DEFAULT	Leaf tendrils	...	Aerial and contractile roots
Interactions	Hollows	Traps, “sticky tapes”, urns	...	Mycorrhizae, nodules

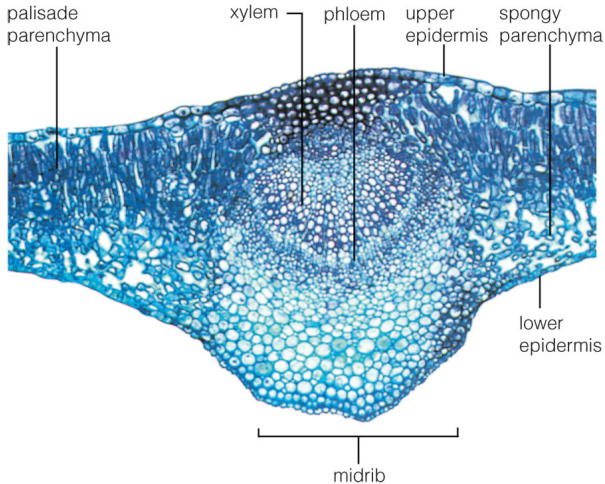
Leaf

Anatomy of leaf

General leaf anatomy

- Epidermis with stomata
- Mesophyll
- Vascular bundles, or veins

Lilac (*Syringa vulgaris*) leaf in cross-section



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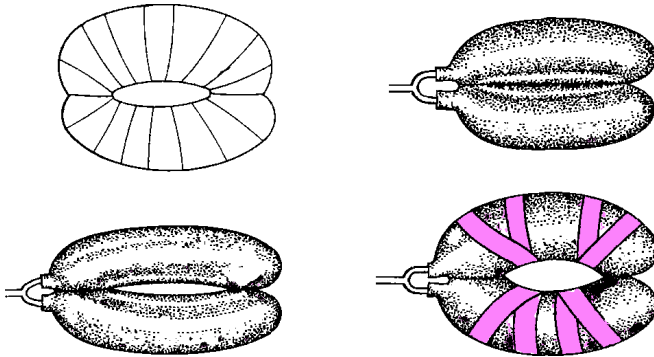


Epidermis and stomata

- Covered with cuticle
- Include stomata with guard cells and (often) subsidiary cells and trichomes
- Opening of stomata is a result of exchange of K^+ , osmosis and uneven cell wall
- Lower epidermis in most cases contain more stomata



Stomata as balloons

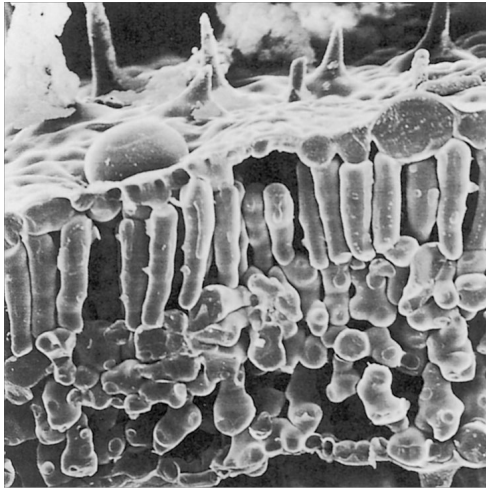


Mesophyll

- Palisade mesophyll consists of tightly arranged elongated cells with less chloroplasts
- Spongy mesophyll consists of loosely attached cells rich of chloroplasts



Palisade and spongy cells



palisade
mesophyll

spongy
mesophyll

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Final question (3 points)

Final question (3 points)

Please invent a test question for the third exam
(**subject**: today's lecture).
There should be at least **three** exclusive choices.

Best questions will really go to the exam!



Summary

- *Osmotic processes in guard cells* result in opening and closing of stomata
- The differentiation of mesophyll to **palisade** and **spongy** cells helps to acquire different types of sun rays



For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 7.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 6.

