Engler and Prantle's system of classification

Adolf Engler (1843-1930)

Karl Prantl (1849-1893)

Phylogenetic classification based on evolutionary trends

- Adolph Engler and Karl prantl two German botanists published their classical treaties in "Die Naturalichen Pflanzenflamilien "in form of 23 volumes covering the entire plant kingdom in a systematic order of arrangement. They made attempts to rectify the short comings of Eichler and Bentham and hooker's classification.

Salient features of the classification:

- Monochlamydea is completely abolished as such and families are distributed in the large series called Archichlamydea.
- This Engler system dominates over all the natural system but not to the exclusion of other.
- They accept the theory of descends and threw light or the phylogeny of various groups.
- It traces upon the increasing complexity of plant parts particularly essential whorls of flowers.

- Most primitive type of flowers has no perianth; in the next evolved type two whorls of perianth then in highest evolved type there are two whorls of perianth in latter case two whorls are indistinguishable (Homochlamydous) or distinguishable (Heterochlamydous).
- vi. Gamopetalous condition considered more advanced than the poly petalous condition and the monocotyledonous are primitive and placed before the dicotyledonous plants.
- vii. Hypogenous form of arrangement is primitive to perigyny to a definite number of stamens and carpals.

- Indefinite number of stamens and carpals are primitive to a definite number of stamens and carpals.
- Monocotyledons have been classified into 11 orders and 45 families where as Dicotyledons classified into 44 orders and 261 families.
- Monocotyledon starts with family typical and ends in Orchidaceae.
- Dicotyledonae begins with family Casuarinaceae and ends in Compositae.
- Engler assumes that, Casuarinaceae with unisexual apetalous flowers borne in catkins is the most primitive family among dicots.

- This system is summarized as follows. All flowering plant belongs to.
- **Division**
- Embryophyta or Siphonogamia or spermatophyte further this division sub-divided into two sub-division.

- i. Sub-division -1 Gymnospermae (naked seeded)
- It includes seven classes' viz. class-cycadofilicales, Cycadales, Bennetitales, Ginkgoales, Coniferales, Cordaitales and Gnetales.
- ii. Sub-division: Angiospermae. This sub-division further divided into two major classes.
- iii. Class -1 – Monocotyledonae (Embryo with single cotyledon) further, this class have been classified into 11 orders

- class2: Dicotyledonae (includes 44 orders)

This class further divided into 2 sub-class:

Archichlamydeae (apetalae)

Corolla polypetalae

perianth single or double

includes 30 orders and 201 families

Metachlamydeae (sympetalae)

10 orders

- Corolla gamopetalous
- perianth two whorls
- includes 11 orders and 57 families

- the monocots are more primitive than the dicots.
- Based on character of perianth
- In the first series , the flowers are naked or have a monochlamydeous bract-like perianth.
- The next series dichlamydeous flowers, - perianth undistinguishable

Subclass monocotyledonae

- (11)
- Pandales
- Helobiae
- Triuridales
- Glumiferae
- Principes
- Synanthae
- Spathiflorae
- Farinosae
- Liliflorae
- Scitaminae
- Microspermae

Class Dicotyledonae

- Verticillatae
- Piperales
- Salicales
- Garryales
- Myricales
- Balanopsidales
- Leitneriales
- Juglandales
- Batidales
- Julianales

- Fagales
- Utricales
- Proteales
- Santalales
- Aristolochiales
- Polygonales
- Centrospermae
- Ranales
- Rhoeadales
- Sarraceniales

- Rosales
- Pandales
- Geraniales
- Sapindales
- Rhamnales
- Malvales
- Parietales
- Opuntiales
- Myrtiflorae
- Umbelliflorae

- Ericales
- Primulales
- Plumbaginales
- Ebenales
- Contortae
- Tubiflorae
- Plantaginales
- Rubiales
- Cucurbitales
- Companilatae

Merits and demerits

- Monochlamydaea has been completely abolished
- Sympetalae corresponds to gamopetalae of B& H

Hutchinon's Classification:

- 1. The evolution is both upward and downward, the former tending towards preservation and the later to their reduction and degeneration of characters.
- 2. Evolution does not necessarily involve all organs at one time or simultaneously.
- 3. Aquatic plants are derived from terrestrial and saprophytes, parasites, epiphytes are more recent.
- 4. Trees and shrubs are more primitive than herbs.
- 5. Perennials are more primitive than biennials and annuals.
- 6. Plants with vascular bundles arranged in a ring are more primitive those in which vascular bundlers are scattered.

- Dioecious plants are more advanced than bisexual flowers.
- Unisexual flower are more primitive than bisexual flowers.
- Petaloid flowers are more primitive than bisexual flowers.
- Gamopetally is more advanced than polypetalae.

- Zygomorphic flower are more advanced than actinomorphic flowers.
- Hypogyny is more primitive than perigyny and epigyny.
- Simple leaves are more primitive than compound leaves.
- Solitary flower is more primitive than inflorescence flowers.
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- Apocarpy is more primitive than syncarpy.
- Polycarpy.
- Endospermic seeds with small embryo are more primitive than non endospermic seeds with large embryo.
- Flowers with numerous stamens are more primitive than those with fewer stamens.

- Free stamens precede the fused ones.
- Aggregate fruits are more evolved than single fruit and capsule precedes berry or drupe.
- Parietal placentation is more primitive than axial and free central placentation.
- Trees or arboreal habit are more primitive than climbers are twiners in any one family or genus.

- **A) Sub-phylum – I – Dicotyledonae**
- i) Embryo with two cotyledons
- ii) Tap root system
- iii) Reticulate venation of leaves
- iv) Pentamerous floral parts
- This sub phylum further divided into two divisions.
- 2 division – Lignosae, Herbaceae

- **Division (I) : Lignosae**
- i) Trees and shrubs, woody plants.
- ii) It includes 54 orders which begins with magnoliales and ends with verbenales.
- Order – 1 – Magoliales – (Magnoniaceae)
- 2 – Anonales – (Annonaceae)
- 3 - Laurales
- 4 – Dilleniales
- 5 Coriarales

  6 – Rosales – (Rosaeae)
- 7 – Leguminales – (Mimosae, Fabaceae)

- Cunoniales
- Styracales
- Araliales
- Hamamelidales
- Salicales
- Leitneriales
- Myricales
- Balanopsidales
- Fagales
- Jugiandales

- Casuarinales
- Urticales
- Bixales
- Thymelaeles
- Proteales
- Capparidales
- Tamaricales
- Violales
- Polygalales
- Lossales

- Passiflorales
- Cucurbitales
- Cactales
- Tiliales
- Malvales
- Malphigales
- Euphorbiales
- Theales
- Ochnales
- Ericales
- Guttiferales

- Myrtales
- Celastrales
- Olacales
- Santalales
- Rhamnales
- Myrsinales
- Ebenales
- Rutales
- Meliales
- Sapindales

- Loganiales
- Apocynales
- Rubiales
- Bignoniales
- Verbenales

- **Division –II Herbaceae:**
- i) It includes all herbaceous plants.
- ii) Plants may be annuals or biennials or perennials.
- iii) This division includes 28 orders which start with ranales and ends with lamiales.

- Division II Herbaceae
- Ranales
- Berberidales
- Aristolochiales
- Piperales
- Rhoeadales
- Cruciales
- Resedales
- Caryophyllales
- Polygonales
- Chenopodiales

- Lythrales
- Gentianales
- Primulales
- Planttaginales
- Saxifragales
- Sarracinales
- Podostemales
- Umbellales
- Valerianales
- Campanulales

- Goodiniales
- Asterales
- Solanales
- Personales
- Geraniales
- Polemoniales
- Boraginales
- Lamiales

- **SUB –PHYLUM – 2- Monocoty ledonae:**
- i) Embryo with one cotyledon
- ii) Fibrous adventitious root system
- iii) Parallel venation of leaves
- iv) Closed and scattered vascular bundles
- v) Trimerous flowers
- This sub – phylum divided into three divisions
- Div. Calycifloraе, Corolliferae, Glumifloraе

Sub-phylum Monocotyledones

- **Division – I – Calyciferae:**
- i) Flowers with distinct calyx and corolla
- ii) Sepals green in colour, petals colored variously.
- iii) It includes 12 orders, starting with butamales and ends with zingiberales.
- Order – 1 – Butamales – (Butamaceae)
- Alismatales
- Triuridales
- Juncaginales

- Aponogetonales
- Potamogetonales
- Najadales
- Commelinales – (Commelinaceae)
- Xyridales
- Eriocaulales
- Bromeliales
- Zingiberales – (Zingiberaceae; musaceae)

- **Division – II – Corolliferae:**
- i) Both calyx and corolla are not distinct in coloration.
- ii) Sepals may be colored other than green.
- iii) Petals and sepals present in different whorl.
- It includes 14 orders begins with liliales and end with orchidales
- Liliales
- Alstroemeriales
- Arales
- Typhales

- Amaryllidales
- Iridales
- Dioscoreales
- Agavales
- Palmales
- Pandanales
- Cyclanthales
- Haemodorales
- Burmanniales
- Orchidales

- **Division – III – Glumiflorae**
- i) Flower with reduced perianth
- ii) Neither sepal not petal is distinct and reduced to membranous lodicules.
- This includes 3 orders and six familes
- Juncales – Juncaceae

  Cyperales – Cyperaceae
- Graminales – Graminae (Poaceae)

Merits of Hutchinson's Classification:

- It is most phylogenetic system of classification based on natural characteristic of plants.
- ii) This system is based on evolutionary tendencies and interrelationship among angiospermic plants.
- iii) Magnoliales representing arborescent plants and ranales representing herbaceaous plants which shows parallel evolution.
- iv) Several big orders have been broken into small orders like rosales, paritales, malvales, leguminales etc.

- Many families have been raised to the rank of orders, leguminosae family raised to order leguminales.
- vi) Reshuffling of genera and families
- vii) Origin of monocots from dicots and placement of first dicot and then monocot families is correct in all respect.
- viii) Placing of gymnosperms before angiosperms in flowering plants

- Thank you