

# Introduction to Botany. Lecture 21

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## 1 Questions and answers

## 2 Leaf

- Leaf morphology
  - General characters
  - Repetitive characters
  - Terminal characters



## 1 Questions and answers

## 2 Leaf

- Leaf morphology
  - General characters
  - Repetitive characters
  - Terminal characters



# Previous final question: the answer

Please give an example of the complex secondary tissue.



# Previous final question: the answer

Please give an example of the complex secondary tissue.

- Periderm
- Phloem or xylem



# Leaf

## Leaf morphology



# 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
  - Do not grow by apex
  - Do not produce new leaves
  - Have hierarchical morphology

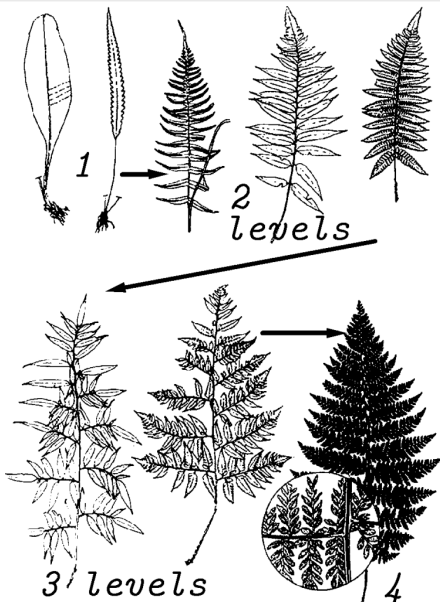


# Hierarchy





# 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



# Hierarchy in leaf morphology

- **General** and **terminal** characters do not depend on hierarchy
- **Repetitive** characters may be different on each step of hierarchy
- Therefore, leaf description should state that “on first level of hierarchy, the shape is ..., on the second level, the shape is ...”
- It is possible that each level has different repetitive characters



# General characters

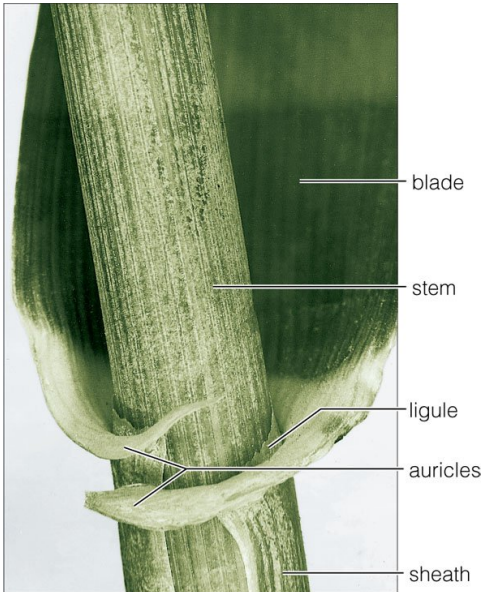
- General characters apply to the whole leaf
- Stipules (present or not, how many etc.)
- Other leaf base organs (sheath, ocrea, ligules etc.)



# Stipules



# Leaf base



# Repetitive characters

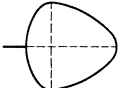

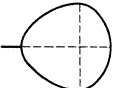
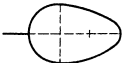
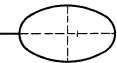
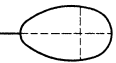


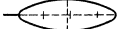

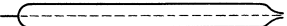
Repetitive characters are the same on each level of leaf hierarchy:

- Shape
- Dissection
- Petiole (stalked/non-stalked etc.)

Repetitive characters of same type may combine




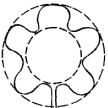



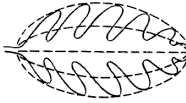

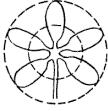
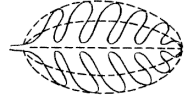
## Shape

	Maximum width closer to leaf base	Maximum width in the middle	Maximum width closer to the apex
Length = width or slightly more	 <p>Deltate</p>	 <p>Circular</p>	 <p>Cuneate</p>
Length > 1-1.5 x width	 <p>Ovate</p>	 <p>Elliptic</p>	 <p>Obovate</p>
Length > 3-4 x width	 <p>Narrowly ovate</p>	 <p>Lanceolate</p>  <p>Oblong</p>	 <p>Narrowly obovate</p>
Length > 5 x width	 <p>Linear</p>		



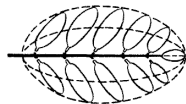
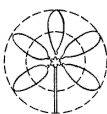


# Dissection

		Tri-	Palmately	Pinnately
<b>Simple leaves</b>	Lobed (from 1/4 to 3/4)			
				
	Dissected (from 3/4 to midrib)			

**Compound leaves**

(leaflets stalked, with joints)



# Terminal characters

Terminal (leaflet) characters are applicable only to terminal parts (normally, leaflets) of leaves:

- Form of base
- Form of tip
- Type of margin
- Surface
- Venation



# Terminal characters: base of leaf blade

- Rounded
- Truncate (straight)
- Cuneate
- Cordate
- Sagittate



# Terminal characters: leaf apex

- Rounded
- Mucronate
- Acute
- Obtuse
- Acuminate
- Retuse



# Final question (2 points)



# Final question (2 points)

How many levels of hierarchy has this leaf?



# Summary

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



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

2010—onwards.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_154](http://ashipunov.info/shipunov/school/biol_154)



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.

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Thomson Brooks/Cole, 2006.

*Chapter 6*.

