Introduction to Botany. Lecture 22

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Outline

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Questions and answers

Quiz

Final question (3 points)

Name three differences between xylem and phloem.

Final question (3 points)

Name three differences between xylem and phloem.

- **State**: (mostly) dead vs. (mostly) living cells
- **Transport**: water vs. sugar
- **Direction**: up vs. (mostly) down
- **Biomass**: bigger vs. smaller

Leaf
Leaf in general

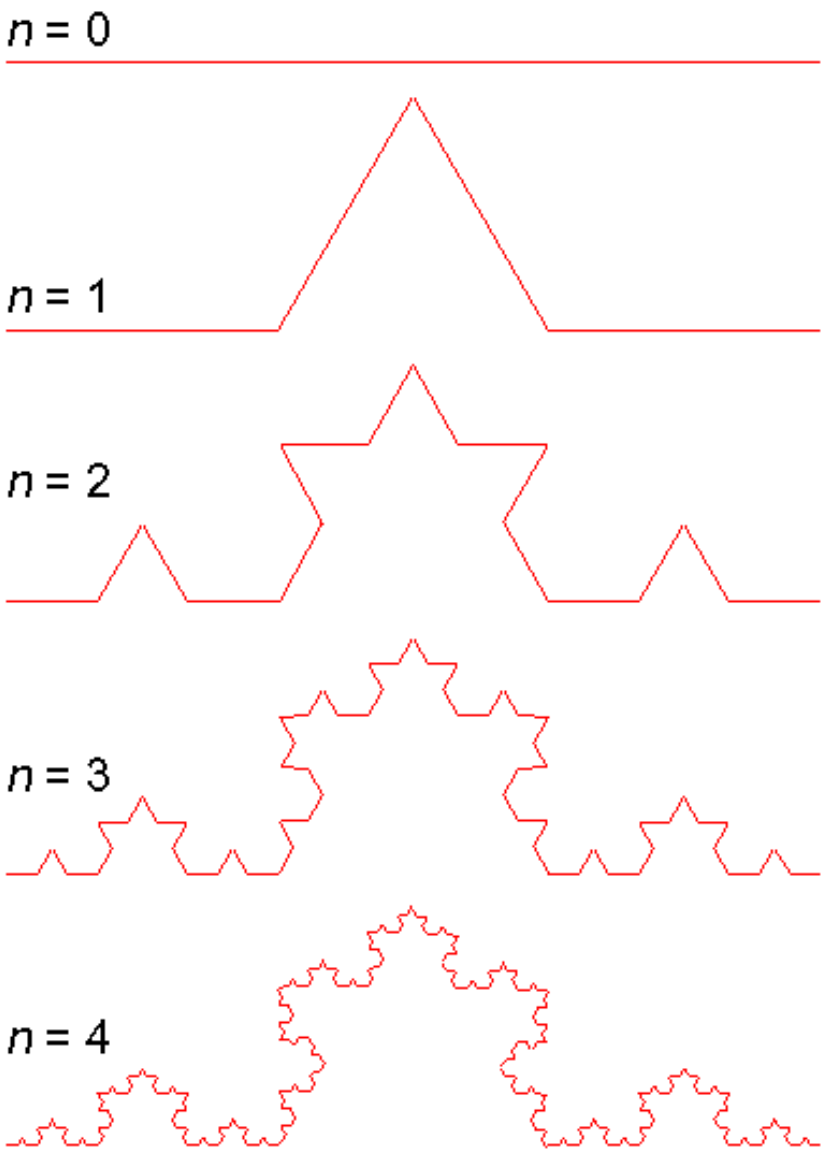
Definition, functions and features

- 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 (fractal) morphology

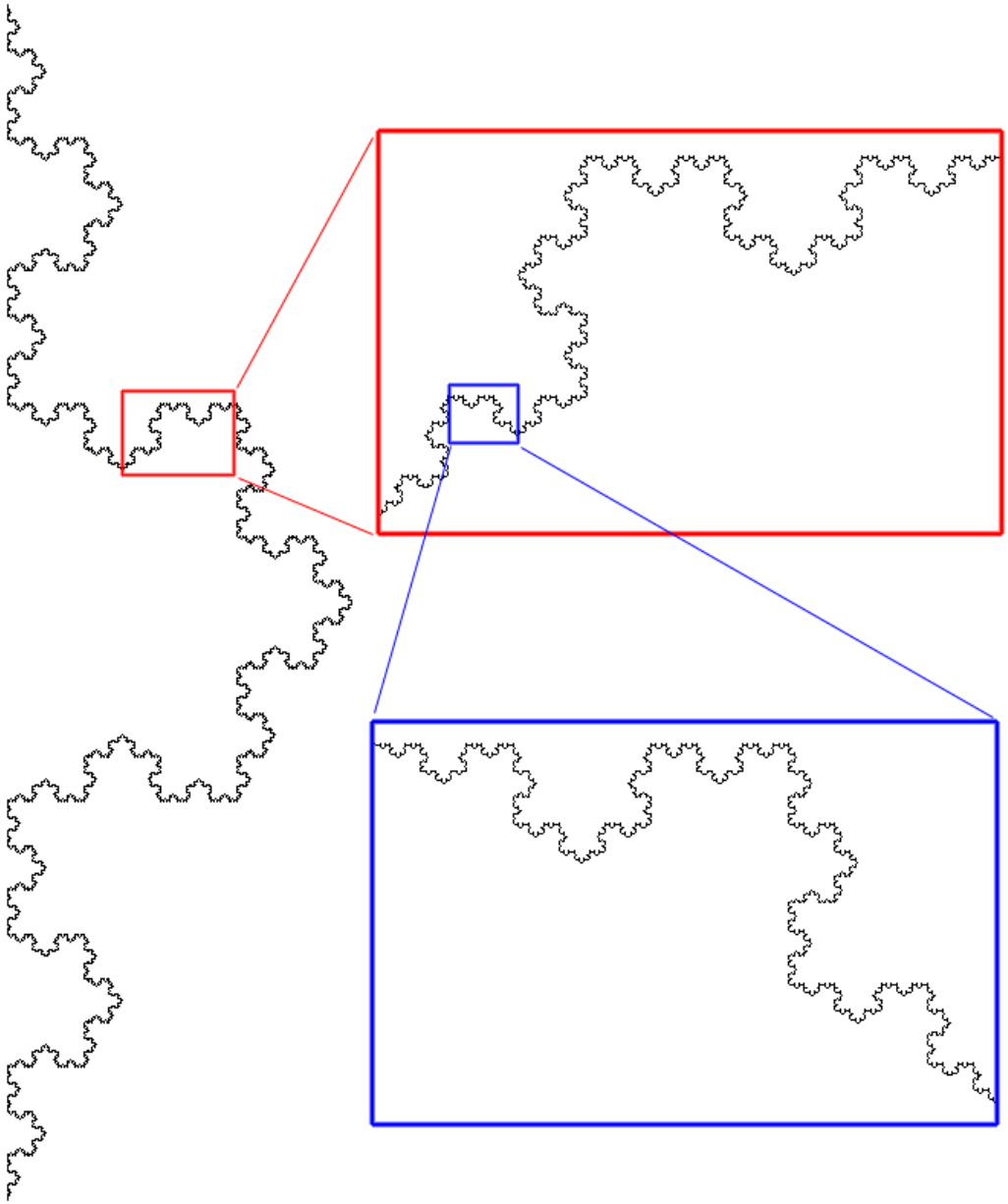
Leaf
Leaf morphology

Hierarchy

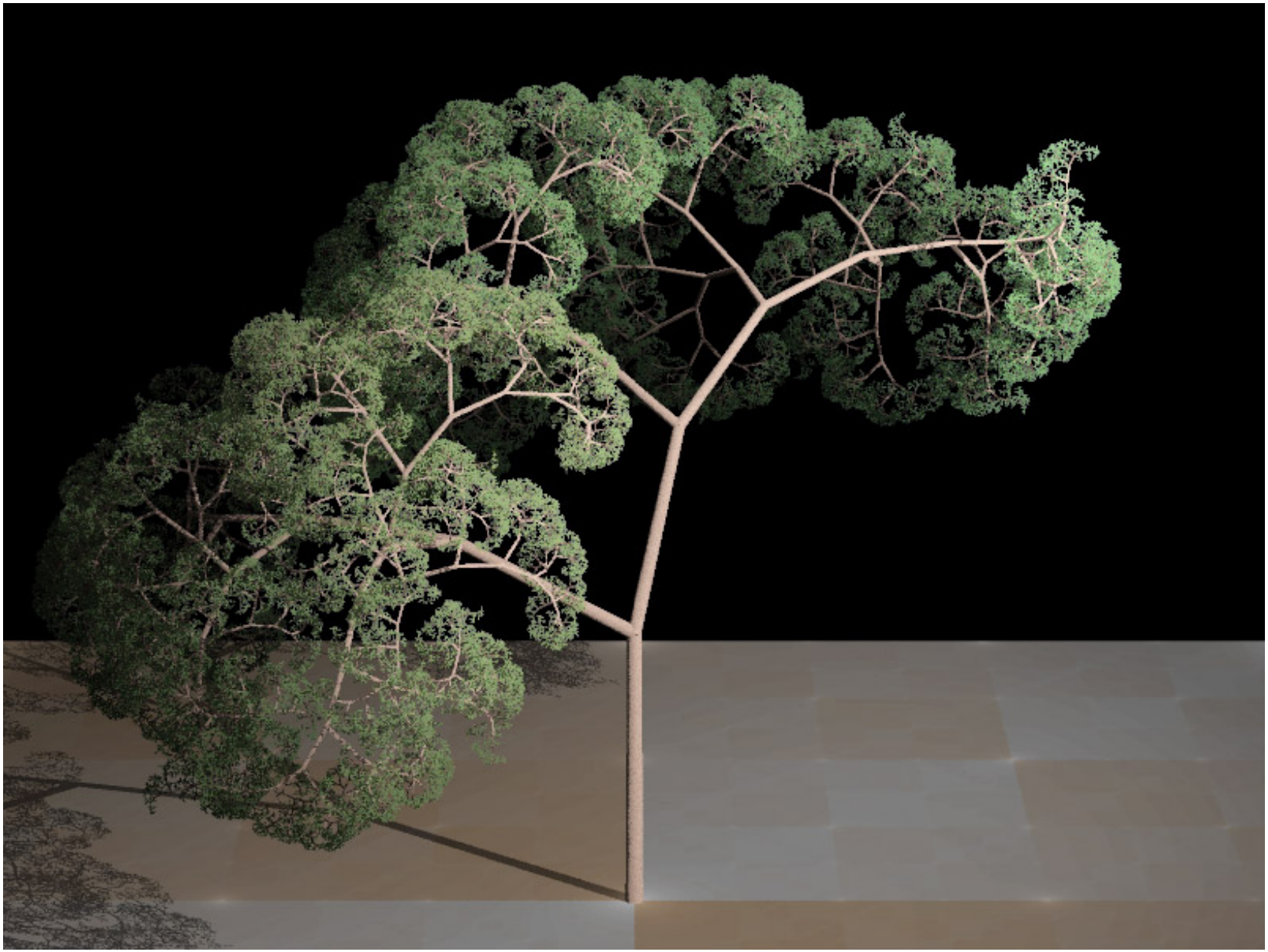
Fractals are hierarchical



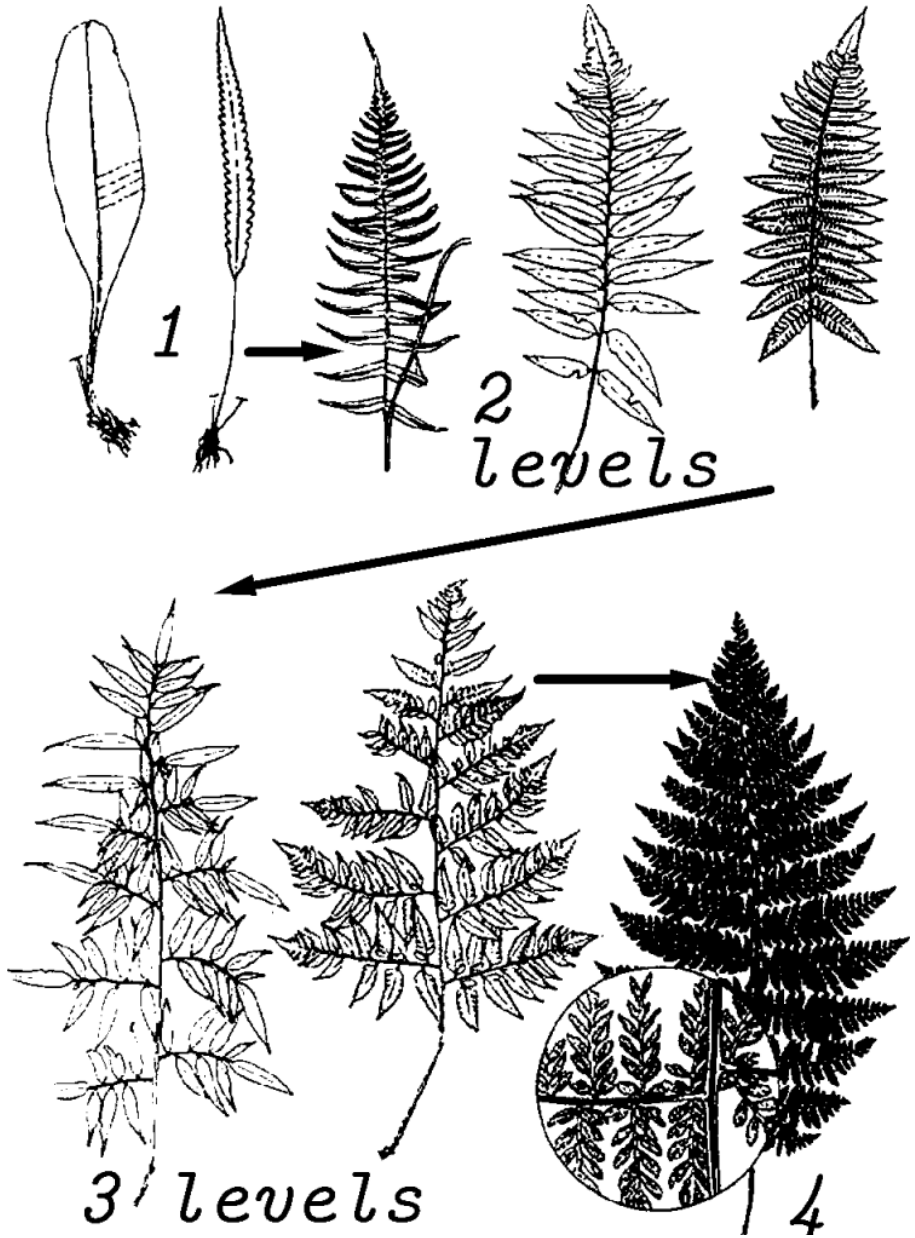
Fractals are self-similar



Fractals could be just like plants



And leaves could be just like fractals, with levels



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

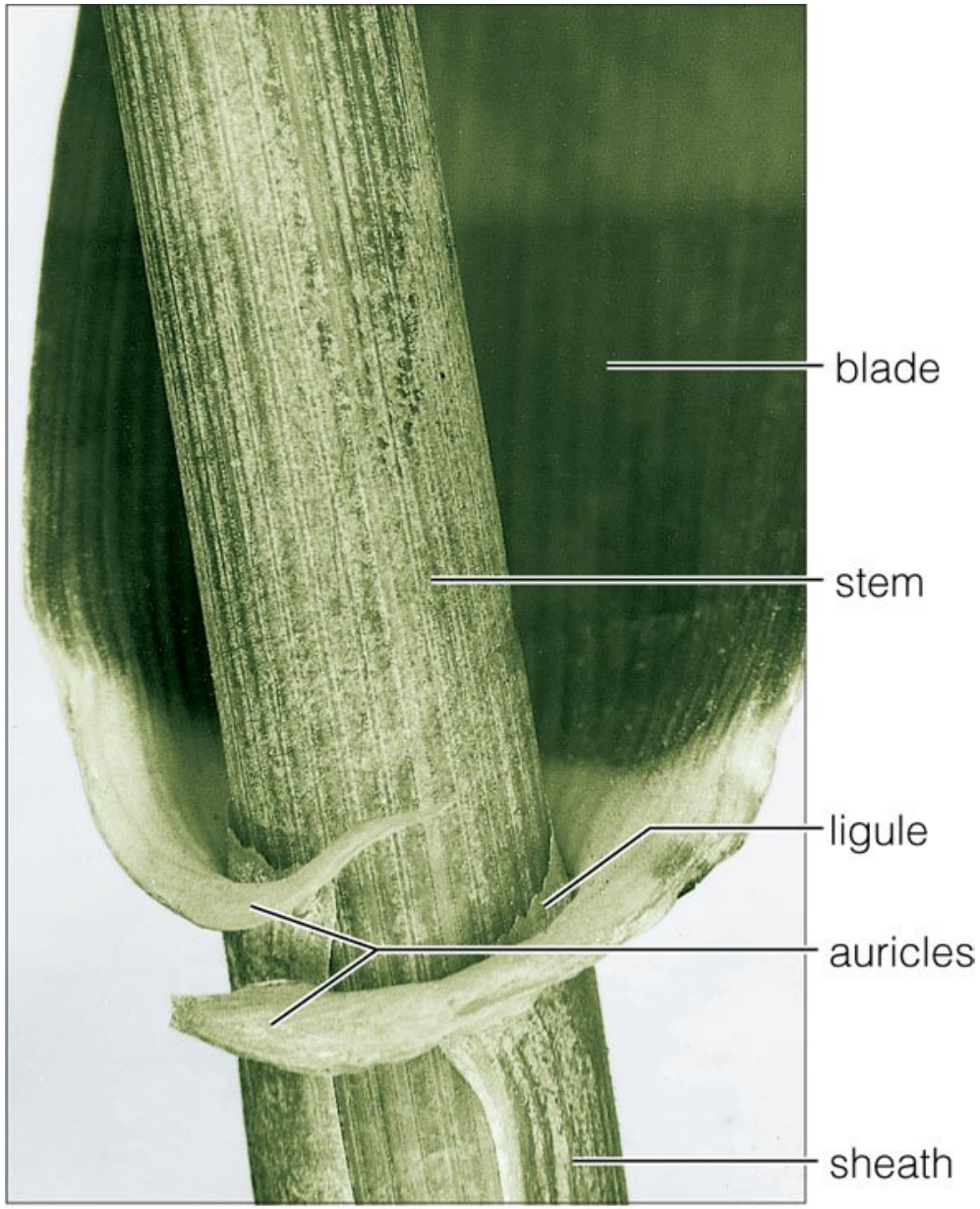
Leaf
General characters

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



Leaf
Repetitive characters

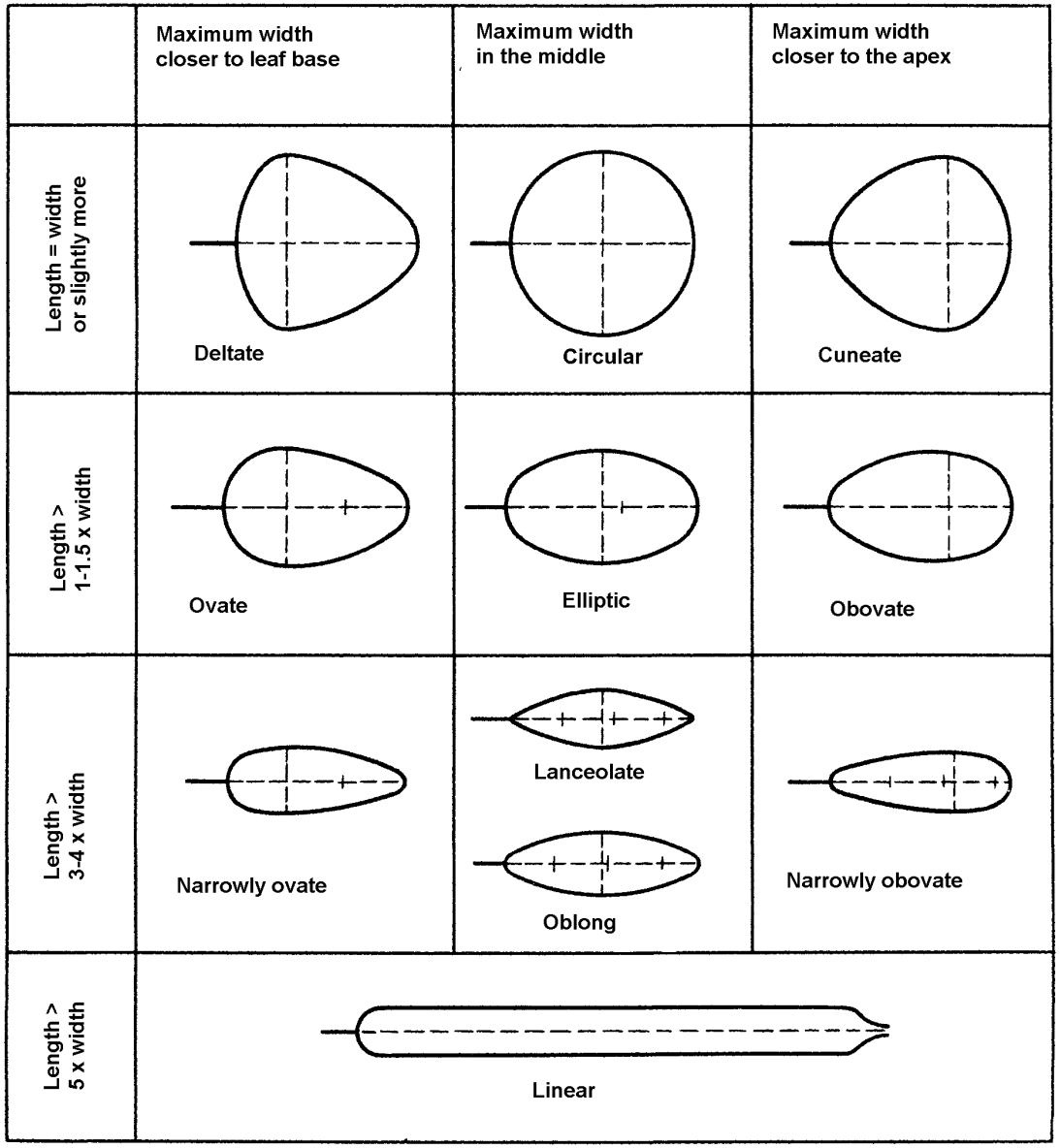
Repetitive characters

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
Deltate
Circular
Cuneate
Length > 1-1.5 x width
Ovate
Elliptic
Obovate
Length > 3-4 x width
Narrowly ovate
Lanceolate
Oblong
Narrowly obovate
Length > 5 x width
Linear

Summary

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

Final question (2 points)

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Please describe the leaf shape on the 2nd level of hierarchy.

For Further Reading

A. Shipunov.
Introduction to Botany [Electronic resource].
Mode of access:
http://ashipunov.info/shipunov/school/biol_154