

BENTHAM AND HOOKER'S SYSTEM OF ANGIOSPERM CLASSIFICATION

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INTRODUCTION

- ▶ Classification denotes the arrangement of a single plant or group of plants in a distinct category following a system of nomenclature, and in accordance with a particular and well established plan.
- ▶ Some of the earlier systems of classification of angiosperms were artificial systems, since they used only certain superficial characteristics as the basis.
- ▶ With more and more detailed study on the morphological, physiological and reproductive aspects of angiosperms, the artificial systems of classifications were replaced by the natural systems of classification.

INTRODUCTION

- ▶ George Bentham and Joseph Dalton Hooker - Two English taxonomists who were closely associated with the Royal Botanical Garden at Kew, England have given a detailed classification of plant kingdom, particularly the angiosperms.
- ▶ They gave an outstanding system of classification of phanerogams in their *Genera Plantarum* which was published in three volumes between the years 1862 to 1883. It is a natural system of classification.
- ▶ They described 97,205 species of flowering plants grouped into 202 orders (now recognised as families).
- ▶ The system has the advantage of being the first great natural system of classification, which is very easy to follow.

KINDS OF CLASSIFICATION

- ▶ **ARTIFICIAL CLASSIFICATION** is based on convenient or conspicuous diagnostic characters without attention to characters indicating relationship; often a classification based on a single arbitrarily chosen character such as flower colour, habit, habitat, time of flowering or arrangement of leaves, rather than an evaluation of the totality of characters. Ex. Linnaeus' sexual system,
- ▶ **NATURAL CLASSIFICATION** is one which is based on over-all resemblances in external morphology, and unlike artificial systems, involved as many characters as possible. Ex. Bentham & Hooker
- ▶ **PHYLOGENETIC CLASSIFICATION** is based on hypothesized evolutionary relationship. In the years, following Darwin's Origin of Species (1859) the theory of evolution gradually replaced the concept of special creation of species. Thus, modern phylogenetic systems of classification based on relationship by descent. Ex. Engler & Prantle

ARTIFICIAL CLASSIFICATION BY LINNAEUS

- ▶ *Carolus Linnaeus* (1707-1778). It is to Swedish botanist, Carolus Linnaeus, that we owe the modern methods of naming plants. He is considered as “Father of Taxonomy”.
- ▶ Linnaeus established what has come to known as ‘binomial system’ of nomenclature, which involves naming of plants by two names - one for the genus and one for the species.
- ▶ Linnaeus also set up a system of classification usually called as ‘sexual system’ or ‘artificial system’, because Linnaeus based his classification on number of stamens and their relation to one another and to other floral parts.
- ▶ Linnaeus divided plants into 24 classes, of which 23 were of flowering plants and the 24th class includes non-flowering plants i.e. ferns, mosses, fungi and algae. The important publications of Linnaeus are: *Syatema Naturae*(1735), *Genera Plantarum*(1737) and *Species Plantarum*(1753).



George Bentham
1800-1884

GENERA PLANTARUM

AD EXEMPLARIA IMPRIMIS IN HERBARIIS KEWENSIBUS SERVATA
DEFINITA;

Joseph Dalton Hooker
1817-1911

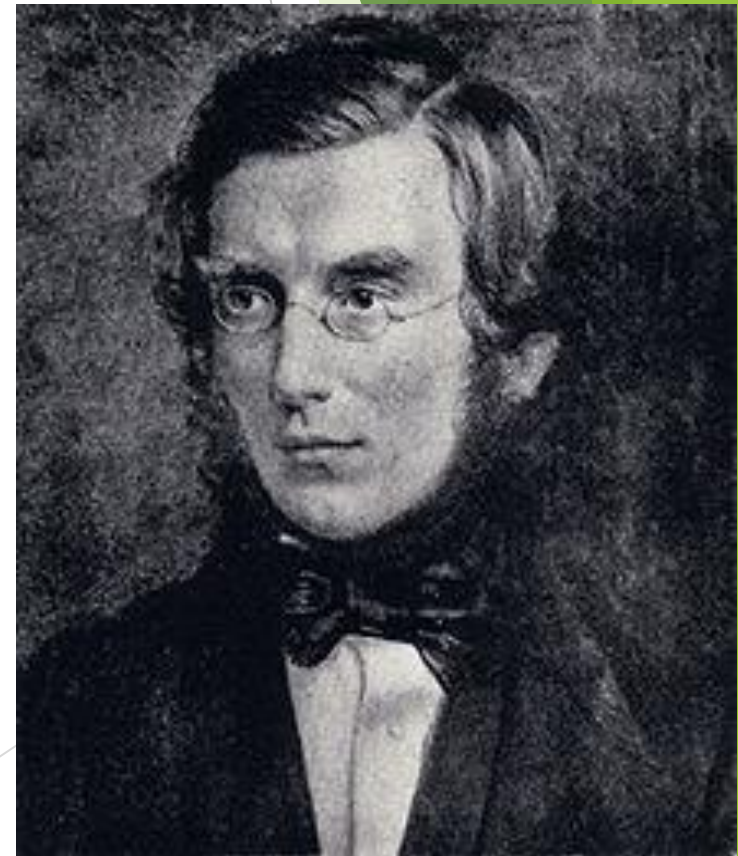
AUCTORIBUS
G. BENTHAM ET J. D. HOOKER.

VOLUMEN PRIMUM,
SISTENS DICOTYLEDONUM POLYPETALARUM ORDINES LXXXIII
RANUNCULACEAS—CORNACEAS.

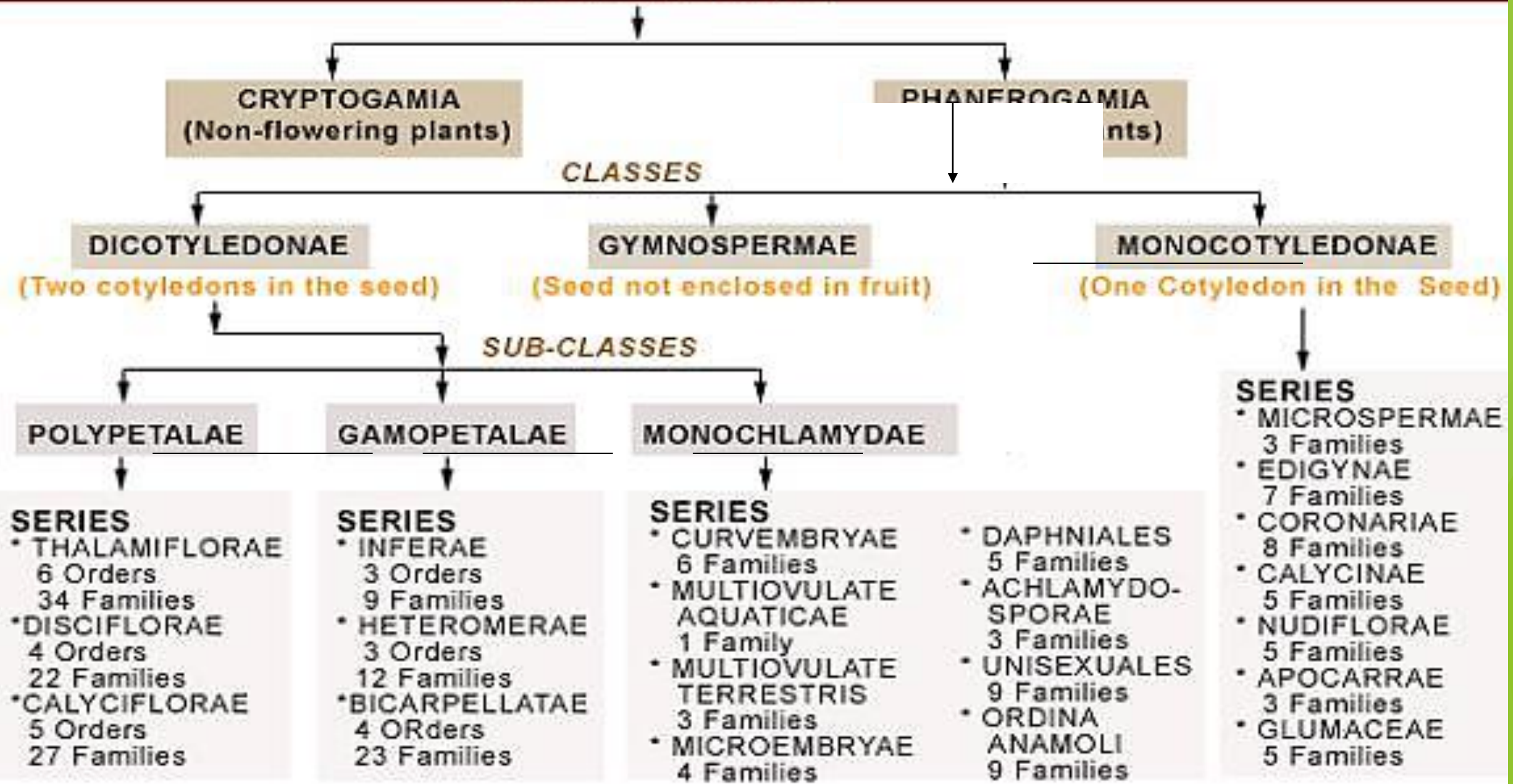


LONDINI:

VENIT APUD
REEVE & CO., 5, HENRIETTA STREET, COVENT GARDEN;
WILLIAMS & NORGATE, 14, HENRIETTA STREET, COVENT GARDEN.
MDCCLXII AD MDCCLXVII.



PLANT KINGDOM



CRYPTOGAMIA
(Non-flowering plants)

PHANEROGAMIA
(Flowering plants)

CLASSES

DICOTYLEDONAE

GYMNOSPERMAE

MONOCOTYLEDONAE

(Two cotyledons in the seed)

(Seed not enclosed in fruit)

(One Cotyledon in the Seed)

SUB-CLASSES

POLYPETALAE

GAMOPETALAE

MONOCHLAMYDAE

SERIES
• THALAMIFLORAE
6 Orders
34 Families
• DISCIFLORAE
4 Orders
22 Families
• CALYCIFLORAE
5 Orders
27 Families

SERIES
• INFERAEE
3 Orders
9 Families
• HETEROMERAE
3 Orders
12 Families
• BICARPELLATAE
4 Orders
23 Families

SERIES
• CURVEMBRYAE
6 Families
• MULTIOVULATE
AQUATICAE
1 Family
• MULTIOVULATE
TERRESTRIS
3 Families
• MICROEMBRYAE
4 Families

• DAPHNIALES
5 Families
• ACHLAMYDO-
SPORAE
3 Families
• UNISEXUALES
9 Families
• ORDINA
ANAMOLI
9 Families

SERIES
• MICROSPERMAE
3 Families
• EDIGYNAE
7 Families
• CORONARIAE
8 Families
• CALYCINAE
5 Families
• NUDIFLORAE
5 Families
• APOCARRAE
3 Families
• GLUMACEAE
5 Families

SUB-CLASS - POLYPETALAE
petals separate

Series

THALAMIFLORAE

Orders

Ranales

Parietales

Polygalineae

Caryophyllineae

Guttiferales

Malvales

DISCIFLORAE

Orders

Geraniales

Olacales

Celastrales

Sapindales

CALYCIFLORAE

Orders

Rosales

Myrtales

Passiflorales

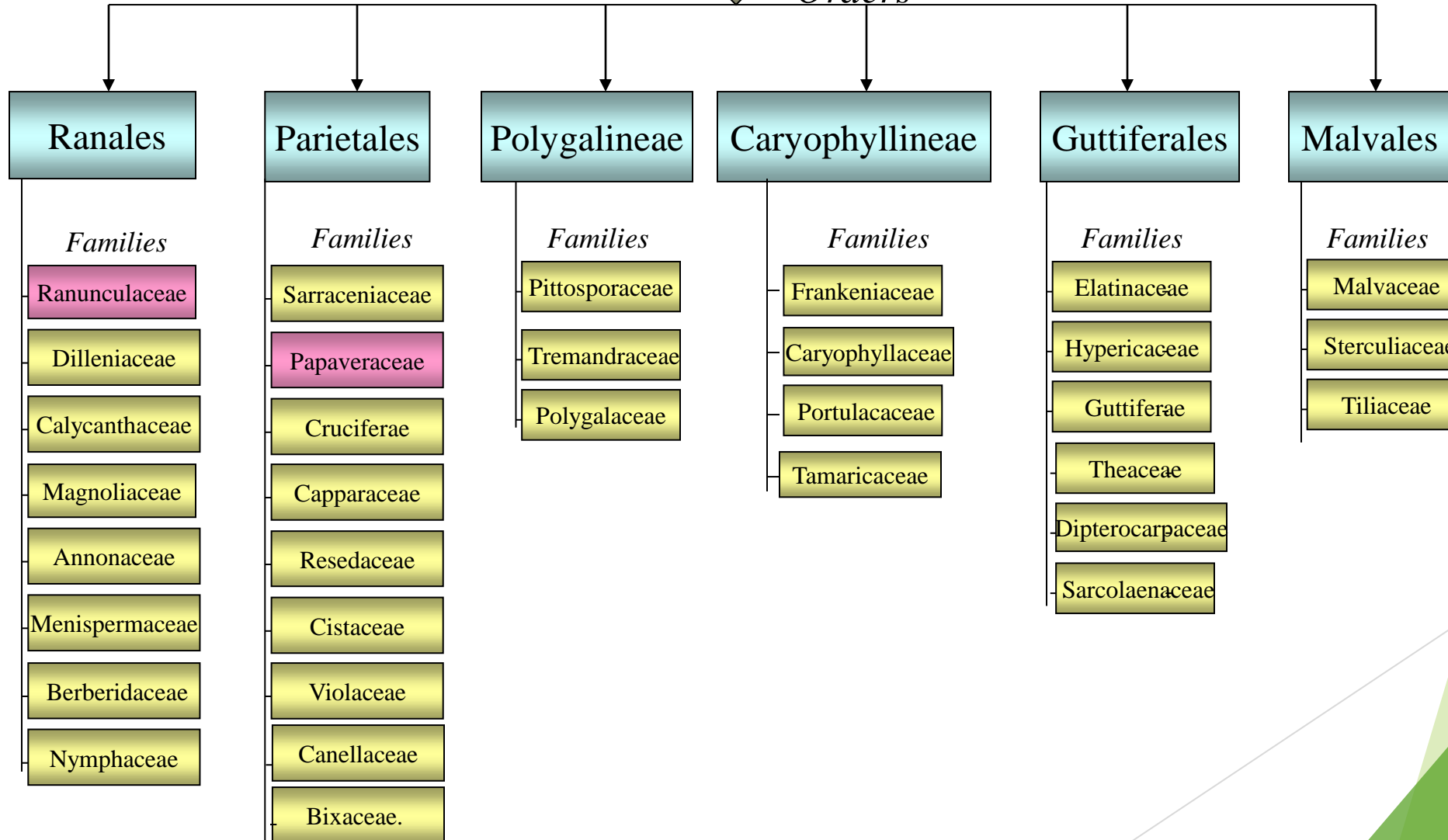
Ficoidales

Umbellales

THALAMIFLORAE

Many stamens in the androecium.
Flower is hypogynous

Orders



DISCIFLORAE

Hypogynous flowers with a cushion-like disc around or below the ovary

Orders

Geraniales

Families

Linaceae

Humiriaceae

Malpighiaceae

Zygophyllaceae

Geraniaceae

Rutaceae

Simaroubaceae

Ochnaceae

Burseraceae

Meliaceae

Dichapetalaceae

Olacales

Families

Olacaceae

Aquifoliaceae

Celastrales

Families

Celastraceae

Stackhousiaceae

Rhamnaceae

Vitaceae

Sapindales

Families

Sapindaceae

Meliosmaceae

Anacardiaceae

Coriariaceae

Moringaceae

CALYCIFLORAE

Flowers epigynous or perigynous
Thalamus is in the form of a cup

Orders

Rosales

Families

Connaraceae

Leguminosae

Rosaceae

Saxifragaceae

Crassulaceae

Droseraceae

Hamamelidaceae

Bruniaceae

Haloragaceae

Myrtales

Families

Rhizophoraceae

Combretaceae

Myrtaceae

Melastomataceae

Lythraceae

Onagraceae

Passiflorales

Families

Loasaceae

Turneraceae

Passifloraceae

Cucurbitaceae

Begoniaceae

Datisceae

Ficoidales

Families

Cactaceae

Aizoaceae

Umbellales

Families

Umbelliferae

Araliaceae

Cornaceae

SUB-CLASS - GAMOPETALAE
petals fused

Series

INFERRAE

Orders

Rubiales

Asterales

Campanulales

HETEROMERAE

Orders

Ericales

Primulales

Ebenales

BICARPELLATAE

Orders

Gentianales

Polemoniales

Personiales

Lamiales

INFERRAE
Flowers with inferior ovary

Orders

Rubiales

Families

Caprifoliaceae

Rubiaceae

Asterales

Families

Valerianaceae

Dipsacaceae

Calyceraceae

Compositae

Campanulales

Families

Stylidaceae

Goodeniaceae

Campanulaceae

HETEROMERAE

Flowers with superior ovary
Number of carpels - more than two

Orders

Ericales

Families

Ericaceae

Clethraceae

Epacridaceae

Diapensiaceae

Lennoceae

Primulales

Families

Plumbaginaceae

Primulaceae

Myrsinaceae

Ebenales

Families

Sapotaceae

Ebenaceae

Styracaceae

BICARPELLATAE

Ovary superior, with 2 carpels

Orders

Gentianales

Families

Oleaceae

Salvadoraceae

Apocynaceae

Asclepiadaceae

Loganiaceae

Gentianaceae

Polemoniales

Families

Polemoniaceae

Hydrophyllaceae

Boraginaceae

Convolvulaceae

Solanaceae

Personiales

Families

Scrophulariaceae

Globulariaceae

Lentibulariaceae

Gesneriaceae

Bignoniaceae

Pedaliaceae

Acanthaceae

Lamiales

Families

Myoporaceae

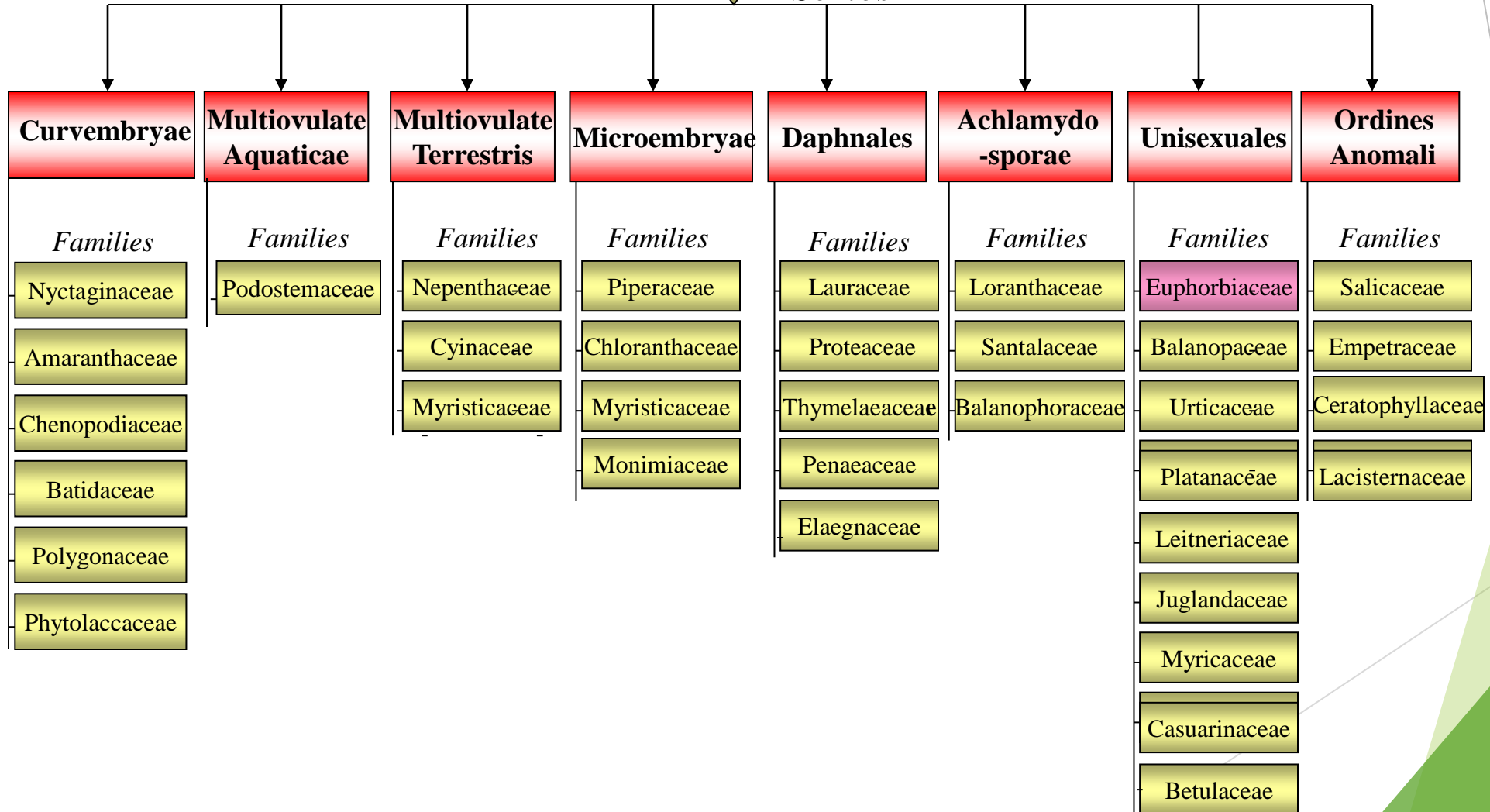
Verbenaceae

Labiatae

Plantaginaceae

MONOCHLAMYDEAE
only 1 kind of perianth

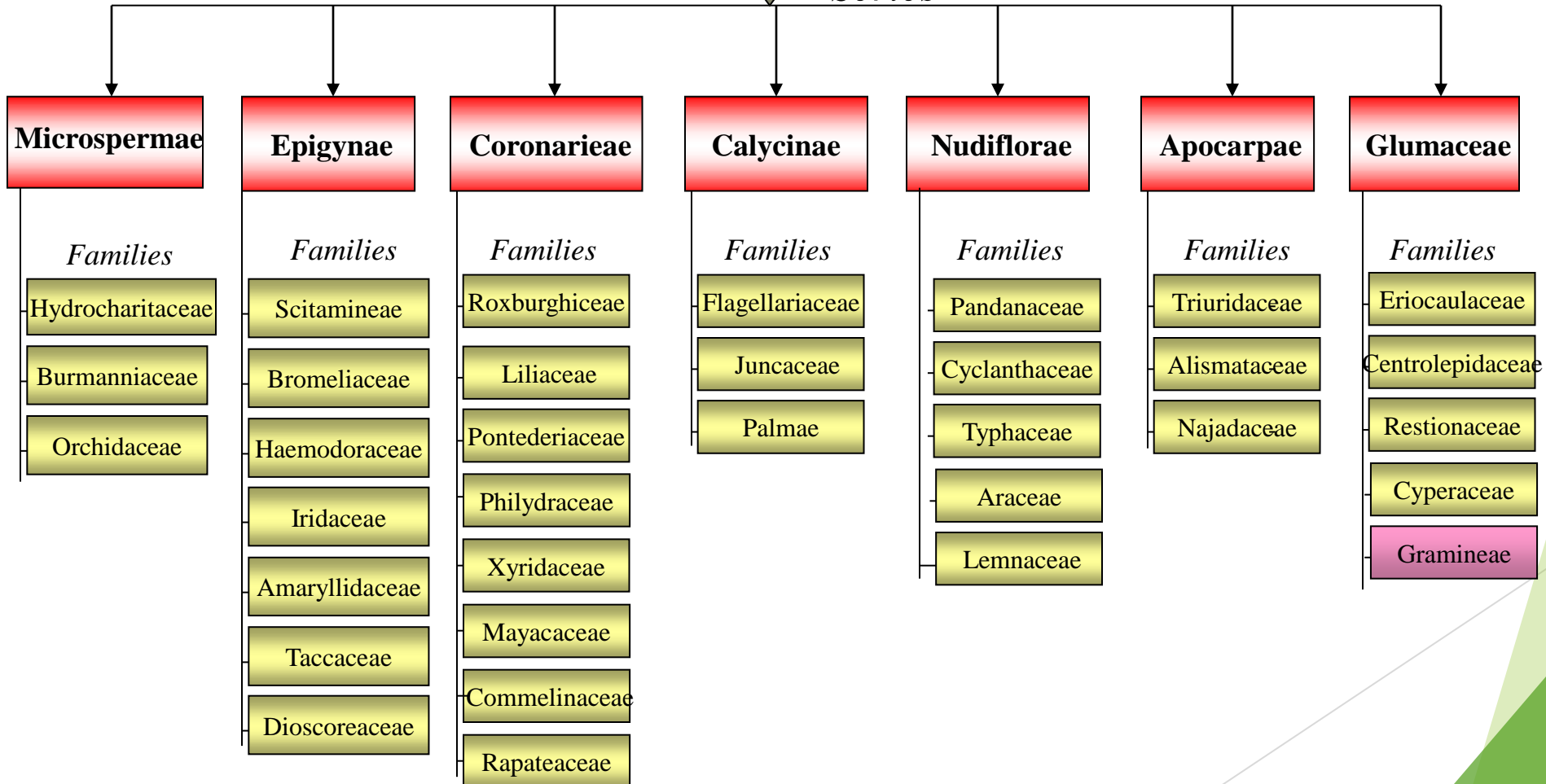
Series



CLASS-MONOCOTYLEDONAE

1 cotyledon, flowers trimerous

Series



MERITS

- Bentham and Hooker's classification is the most natural system, based on actual examination of specimens.
- The description of plants is quite accurate and reliable.
- As it is easy to follow, it is used as a key for the identification of plants in Kew herbarium and several other herbaria of the world.
- Although this system is natural, most of the aspects of this system show affinity to modern concepts of evolution. For example, the order Ranales, which is the first order in the arrangement of plants, has been given a primitive position in this system. Recent taxonomic findings also indicate that the members of Ranales are the most primitive living angiosperms.
- The placement of monocotyledonae after the dicotyledonae also appears to be in accordance with the evolutionary trends.

DEMERITS

- ▶ The placement of Gymnospermae in between dicotyledonae and monocotyledonae is an error.
- ▶ Several important floral characters have been neglected in this system.
- ▶ Advanced family Orchidaceae has been considered as primitive among monocotyledons and it is placed in the beginning of the system.
- ▶ In this system, some closely related families have been separated and placed under different groups.
- ▶ Unrelated families have been grouped nearer. For example, Podostemaceae of series Multiovulatae aquaticae of Monochlamydeae deserves a place in Rosales of the series Calyciflorae of Polypetalae.



THANK YOU



Delphinium amplibracteatum



RANUNCULACEAE



Ranunculus laetus





Argemone mexicana



PAPAVERACEAE





*Citrus
aurantifolia*

RUTACEAE



Citrus limon



Murraya koenigii



Murraya paniculata

LEGUMINOSAE



Pisum sativum



Lathyrus odoratus





ROSACEAE



UMBELLIFERAE



Coriandrum sativum



COMPOSITAE



ASCLEPIADACEAE



Asclepias quinquedentata



Calotropis
www.salinitysociety.com



SOLANACEAE



*Nicotiana
glauca*



Solanum nigrum



LAMIALES



Ocimum



Euphorbia pulcherrima



EUPHORBIAEAE



Euphorbia hirta



GLUMACEAE



Triticum aestivum



Oryza sativa

