Taxonomy

What is taxonomy?

- Is the science of identifying and naming of species and organizing them into system of classification.
- **Taxonomy** is a hierarchical system for classifying and identifying organisms. This system was developed by Swedish scientist Carolus Linnaeus in the 18th century.

Binomial Nomenclature

- Linnaeus's taxonomy system has two main features that contribute to its ease of use in naming and grouping organisms. The first is the use of binomial nomenclature. This means that an organism's scientific name is comprised of a combination of two terms. These terms are the genus name and the species or epithet. Both of these terms are italicized and the genus name is also capitalized.

- For example, the scientific name for humans is *Homo sapiens*. The genus name is *Homo* and the species is *sapiens*. These terms are unique and no other species can have this same name.

- The second feature of Linnaeus's taxonomy system that simplifies organism classification is the ordering of species into broad categories. There are seven major categories: **Kingdom**, **Phylum**, **Class**,(sub-class, series) **Order**, **Family**, **Genus**, and **Species**.

SYSTEMS OF CLASSIFICATION

- Artificial
- Natural
- Phenetic
- Numerical
- Cytotaxonomy
- Chemotaxonomy
- Phylogenetic

ARTIFICIAL CLASSIFICATION

Artificial classification is the system of classification which uses only gross superficial morphological characters such as habit, colour and shape of leaves etc. They were based mainly on vegetative characters or on the androecium structure.

DRAWBACKS:

- They separated the closely related species since they were based on a few characteristics.
- They gave equal weightage to vegetative and sexual characteristics.

NATURAL CLASSIFICATION

- Natural classification systems were based on natural affinities among the organisms and consider, not only the external features, but also internal features, like ultra-structure, anatomy, embryology and phytochemistry. This classification for flowering plants was given by George Bentham and Joseph Dalton Hooker.

PHENETIC CLASSIFICATION

NUMERICAL TAXONOMY

Numerical taxonomy is carried out using computers is based on all observable characteristics. Numbers and codes are assigned to all the characters and the data are then processed.

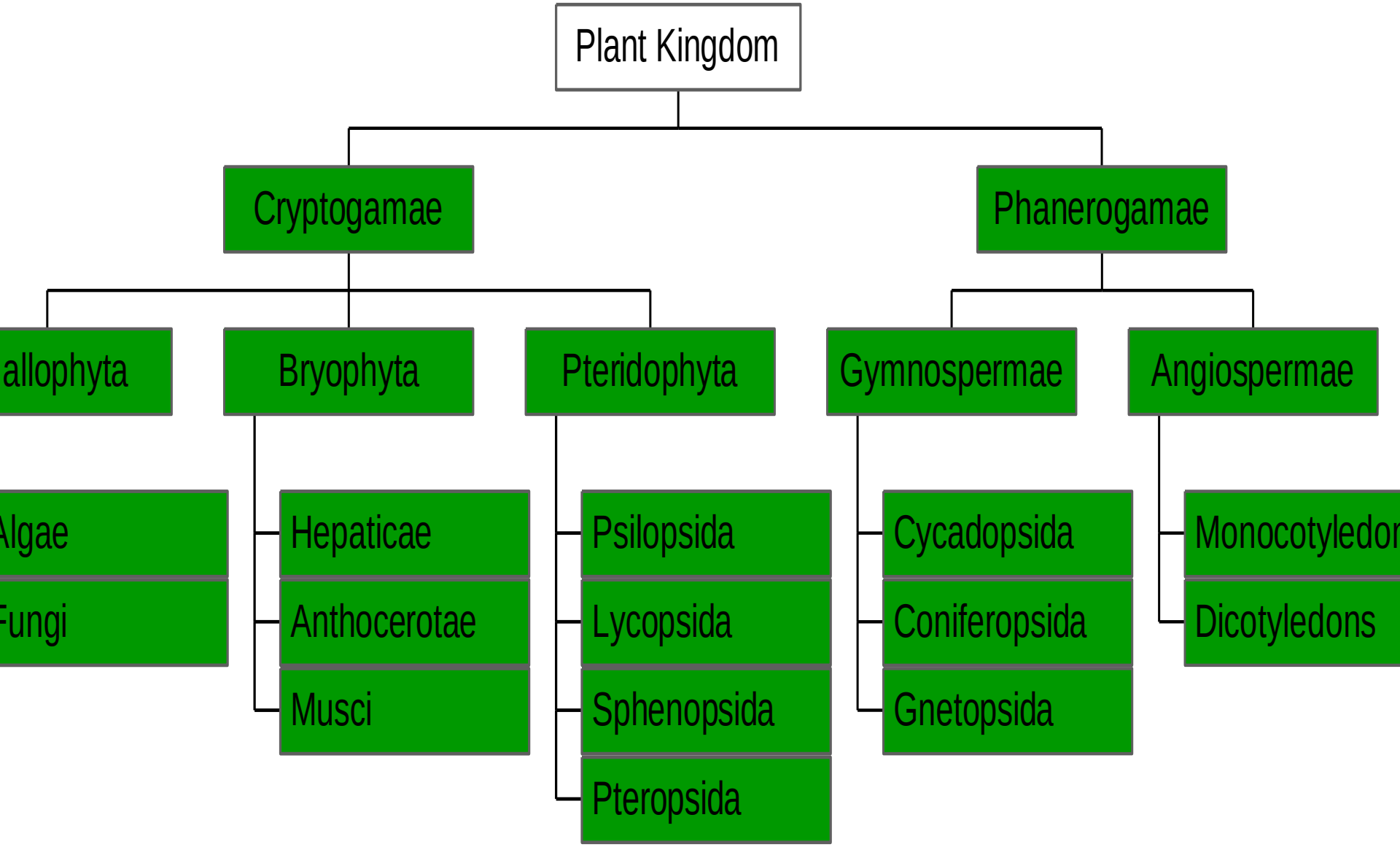
CYTOTAXONOMY

Cytotaxonomy is based on cytological information like chromosome number, structure and behavior.

CHEMOTAXONOMY

Chemotaxonomy uses the chemical constituents of the plant to resolve confusions.

CLASSIFICATION OF PLANTS



- Classification denotes the arrangement of a single plant or group of plants in 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.

- 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.

George Bentham
1800-1884

Joseph Dalton Hooker
1817-1911

GENERA PLANTARUM

AD EXEMPLARIA IMPRIMIS IN HERBARIIS KEWENSIBUS SERVATA

DEFINITA;

AUCTORIBUS

G. BENTHAM ET J. D. HOOKER.

VOLUMEN PRIMUM,

SISTENS DICOTYLEDONUM POLYPETALARUM ORDINES LXXXIII

RANUNCULACEAS—CORNACEAS.

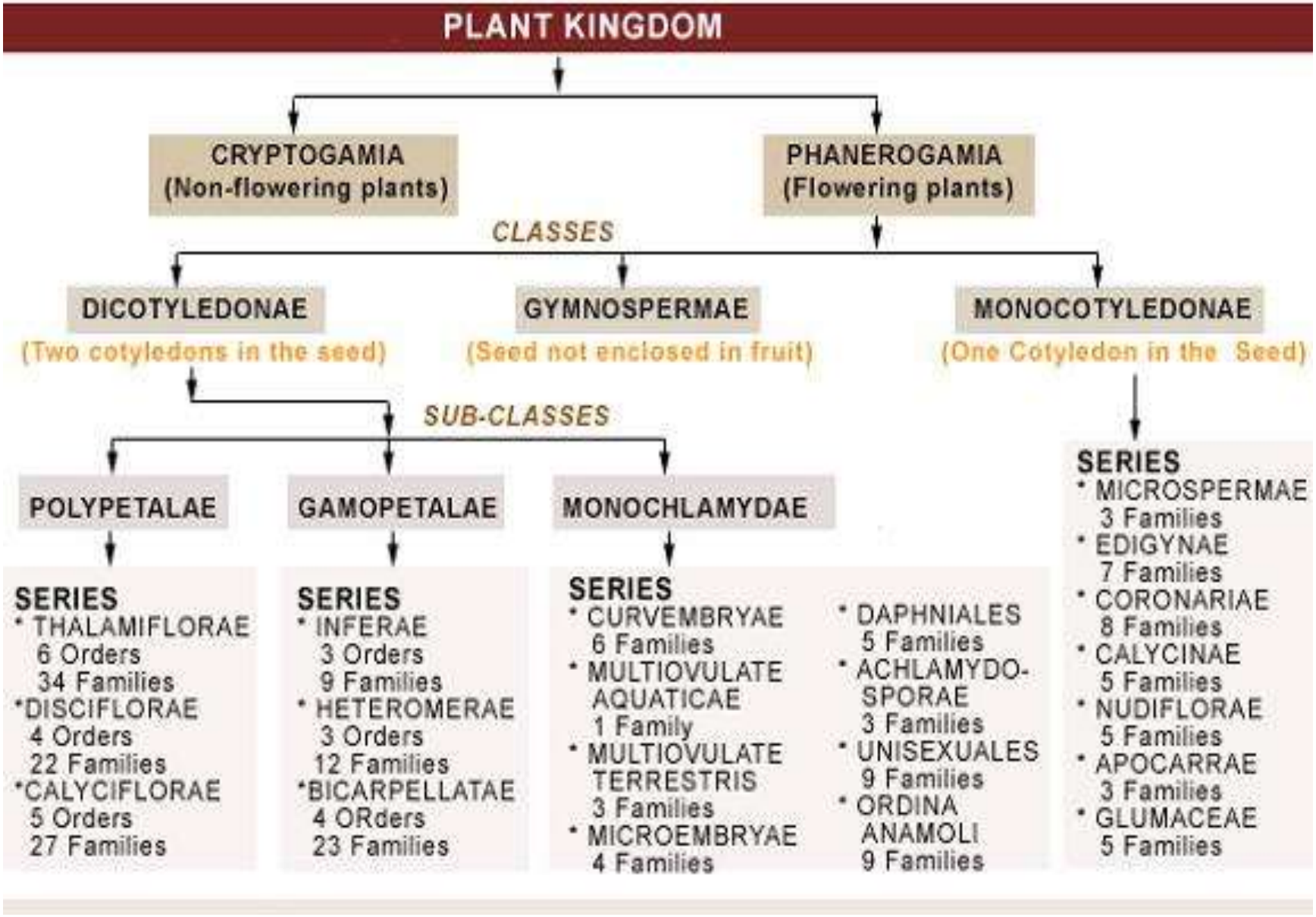
LONDINI:

VENIT APUD

REEVE & CO., 5, HENRIETTA STREET, COVENT GARDEN;

WILLIAMS & NORGATE, 14, HENRIETTA STREET, COVENT GARDEN.

MDCCCLXII AD MDCCCLXVII.


PLANT KINGDOM
CRYPTOGAMIA
(Non-flowering plants)
PHANEROGAMIA
(Flowering plants)
CLASSES
DICOTYLEDONAE
(Two cotyledons in the seed)
GYMNOSPERMAE
(Seed not enclosed in fruit)
MONOCOTYLEDONAE
(One Cotyleden 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
* INFERAE
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

Class Dicotyledonae

- This group includes angiosperms in which the seed bears two cotyledons and leaves exhibit reticulate venation. It is divided into three subclasses - Polypetalae, Gamopetalae and Monochlamydae.

Class Gymnospermae

- This group includes the gymnosperms in which seeds are not enclosed in fruits. This class is divided into three families Gnetaceae, Coniferaceae and Cycadaceae.

Class Monocotyledonae

- This group includes angiosperms in which the seed bears only one cotyledon. The leaves exhibit parallel venation. It is divided into the following seven series.

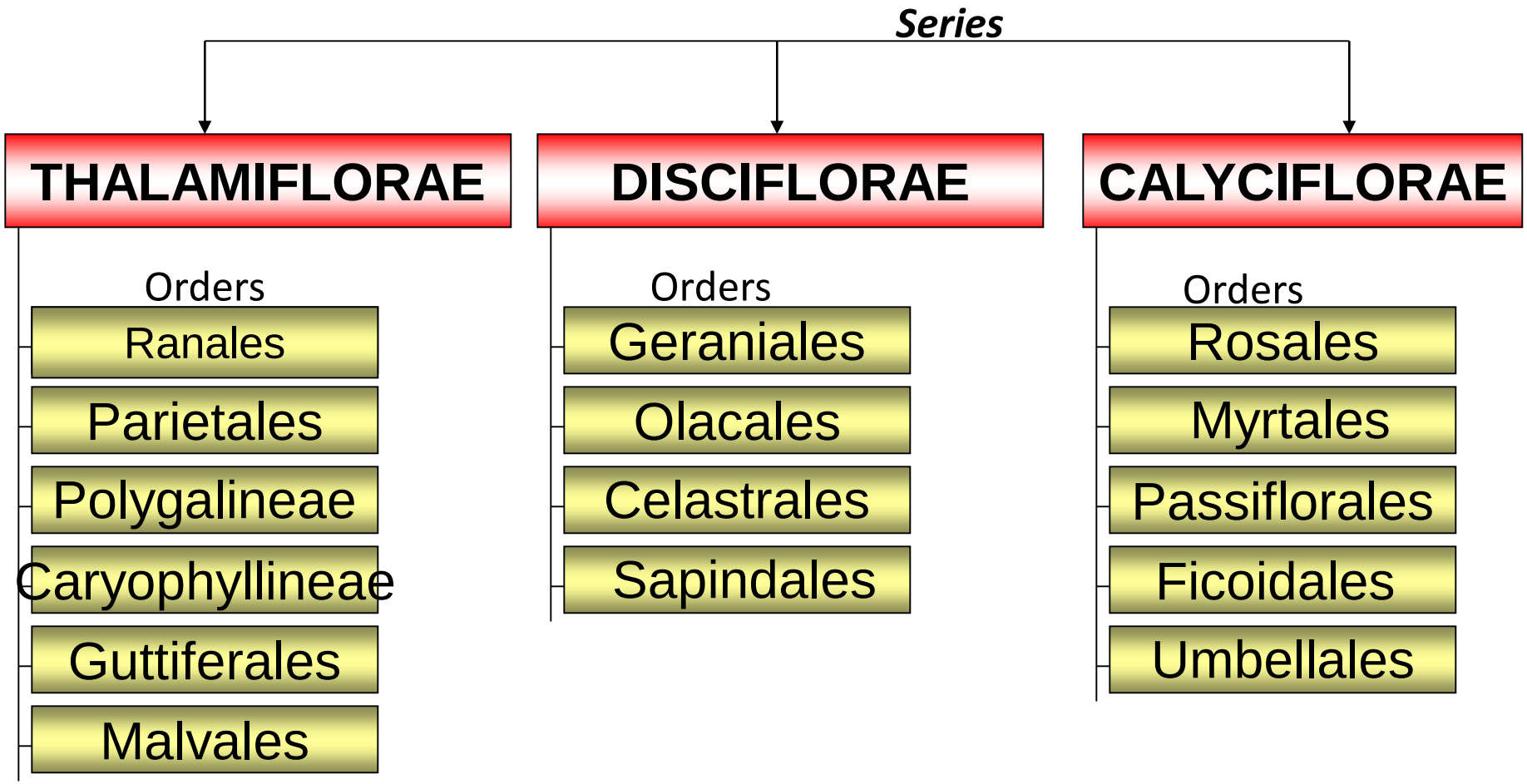
Sub-class Polypetalae

- The flowers contain distinct non-essential whorls calyx and corolla. In the corolla petals are free. This sub-class includes 3 series Thalamiflorae, Disciflorae and Calyciflorae.

- Series Thalamiflorae: Stamens, sepals, petals attached to the receptacle. Many stamens in the androecium. Flower is hypogynous.
- Series Disciflorae: Hypogynous flowers with a cushion-like disc around or below the ovary. (superior ovary)
- Series Calyciflorae: Flowers epigynous or perigynous. Thalamus is in the form of a cup. Stamens fused to calyx.

SUB-CLASS - POLYPETALAE

petals separate



Sub-class Gamopetalae

- Flowers with distinct calyx and corolla. In the corolla petals are fused. This sub-class includes 3 series.
- Series Inferae: Flowers with inferior ovary. Stamen number = to petal number.
- Series Heteromerae: Flowers with superior ovary. Number of carpels - more than two. Stamens opposite to petals / double the number of petals.
- Series Bicarpellatae: Flowers with superior ovary. Number of carpels - two.

SUB-CLASS - GAMOPETALAE
petals fused

Series

INFERAE

Orders

- Rubiales
- Asterales
- Campanulales

HETEROMERAE

Orders

- Ericales
- Primulales
- Ebenales

BICARPELLATAE

Orders

- Gentianales
- Polemoniales
- Personiales
- Lamiales

Sub-class Monochlamydae

- The flowers are with only one non-essential whorl (perianth) or absence of non-essential whorls. It includes 8 series.
- Curvembryae: Usually single ovule, embryo coiled around the endosperm.
- Multiovulate Aquaticae: Aquatic plants with syncarpous ovary and many ovules.
- Multiovulate Terrestris: Terrestrial plants with syncarpous ovary and many ovules.
- Microembryae: Only one ovule, small, tiny embryo endospermic seed.

- Daphnales: Only one carpel and single ovule.
- Achlamydosporae: Ovary inferior, 1 to 3 ovules - unilocular.
- Unisexuales: Flower unisexual, perianth usually absent.
- Ordines Anomali: (Anomolous families) Plants with uncertain systematic position but closer to unisexuales.

THALAMIFLORAE

Many stamens in the androecium.
Flower is hypogynous

Orders

Ranales

Families

- Ranunculaceae
- Dilleniaceae
- Calycanthaceae
- Magnoliaceae
- Annonaceae
- Menispermaceae
- Berberidaceae
- Nymphaceae

Parietales

Families

- Sarraceniaceae
- Papaveraceae
- Cruciferae
- Capparaceae
- Resedaceae
- Cistaceae
- Violaceae
- Canellaceae
- Bixaceae.

Polygalineae

Families

- Pittosporaceae
- Tremandraceae
- Polygalaceae

Caryophyllineae

Families

- Frankeniaceae
- Caryophyllaceae
- Portulacaceae
- Tamaricaceae

Guttiferales

Families

- Elatinaceae
- Hypericaceae
- Guttiferae
- Theaceae
- Dipterocarpaceae
- Sarcolaenaceae

Malvales

Families

- Malvaceae
- Sterculiaceae
- Tiliaceae

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
- Datiscaceae

Ficoidales

Families

- Cactaceae
- Aizoaceae

Umbellales

Families

- Umbelliferae/Apiaceae
- Araliaceae
- Cornaceae

INFERAE
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

Curvembryae
Families
- Nyctaginaceae
- Amaranthaceae
- Chenopodiaceae
- Batidaceae
- Polygonaceae
- Phytolaccaceae

Multiovulate Aquaticae
Families
- Podostemaceae

Multiovulate Terrestris
Families
- Nepenthaceae
- Cyinaceae
- Myristicaceae

Microembryae
Families
- Piperaceae
- Chloranthaceae
- Myristicaceae
- Monimiaceae

Daphnales
Families
- Lauraceae
- Proteaceae
- Thymelaeaceae
- Penaeaceae
- Elaegnaceae

Achlamydo -sporae
Families
- Loranthaceae
- Santalaceae
- Balanophoraceae

Unisexuales
Families
- Euphorbiaceae
- Balanopaceae
- Urticaceae
- Platanaceae
- Leitneriaceae
- Juglandaceae
- Myricaceae
- Casuarinaceae
- Betulaceae

Ordines Anomali
Families
- Salicaceae
- Empetraceae
- Ceratophyllaceae
- Lacisternaceae

Class Monocotyledonae

- This group includes angiosperms in which the seed bears only one cotyledon. The leaves exhibit parallel venation. It is divided into the following seven series.
- Microspermae: Ovary is inferior, seeds are minute and non-endospermic.
- Epigynae: Ovary inferior, seeds are large and endospermic.
- Coronarieae: Ovary superior, perianth petalloid.
- Calycinae: Ovary superior, perianth sepalloid.
- Nudiflorae: Perianth reduced or absent. Seeds are endospermic.
- Apocarpae: Carpels more than one, free, seeds are endospermic.
- Glumaceae: Perianth reduced or absent, scaly bracts present.

CLASS-MONOCOTYLEDONAE
1 cotyledon, flowers trimerous

Series

Microspermae
Families
- Hydrocharitaceae
- Burmanniaceae
- Orchidaceae

Epigynae
Families
- Scitamineae
- Bromeliaceae
- Haemodoraceae
- Iridaceae
- Amaryllidaceae
- Taccaceae
- Dioscoreaceae

Coronarieae
Families
- Roxburghiceae
- Liliaceae
- Pontederiaceae
- Philydraceae
- Xyridaceae
- Mayacaceae
- Commelinaceae
- Rapateaceae

Calycinae
Families
- Flagellariaceae
- Juncaceae
- Palmae

Nudiflorae
Families
- Pandanaceae
- Cyclanthaceae
- Typhaceae
- Araceae
- Lemnaceae

Apocarpae
Families
- Triuridaceae
- Alismataceae
- Najadaceae

Glumaceae
Families
- Eriocaulaceae
- Centrolepidaceae
- Restionaceae
- Cyperaceae
- Gramineae

Delphinium amplibracteatum

RANUNCULACEAE

Ranunculus

Argemone mexicana

PAPAVERACEAE

Citrus aurantifolia

Citrus limon

RUTACEAE

Murraya koenigii

Murraya paniculata

LEGUMINOSAE

Pisum sativum

Lathyrus odoratus

ROSACEAE

UMBELLIFERAE

Coriandrum sativum

COMPOSITAE

ASCLEPIADACEAE

Asclepias quinquedent

Calotropis

SOLANACEAE

Nicotiana glauca

Solanum nigrum

LAMIALES

Ocimun

Euphorbia pulcherime

EUPHORBIACEAE

Euphorbia hirta

GLUMACEAE

Triticum aestivum

Oryza sativa

Gymnosperms were placed between Dicots and Monocots.
Many important floral characters were neglected.
It is not a phylogenetic scheme.
Some of the closely related families have been separated and placed under different cohotrs and a number of unrelated families put together.
Some advanced families like *Orchidaceae* have been regarded as primitive by placing in the beginning.


THANK YOU