

Introduction to Botany. Lecture 22

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Outline

1 Questions and answers

2 Leaf

- Leaves in nature
- Modifications of leaf

3 Leaf

- Anatomy of leaf



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Previous final question: the answer

How many levels of hierarchy has this leaf?



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● 3



Leaf

Leaves in nature

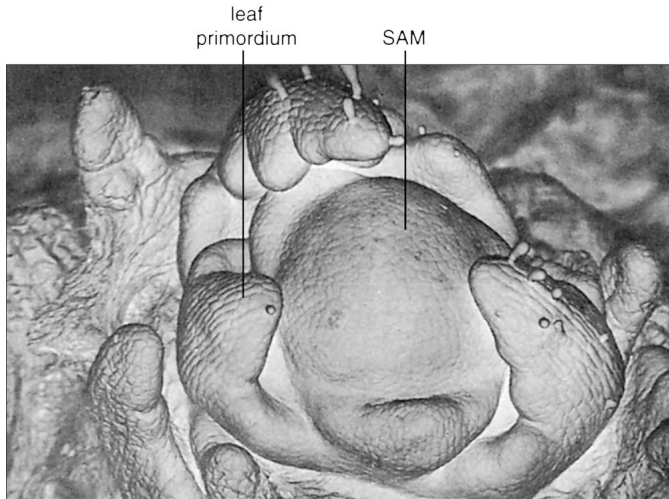


Seasonal life of leaves

- Leaves arise from SAM through leaf primordia
- Old leaves separate from plant in a region called abscission zone



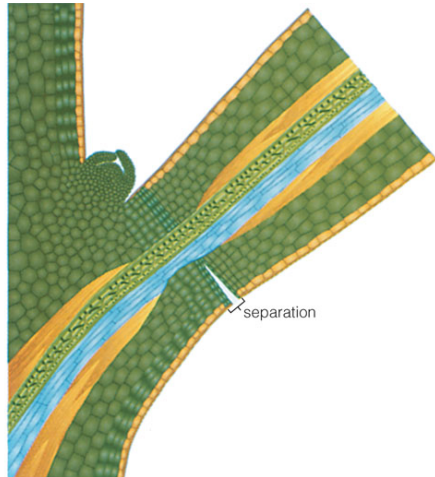
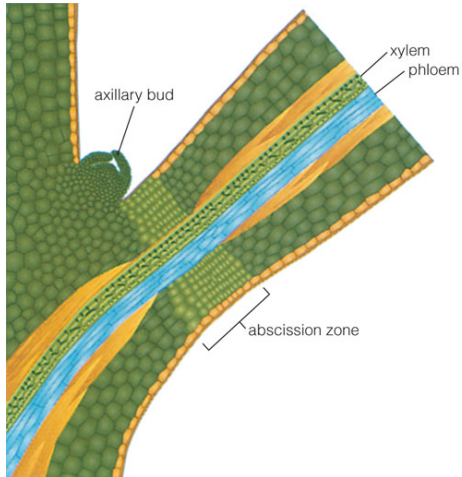
Leaf primordia



© 2006 Brooks/Cole - Thomson



Abscission zone

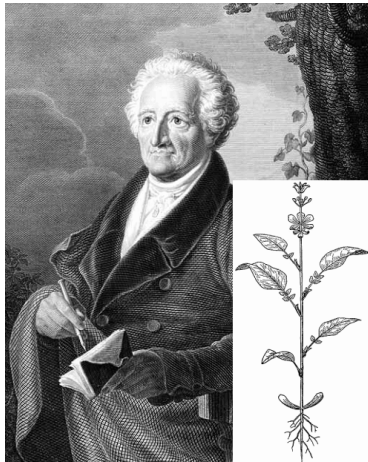


Leaf

Modifications of leaf



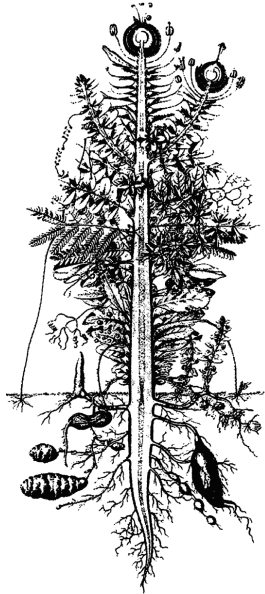
Goethe's theory of modification



Famous German poet and writer Johann Wolfgang Goethe is also a founder of plant morphology. He invented an idea of “primary plant” (“Urpflanze”) where all organs were modifications of one primordial organ.



Urpflanze (another interpretation)



Leaf modifications

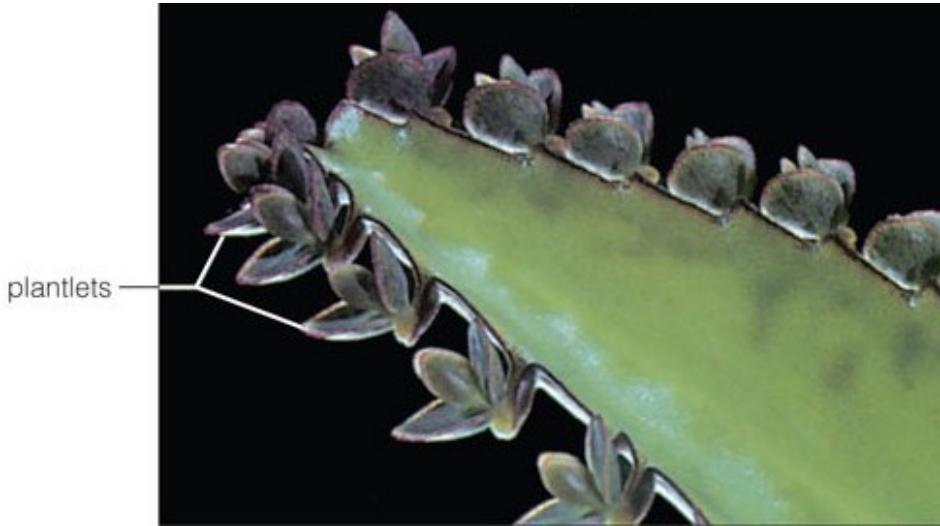
- Spines
- Tendrils
- Succulent leaves
- Traps
- Plantlets



Tendrils of sweet pea (*Lathyrus odoratus*)



Plantlets on the leaf of *Kalanchoe pinnata*



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*)



Sarracenia flava on Buttercup Fields, Mississippi



Prey in the urn



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



Hairs prevent insects from climbing out of leaf



“Cobra Lily” (*Darlingtonia californica*)



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	Root
Expansion		Plantlets	
Storage		Succulent leaves	
Photosynthesis		DEFAULT	
Defense		Spines, scales	
Support		Leaf tendrils	
Interactions		Traps, “sticky tapes”, urns	

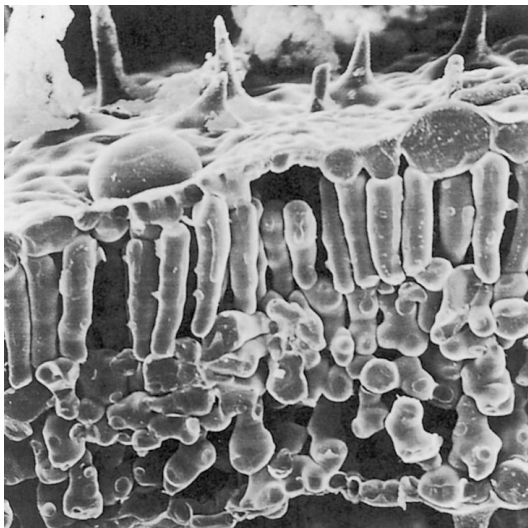


Leaf

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



Summary

- Leaves have **general**, **repetitive** and **terminal** characters
- **Heterophylly** is a co-existence of different types of leaves on the same plant
- **Abscission zone** helps the separation of leaf at the end of season



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2015.

Mode of access:

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

