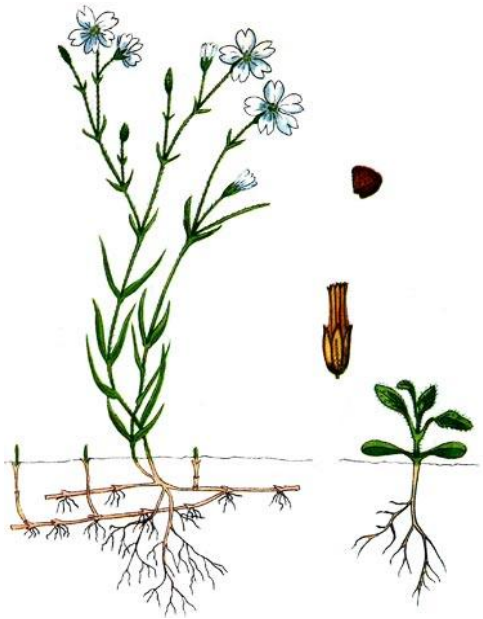


Ministry education and Science of Republic of Kazakhstan
Karaganda State University named after academician Ye.A. Buketov

Biological and geographical faculty

Botany Department

Course – Botany
Specialty - 5B011300 – «Biology»

Lecture № 4

Leaf as a lateral organ of stalk. Morphology and anatomy. Metamorphosis of leaf

(1 hour)

Lecturer: candidate of biological science, associated professor Ishmuratova Margarita Yulaevna

Plan of lecture:

1 Leaf as a vegetative organ.
2 Morphology of leaf. Simple and compound leaves.
3 Anatomical structure of leaves.
4 Metamorphosis of leaves.

Main literatures:

1 Бавтуто Г.А. Практикум по анатомии и морфологии растений. – Минск: Новое знание, 2002. – 185 с.

2 Родман А.С. Ботаника. – М.: Колос, 2001. - 328 с.

Additional literatures:

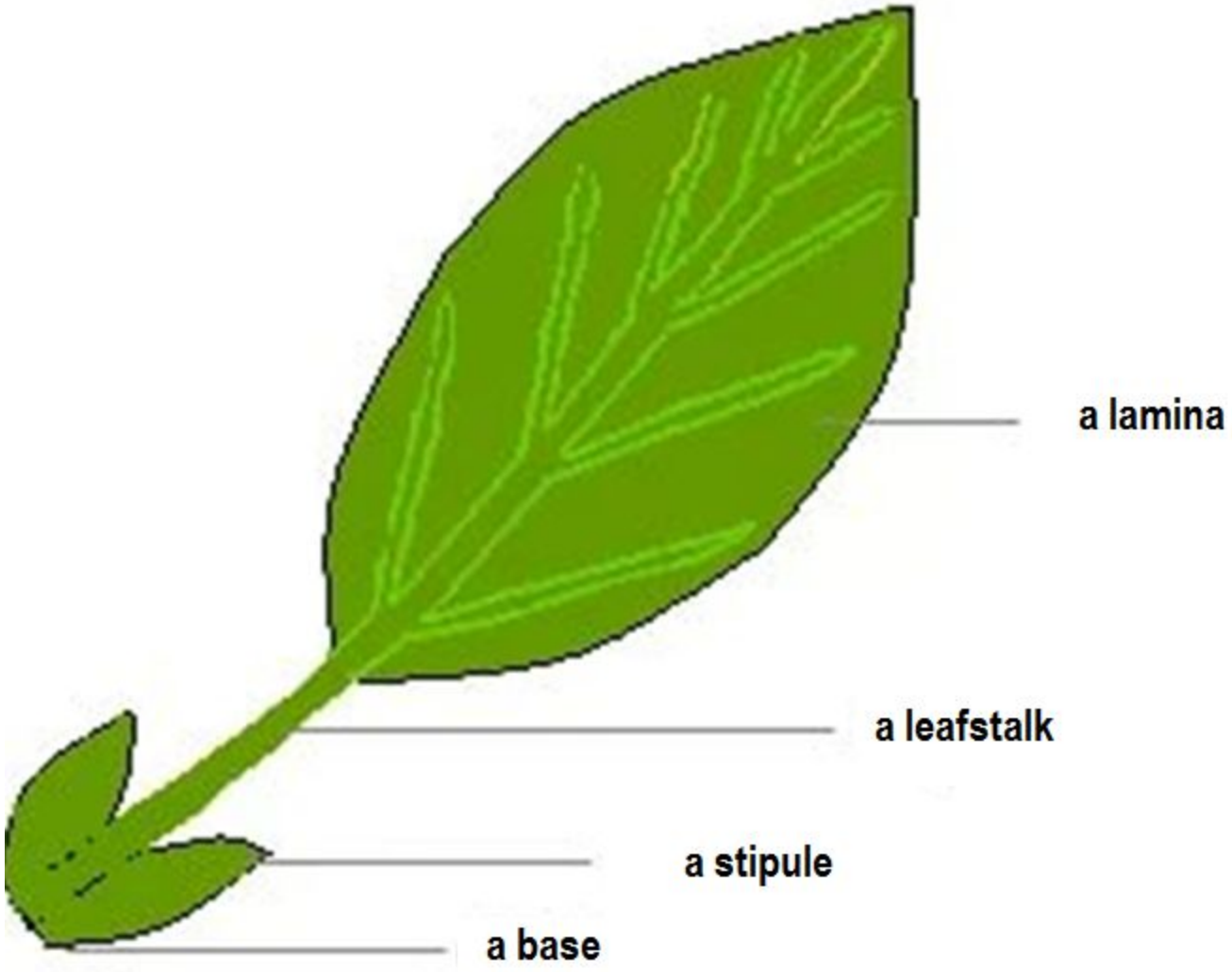
1 Ишмуратова М.Ю. Ботаника. Учебно-методическое пособие. - Караганда: РИО Болашак-Баспа, 2015. - 331 с.

2 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.

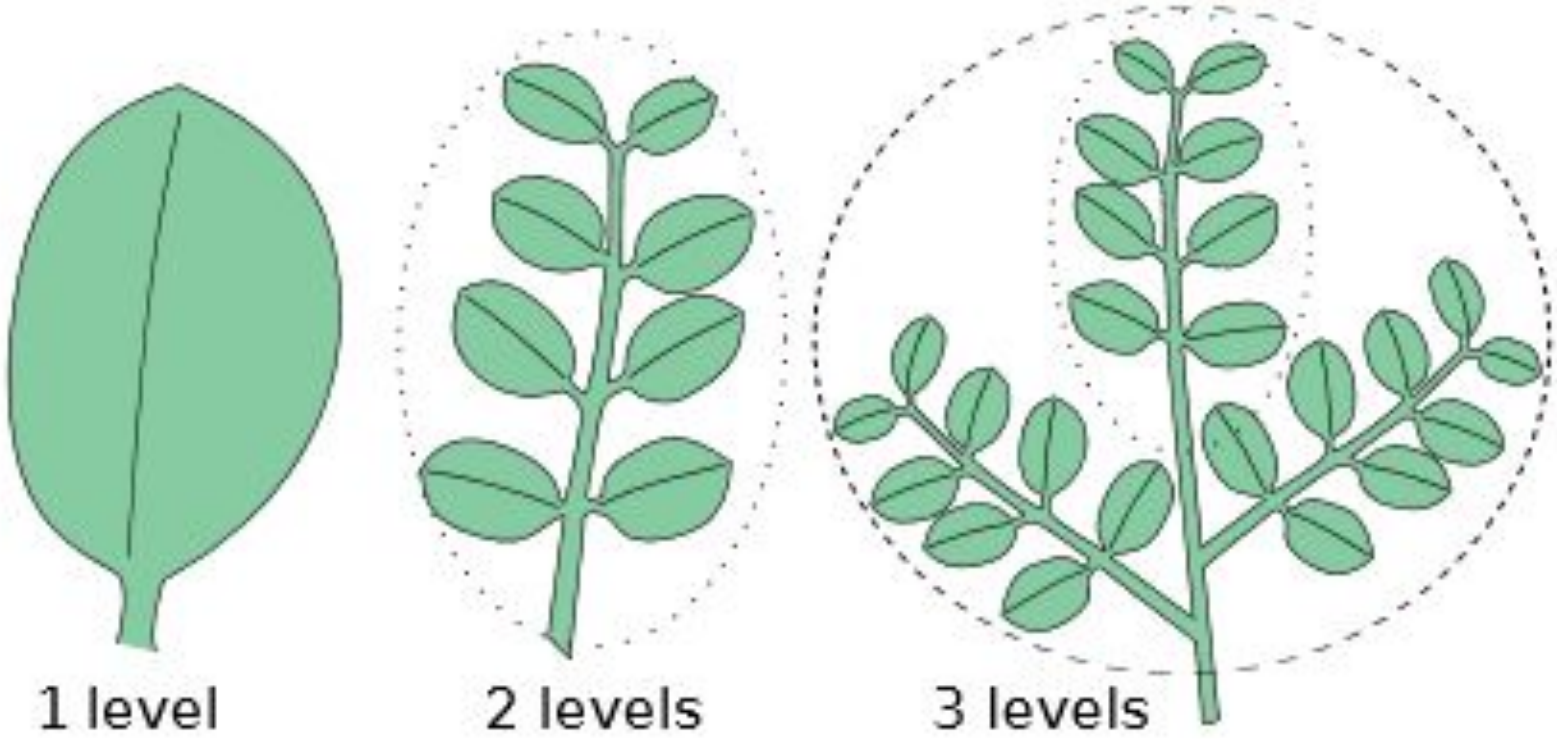
3 Байтулин И.О. Основы ризологии. - Алматы: Гылым, 2001. – 210 с.

Leaf – is a lateral structural part of stalk, acted functions of photosynthesis, gas exchange and transpiration. The first leaf organs of seed plants are cotyledones of embryo. All next leaves appear exogenetic on the apex of stalk.

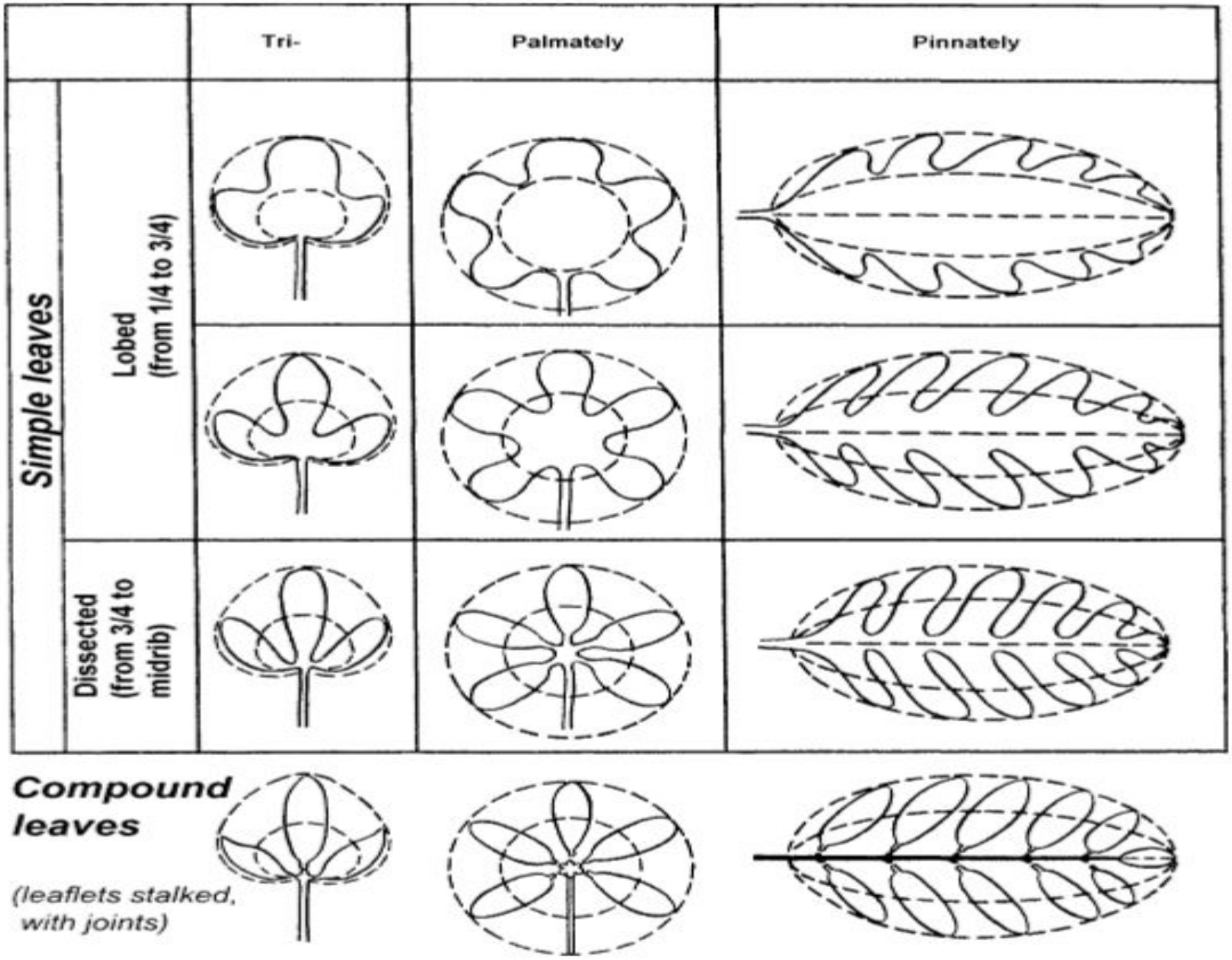
Parts of leaf



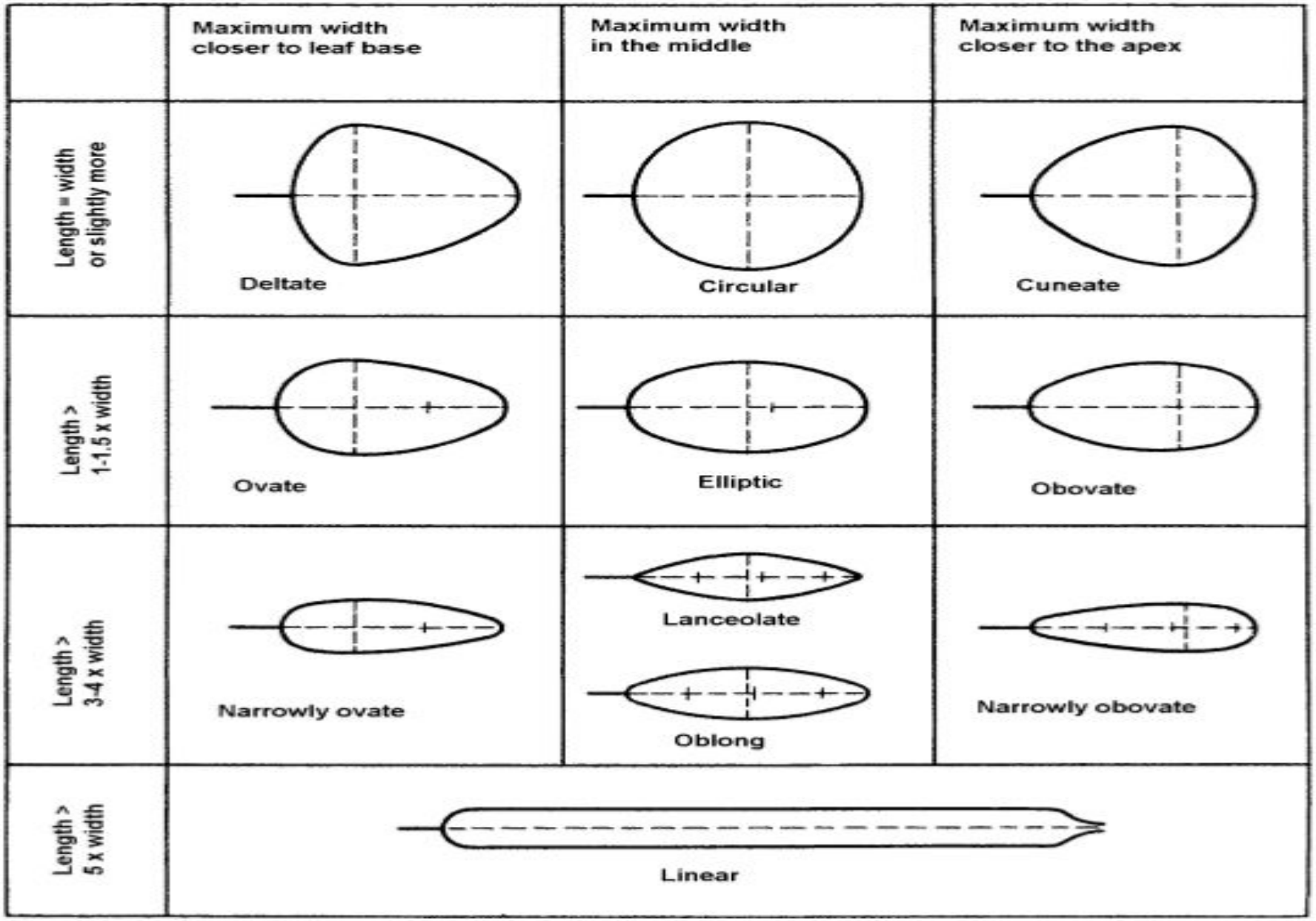
Schemes of hierarchy of simple and compound leaves

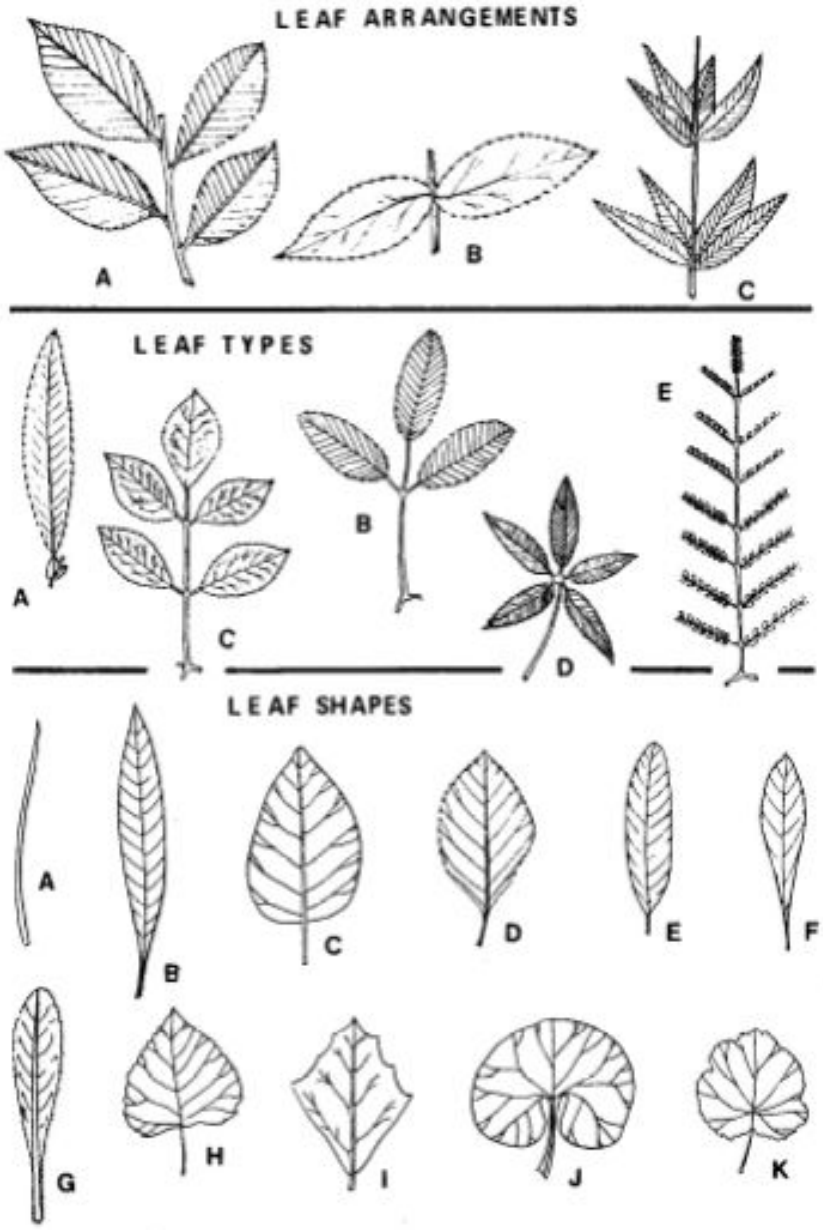


Types of cutting of lamina

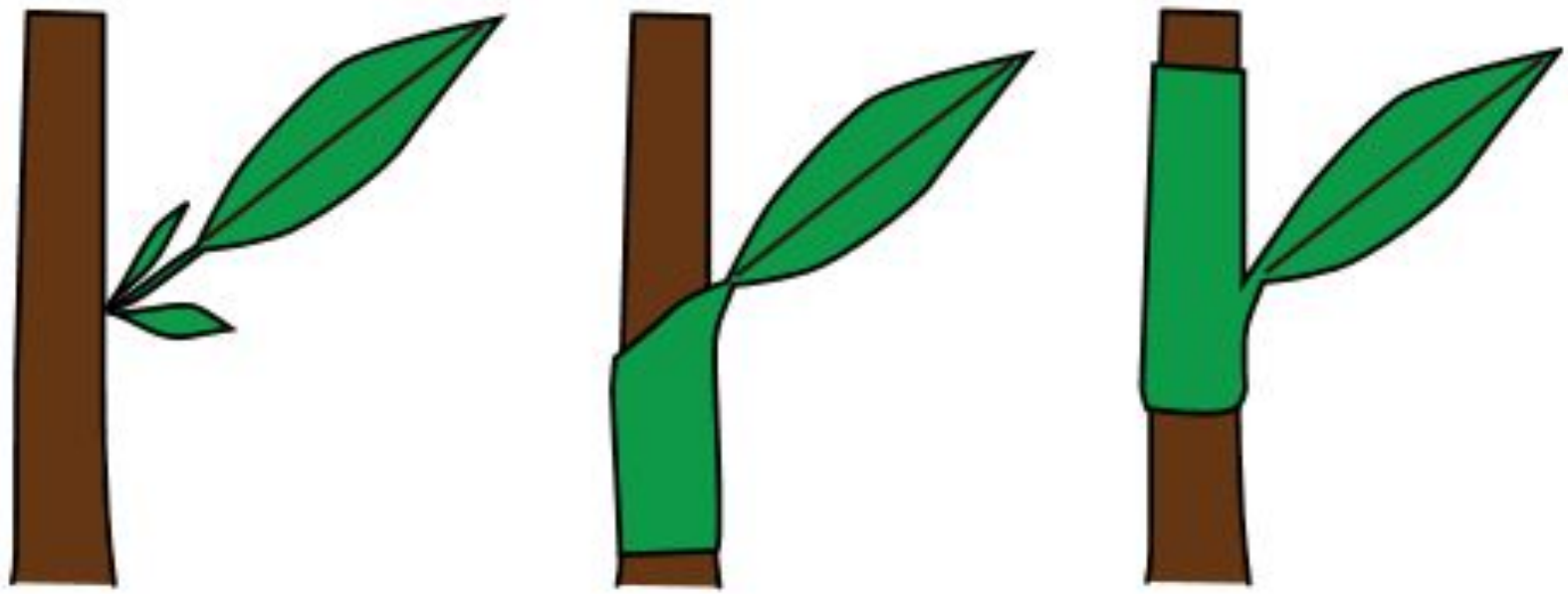


General forms of lamina



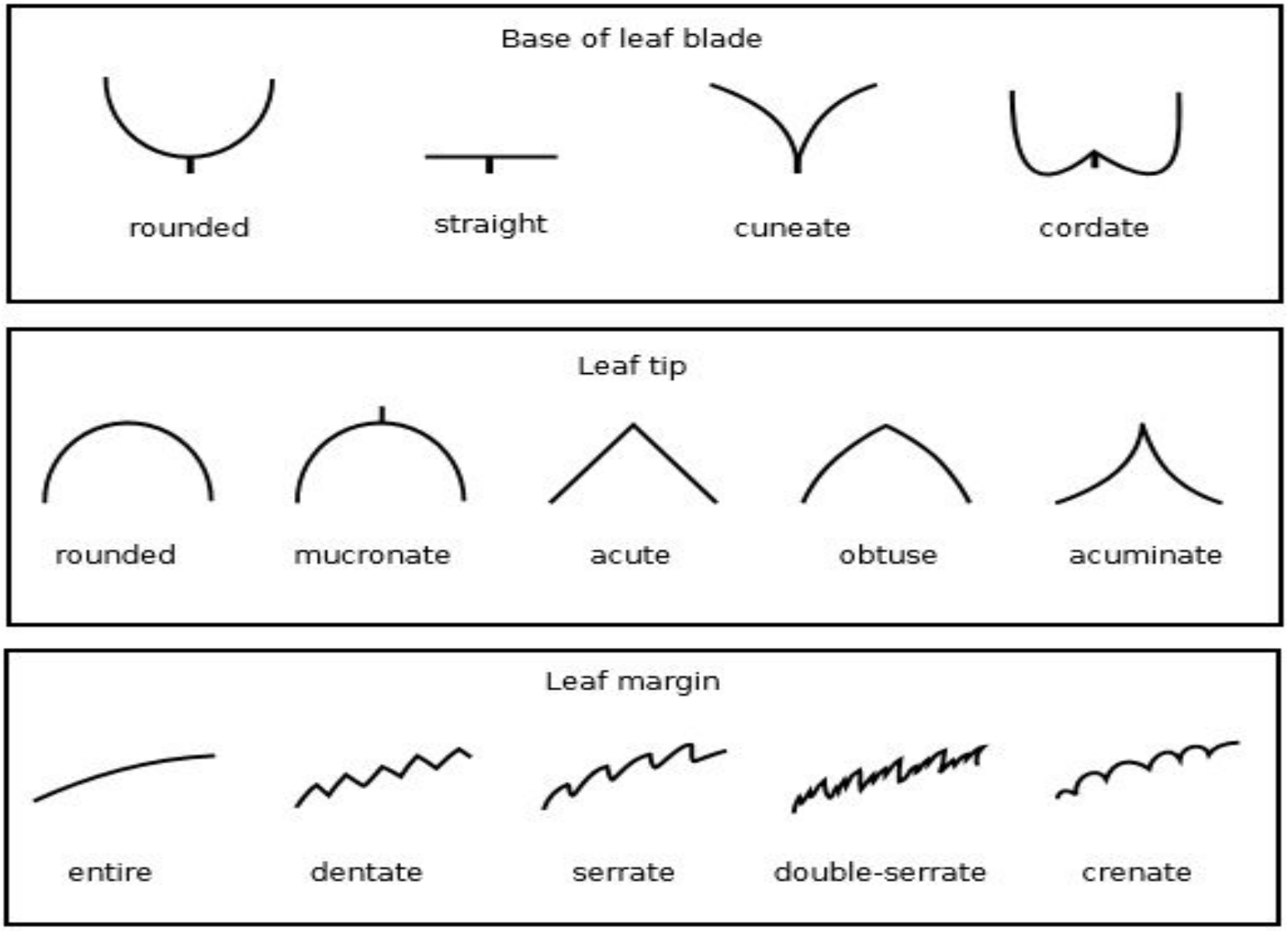


Leaf arrangements: A, alternate; B, opposite: and C, whorled. Leaf types: A, simple; B, ternately compound; C, pinnately comound; D, palmately compound; and E, twice-pinnately compound. Leaf shapes: A, linear; B, lanceolate; C, ovate; D, elliptic; E, narrowly elliptic; F, obovate; G, spatulate; H, deltoid; I, rhomboid; J, reniform; and K, orbicular.

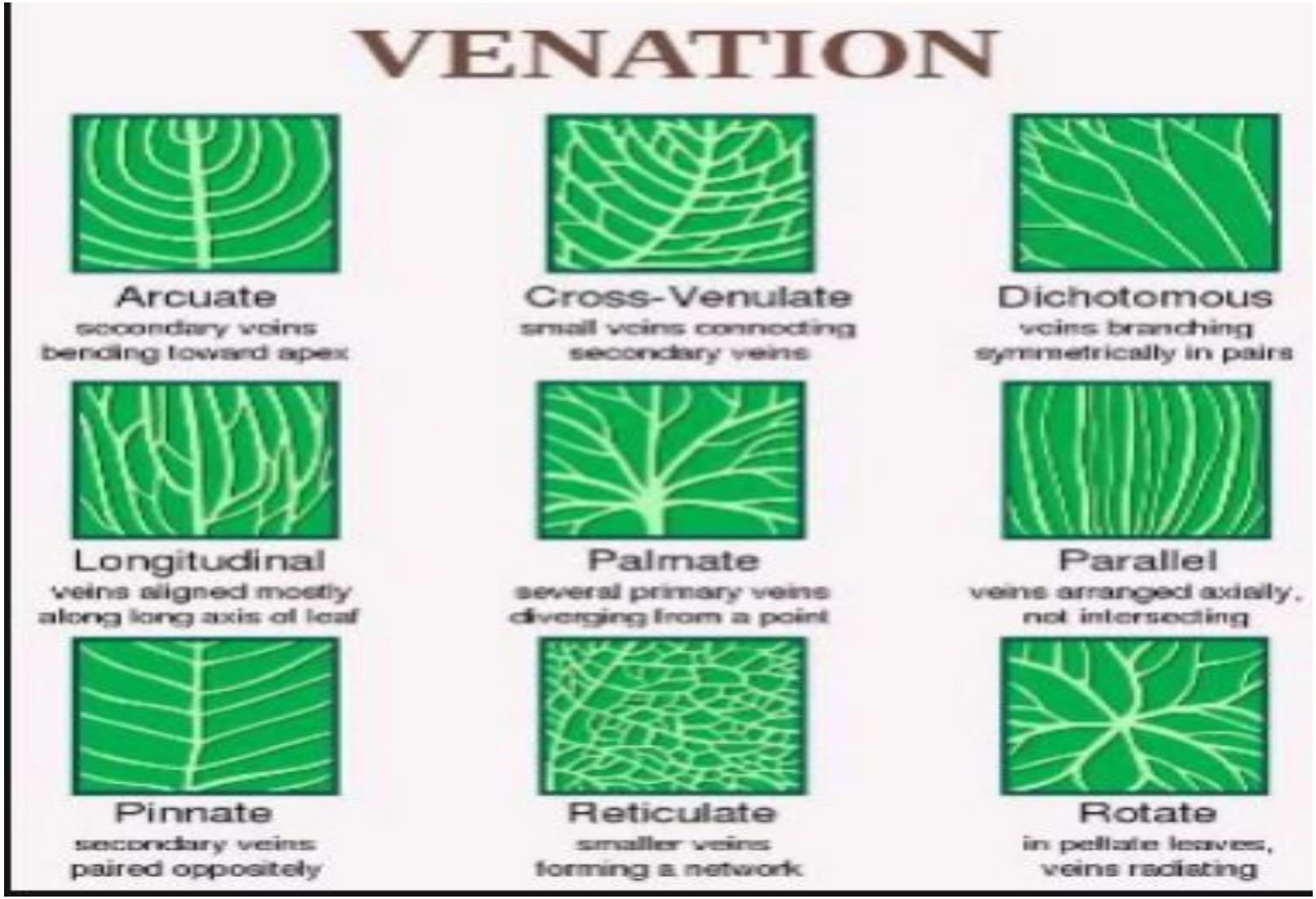


From left to right: stipules, sheath and ocrea.

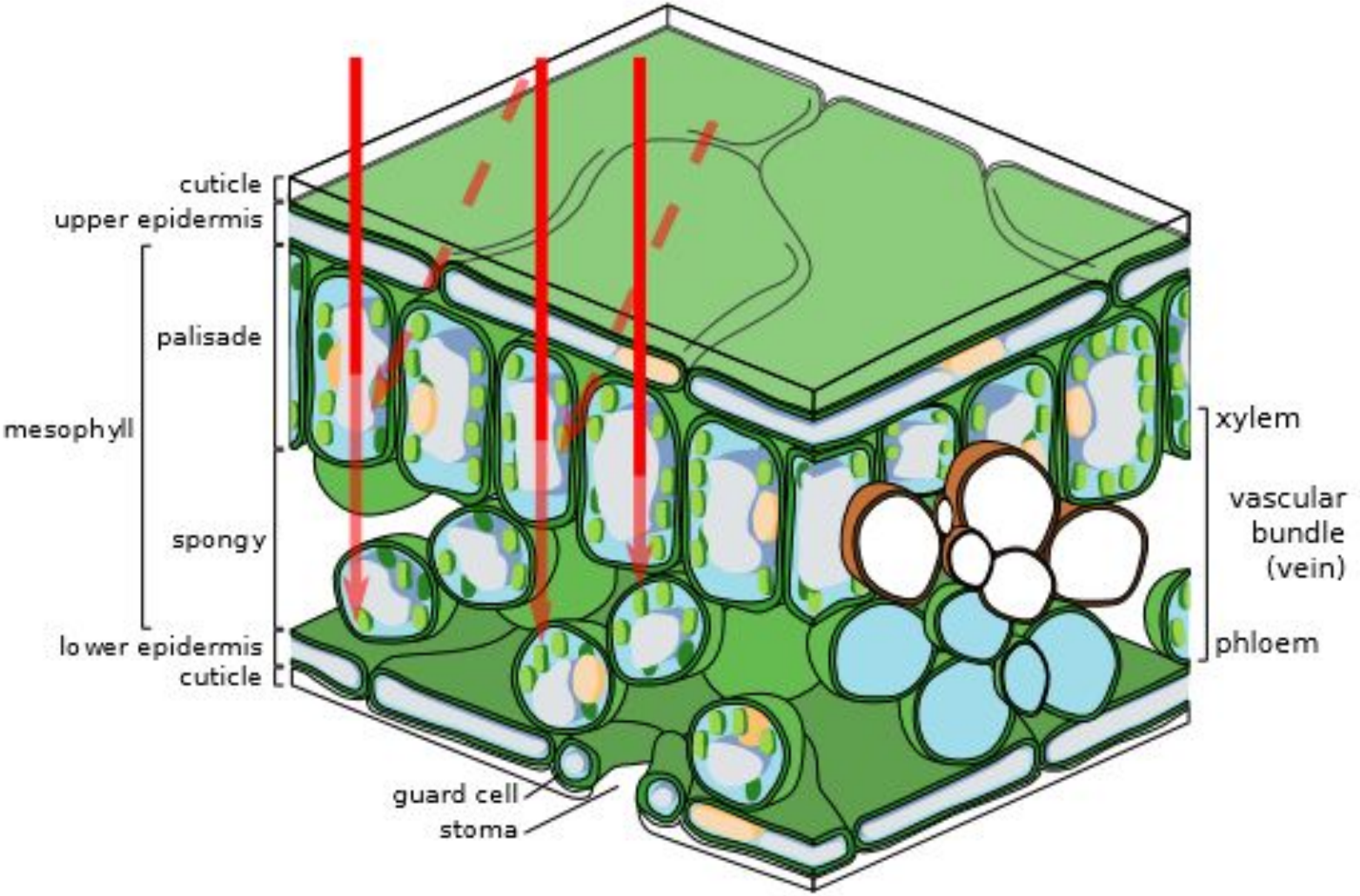
Morphology of leaves



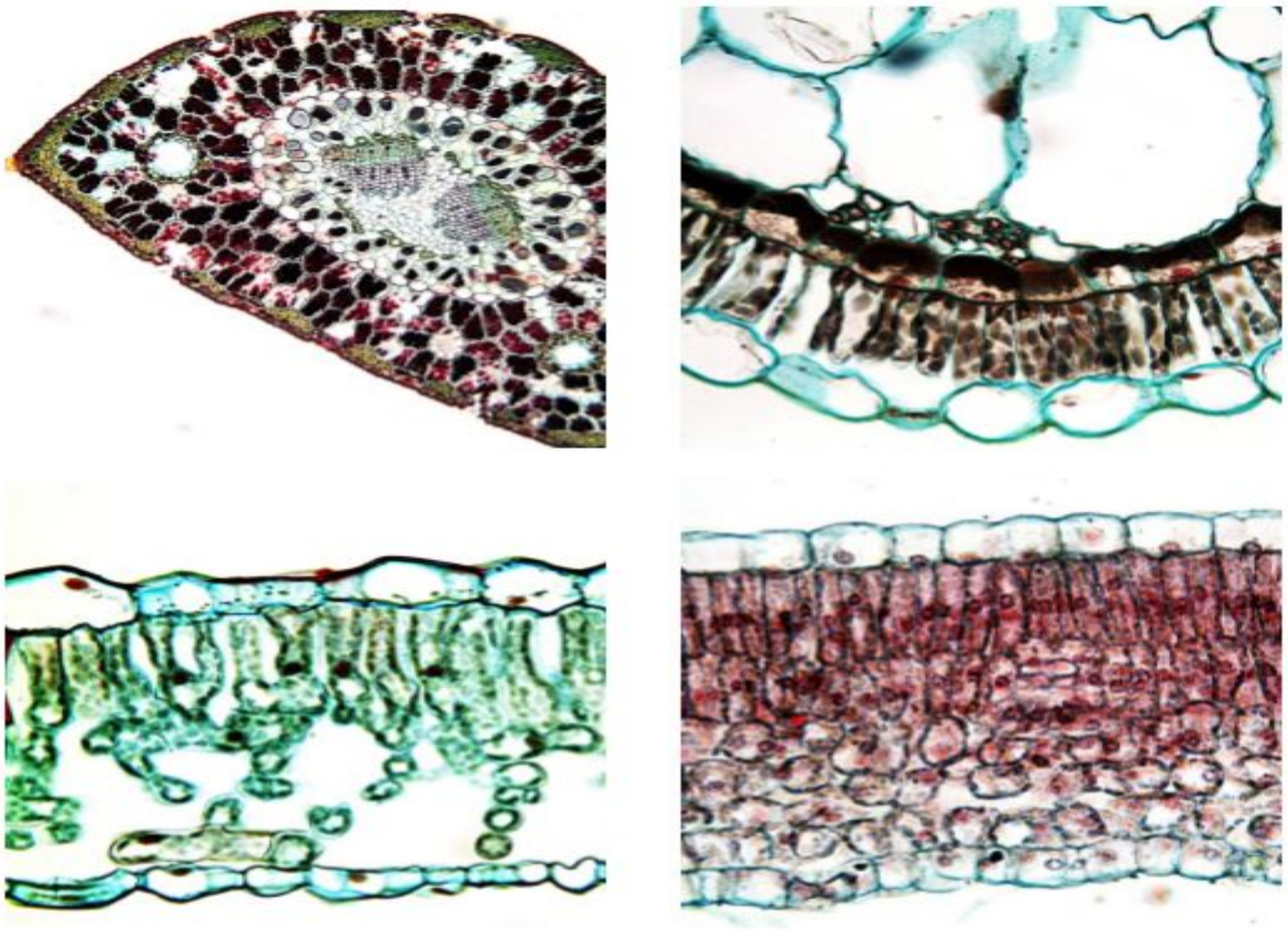
Types of venation



Anatomy of leaf

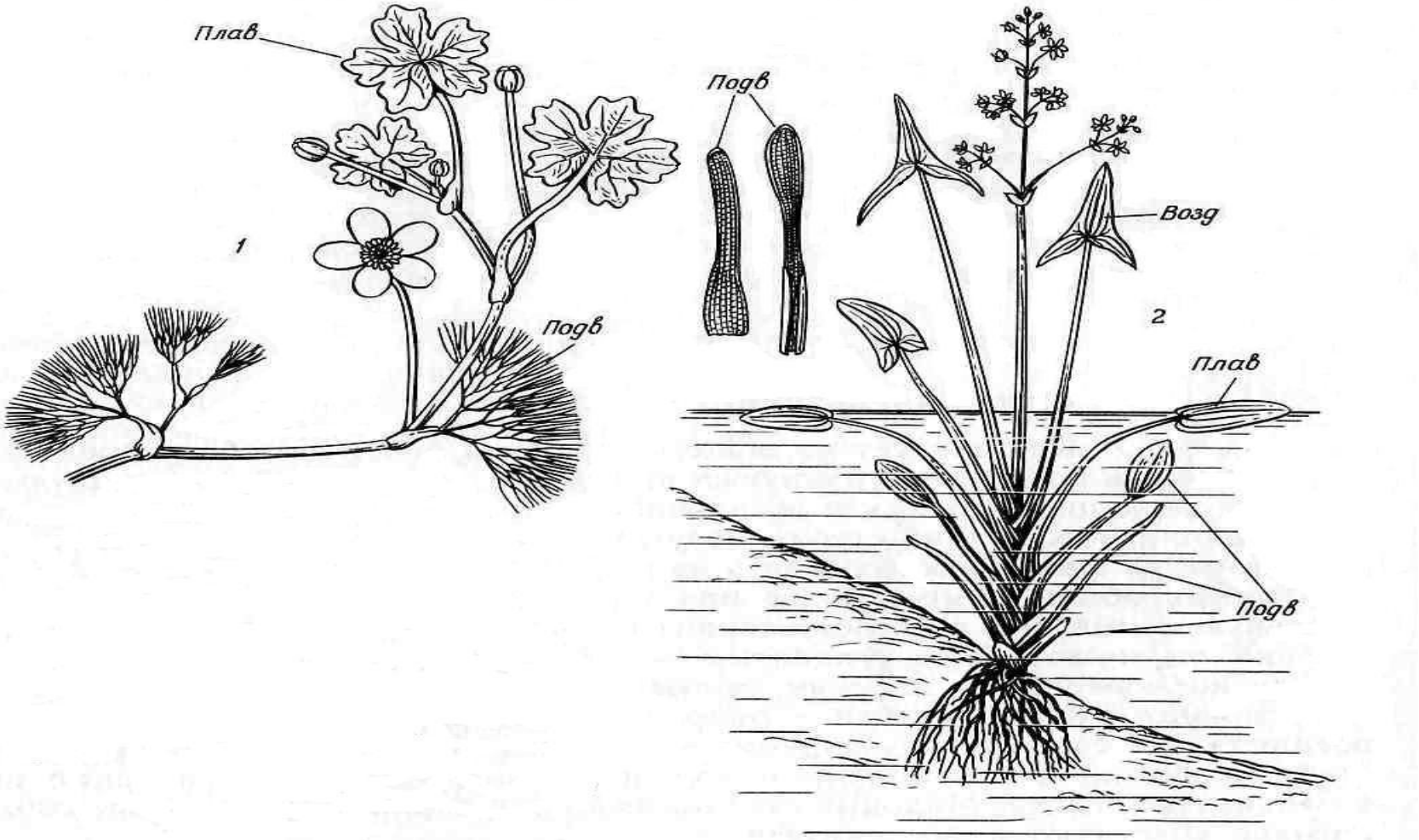


Different types of mesophyll of leaves



Left to right, top to bottom: leaf of sclerophyte *Pinus*, leaf of salt-avoiding (succulent-like) halophyte *Salsola* (epidermis is at the bottom), shade leaf of *Sambucus*, leaf of *Syringa* with guards cells (bottom left). Magnifications ×100 (first) and ×400 (others).

Heterophylly of water plants



1 – water ranunculus; 2 – Sagittaria; *Подв* – underwater leaves; *Плав* – swimming leaves; *Возд* – air leaves

Control questions:

1 How does structure of leaves depend from ecological groups of plants?
2 Note the peculiarities of sunny and shade leaves, mesophytes and xerophytes plants.
3 Which is the physiological function of decidu?
4 Note the peculiarities of leaf venation as diagnostic signs for vascular plants.
5 Determine the basic forms of simple and compound lamella of leaves.
6 How metamorphosis of leaves can help plants to live in different conditions?

Test questions:

Types of venation of dicotyledonous plants:
A) cross-venulate
B) reticulate
C) parallel
Д) palmate
E) rotate
F) Stipulate
H) Absent

Tissues of mesophyll of leaf:
A) epidermis
B) spongy mesophyll
C) basic parenchymes
Д) sclerenchymas
E) palisade mesophyll