FLOWERING PLANTS

MAGNOLIOPHYTA

(ANGIOSPERMAE)

Lecture 6

REPEATING !!!

In modern systematics, plants are classified into the following categories: kingdom (Regnum) -section (Divisio) - class (Classis) - order (Ordo) - family (Familia) - genus (Genus) - species (Species)

BINARY NOMENCLATURE

According to the Linnaeus system, the name of each plant consists of two words: I means genus, and I and II together is the name of the species. I - the noun, II - the adjective. The letter or short notation after these words is the surname of the author who first described this species.
For example:

Valeriana officinalis L.

MAGNOLIOPHYTAF

(ANGIOSPERMAE) in brief

Angiosperms(flowering plants) are seed plants. The ovule and the seed develops from the ovule, are enclosed within an ovary. So they are different from gymnosperms in their unique ovules. The ovary is part of a new organ called a carpel, and the carpel is part of a new complex structure called the flower. They have vessels in the xylem and companion cells in the phloem .They have double fertilization of the ovum and endosperm.

Paleobotanists theorise that the first appearance of angiosperms on Earth may have been 135 years ago in form small living group during Carboniferous period. Flowering plants have dominated throughout the Cenozoic era.

Now Angiosperms have more than 200 families and 250 000 species. They are divided into 2 classes the monocotyledons and the dicotyledonous. According to other modern classification they divided into magnolids, monocots and eudicots . We well divide them into monocots and dicotyledonous. These classes differ to several features. At first, the embryo has a single cotyledon in the monocotyledons and two cotyledons in the dicotyledonous.

Angiosperms are flowering plants. This means that unlike other types of plants, they produce flowers and seed-containing fruits to assist their reproductive process. This is in contrast to other types of plants that are reliant on seeds only to reproduce.

Because there are so many plants that fall into the angiosperm category, it is important that we have a system in place to classify them into more specific groups. Attempts at classifying angiosperms date to ancient times, so modern scientists are clearly not the only ones in scientific history interested in plant classification.

The artificial systems

One of the earliest classification systems is what we now refer to as an artificial classification system. This means that plants are grouped based on similar characteristics, not on their genetic makeup.

- The special interest in the taxonomy of angiosperms is explained by their dominant role. An artificial system created by the great Swedish naturalist K. Linnaeus (1735) had a noticeable influence on the development of science and knowledge of the plant world. Linnaeus attached decisive importance in the classification of angiosperms to the flower, and above all to the structural features of the androeum.

Natural classification systems attempt to group angiosperms based on more scientific factors, such as their chemistry, preferred growth locations, anatomical features, and other similarly scientific features. Natural classification is much more like the taxonomy you might be familiar with from biology class.

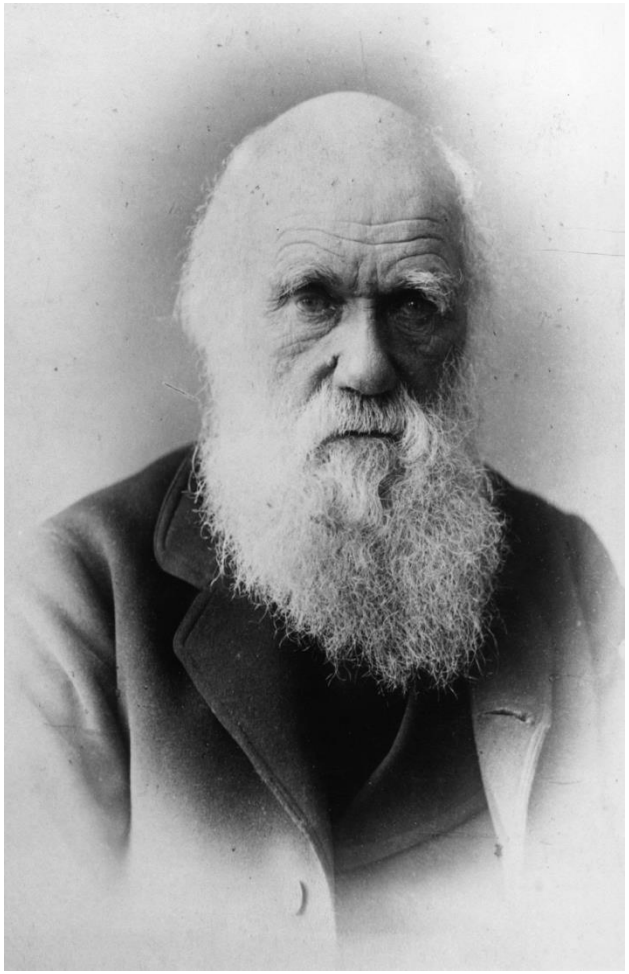
- Since the second half of the 18th century. the first natural systems appear that dominated science until the end of the 19th century. One of them belonged to the most prominent representative of the dynasty of French botanists A. Jussier (1789). The system of the Swiss naturalist O. Decandol, created in the first half of the 19th century, was used even in the 30s of our century. In the English-speaking countries for a long time the most common was the system developed by two prominent English botanists - D. Bentham and D. Hooker (1862-1883). Plants in these systems were grouped based on morphological similarity. ,

A. Jussier

O. Decandol

Phylogenetic system

This system is based on evolutionary sequence as well as genetic relationships among different groups of plants. In addition to this, it employs as many taxonomic characters as possible. Charles Darwin's concept of Origin of Species had given enough stimulus for the creation of phylogenetic system of classification.



- Charles Darwin

The first phylogenetic system is considered to be the system created by the largest German botanist-geographer A. Engler at the turn of the 19th and 20th centuries. It was the first to take into account the possible evolution of morphological characters. The detailed study of the materials to the level of the genus attracted many botanists to the Engler system. Its popularity was facilitated by the Dall Torre and Garms handbook published in 1907, in which all genera recognized by Engler are listed and numbered, which greatly facilitated the work of botanists. The materials of most of the world's largest herbaria are still arranged according to this system. Engler considered the most primitive flowers to be unisexual, without a perianth. Taxa characterized by flowers of this type were considered the most archaic and were placed at the beginning of the system. However, as early as 1875, the German botanist A. Braun came to the conclusion about the greater primitiveness of large bisexual polypetal magnolia flowers and the probable secondary nature of petal and unisexual flowers. The simplicity of these flowers, in his opinion, was secondary, resulting from simplification. A. Brown's ideas received support from many morphologists of the early XX century. and had a huge impact on the creation of new genealogical systems.

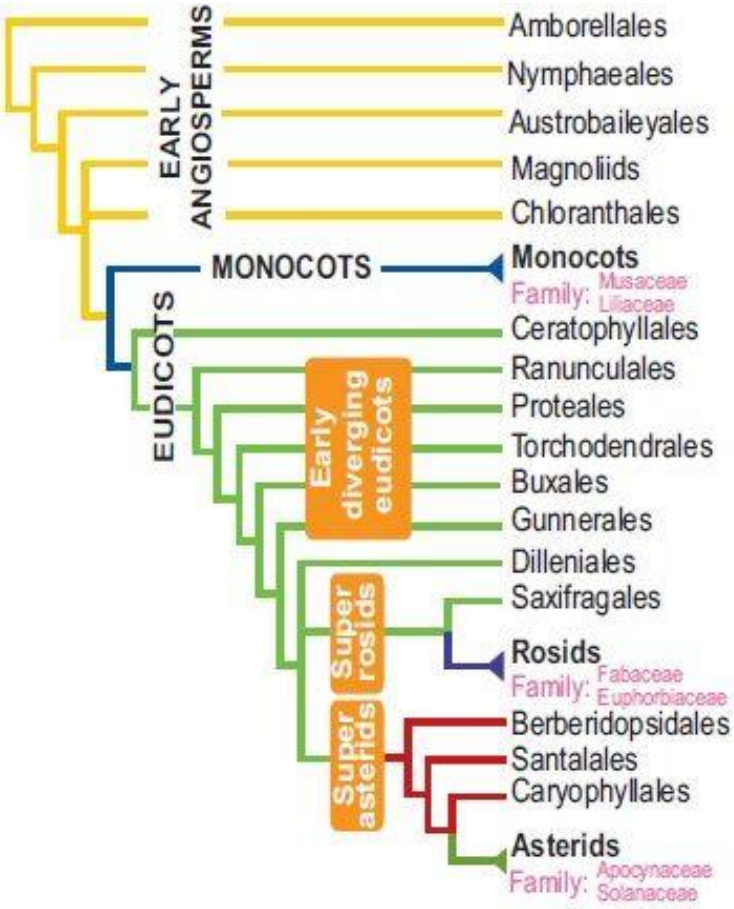
New phylogenetic systems differ mainly in the ambiguous interpretation of the probable kinship between individual groups of flowering plants. The original group of angiosperms remains controversial. Some taxonomists consider magnolia as such. However, most botanists admit that magnolias only retained the greatest number of archaic characters, but themselves, like all other flowering taxa, descended from some extinct, even more ancient hypothetical group of angiosperms.

A. Engler

A. Brown

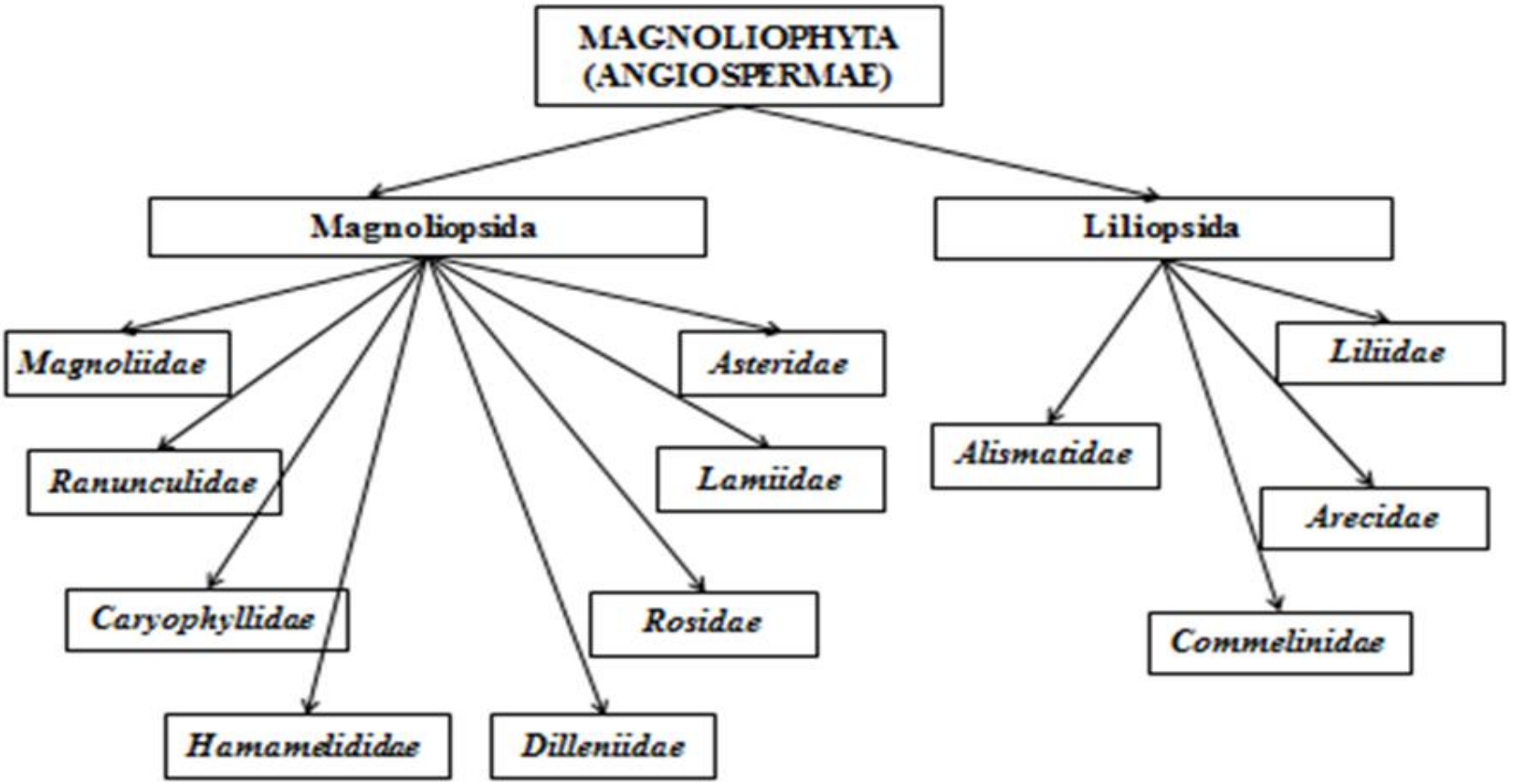
The APG system (Angiosperm Phylogeny Group system)

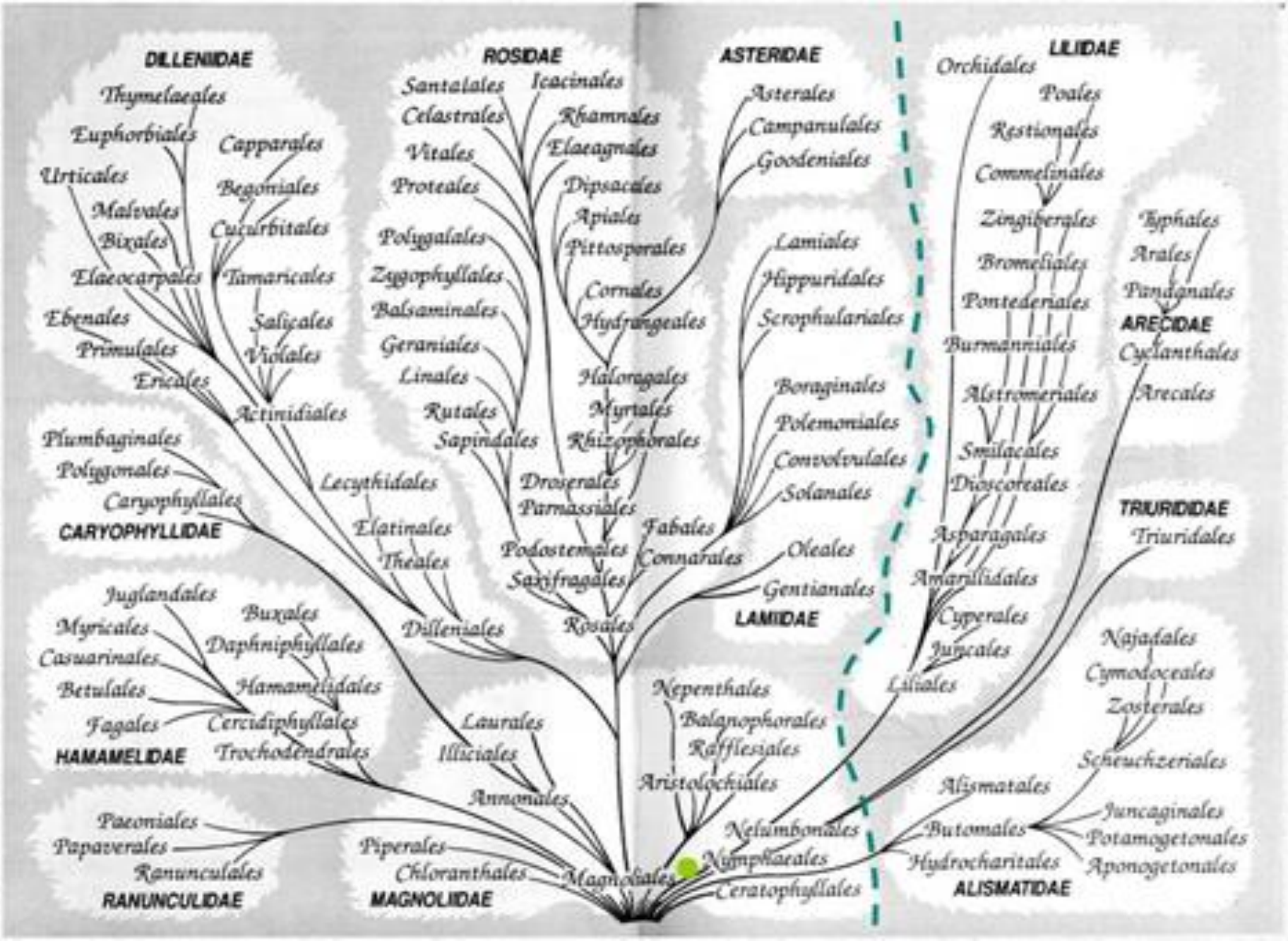
- The type plant classification is the first version of a modern, mostly molecular-based, system of plant taxonomy. Published in 1998 by the Angiosperm Phylogeny Group, it was replaced by the improved APG II in 2003, APG III system in 2009 and APG IV system in 2016.
- The principles of APG system are retaining the Linnean system of orders and families, Use of monophyletic groups (Consist of all descendants of a common ancestor), taking a broad approach to defining the limits of groups such as orders and families and use of term ‘clades’ above or parallel to the level of orders and families. A major outcome of the classification is the disappearance of the traditional division of the flowering plants into two groups, which are monocots and dicots.
- Even though there are several controversies about APG the botanists worldwide are influenced by the concept and are currently practice the system



Simplified version of APG IV

(Source: Plant Gateway's The Global Flora, Vol. I January 2018)


MAGNOLIOPHYTA
(ANGIOSPERMAE)
Magnoliopsida
Liliopsida
Magnoliidae
Ranunculidae
Caryophyllidae
Hamamelididae
Asteridae
Lamiidae
Rosidae
Dilleniidae
Alismatidae
Liliidae
Arecidae
Commelinidae


DILLENIDAE
Thymelaeales
Euphorbiales
Capparales
Urticales
Begoniales
Malvales
Cucurbitales
Bixales
Elaeocarpales
Tamaricales
Salicales
Ebenales
Primulales
Violales
Ericales
Actinidiales
Plumbaginales
Polygonales
Caryophyllales
CARYOPHYLLIDAE
Lecythidales
Elatinales
Theales
Dilleniales
Juglandales
Buxales
Myricales
Daphniphyllales
Casuarinales
Hamamelidales
Betulales
Cercidiphyllales
Fagales
Trochodendrales
HAMAMELIDAE
Paeoniales
Papaverales
Ranunculales
RANUNCULIDAE
ROSIDAE
Santalales
Icacinales
Celastrales
Rhamnales
Elaeagnales
Vitales
Proteales
Dipsacales
Apiales
Polygalales
Pittosporales
Zygophyllales
Cornales
Balsaminales
Hydrangeales
Geraniales
Haloragales
Linales
Myrtales
Rutales
Rhizophorales
Sapindales
Droserales
Parnassiales
Fabales
Podostemales
Connarales
Saxifragales
Rosales
Laurales
Illiciales
Annonales
Piperales
Chloranthales
Magnoliales
ASTERIDAE
Asterales
Campanulales
Goodeniales
Lamiales
Hippuridales
Scrophulariales
Boraginales
Polemoniales
Convolvulales
Solanales
Oleales
Gentianales
LAMIIDAE
Nepenthales
Balanophorales
Rafflesiales
Aristolochiales
Nelumbonales
Nymphaeales
Ceratophyllales
LILIIDAE
Orchidales
Poales
Restionales
Commelinales
Zingiberales
Bromeliales
Pontederiales
Burmanniales
Alstromeriales
Smilacales
Dioscoreales
Asparagales
Amaryllidales
Cyperales
Juncales
Liliales
Typhales
Arales
Pandanales
ARECIDAE
Cyclanthales
Arecales
TRIURIDIDAE
Triuridales
Najadales
Cymodoceales
Zosterales
Scheuchzeriales
Alismatales
Juncaginales
Butomales
Potamogetonales
Hydrocharitales
Aponogetonales
ALISMATIDAE

The difference between monocots and dicotyledonous

Magnoliopsida	Liliopsida
The embryo usually with 2 cotyledons that germinate, as a aboveground. Rarely embryo with 1 cotyledon or 3 cotyledons. Cotyledons usually have 3 conductive bundles.	The embryo with 1 cotyledon that germinates, as a rule, underground. Cotyledons usually have 2 conductive bundles.
Leaves are simple or compound, more or less divided into petiole and leaf blade, usually with pinnate or seldom palmate venation type. The leaves are different form often with stipules.	Leaves are always simple, don't divided into petiole and leaf blade, often vaginal (sheathing), with parallel or arcuate venation types, connecting by short veins.
Conductive system usually is consist of from one circle conductive bundles with cambium, phloem parenchyma is present; bark and pith are well differentiated.	Conductive system usually is consist of from many different bundles, usually without cambium, phloem parenchyma is absent; bark and pith are not well expressed.
The primary (embryonic) root usually develops into the main root, from which smaller secondary (lateral) roots depart. The root system is tap or branchy, but in some herbaceous forms, the root system is fibrous.	The primary root dies off early, being replaced by adventitious. The root system usually are fibrous or with underground metamorphosis.
The life(living) form are of arboreal(woody) and herbaceous(grass) type (annual, biennial, perennial).	The life form usually are herbs or secondary wood forms.
The flowers are 5,4 membered, rarely- 3 membered.	The flowers are 3 membered, rarely 4 or membered. 5-membered are unknown.
Nectaries are various types, often modified stamens	Nectaries mostly are localized at the septum ovary
Exine of pollens usually are trisulcate	Exine of pollens usually are singlesulcate

Thank you for attention!