

# BIOLOGY

MEDICAL

PLANT KINGDOM



**BANSAL CLASSES**

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## **PLANT KINGDOM**

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# Plant Kingdom

In earlier systems of classification, only habit or external morphological characters were considered as sole basis of classification. But later on, organisms were classified on the basis of their natural affinities and finally on the basis of phylogeny (evolutionary tendencies).

## A. Artificial System of Classification

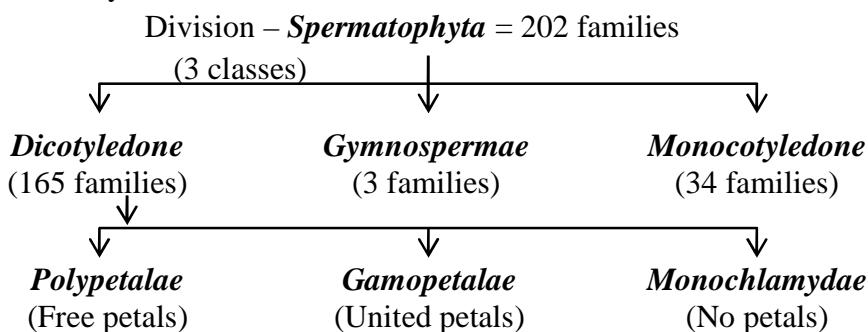
- It is based on a few morphological characters of vegetative nature for grouping of organisms, e.g., early systems of classifications by Aristotle, Theophrastus, Pliny, Bauhin, Linnaeus etc.
- Theophrastus** proposed the first system of artificial classification of plants on the basis of habit and classified plants into herbs, shrubs, undershrubs and trees.
- Carolus Linnaeus** (1707-1778) proposed the artificial system of classification based exclusively on nature and number of stamens and carpels. It was called as **Sexual System of Classification**.
- Classification by Linnaeus consisted of 24 classes, in which 23 classes were of flowering plants (**Phanerogamia**) and 24th class had flowerless plants (**Cryptogamia**). Details of this classification were published in **Genera Plantarum** (1737).

### Drawbacks:

- This system was based on one or a few characters, hence the diverse animals or plants were placed into limited number of groups.
- Natural affinities and phylogenetic relationships were not considered.
- The artificial system gave equal weightage to vegetative and sexual characters; this is not acceptable and since we know that often the **vegetative characters are more easily affected by environment**.

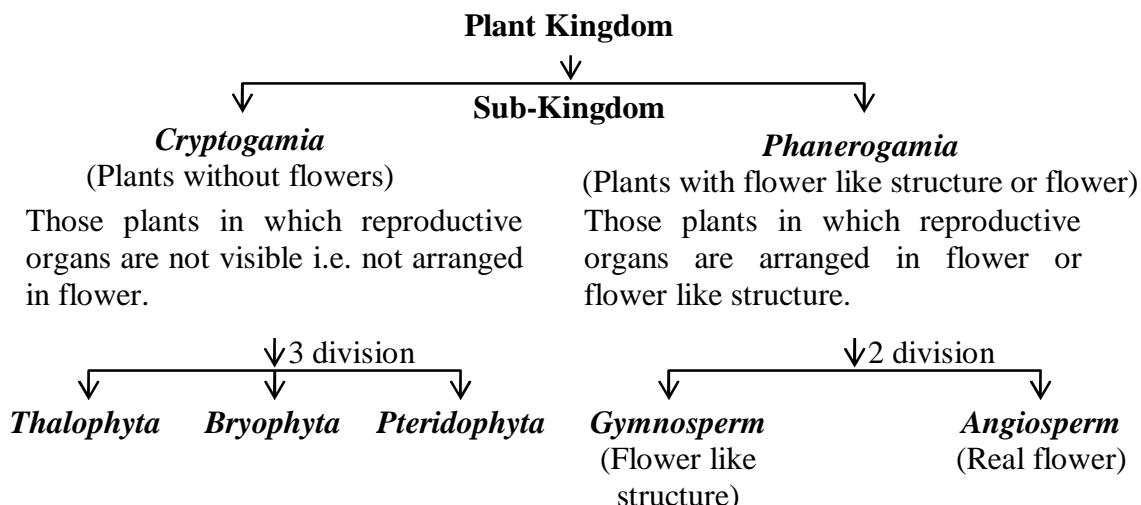
## B. Natural System of Classification

- Also known as **horizontal system** of classification or **2 D system**. Organisms in this system are classified on the basis of natural affinities. This system uses as many taxonomic characters as possible to group organisms.
  - This classification is mainly based on forms, relationship realising all information available at the time of collection of plants. This also considers internal features like ultrastructure, anatomy, embryology and phytochemistry .
  - Common natural systems were proposed by -John Ray, de Jussieu, de Candolle, Bentham and Hooker etc.
- (a) **George Bentham** and **J.D. Hooker** gave most important natural system of classification of angiosperms and published it in three volumes of '**Genera Plantarum**'. They described 202 families. In this system, description of plants was based on their detailed studies and dissections. This system is followed in all British Commonwealth countries including India.



### C. Phylogenetic System of Classification

- The term **phylogeny** was given by **Lamarck** and concept of phylogeny by **E. Haeckel**. Phylogeny is the evolutionary history of the organism. This system is also called '3D' or **vertical system**.
  - In this system, plants are classified according to their evolutionary and genetic affinities. Organisms belonging to same taxa are believed to have a common ancestor and may be represented in the form of family tree called **Cladogram**.
- (a) **A.W. Eichler** modified Bentham and Hooker's system of classification by placing gymnosperms in the beginning. He is also called as the pioneer in phylogenetic system of classification.

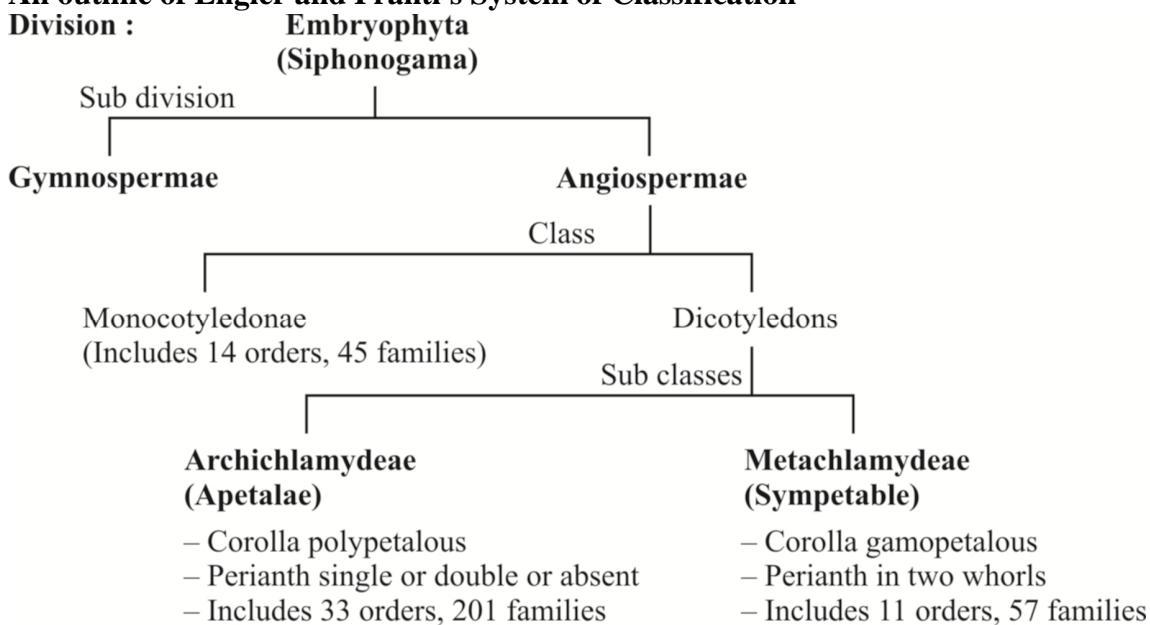


In this way Eichler classified plant kingdom into **five kingdom** and arranged them in the order of evolution (Phylogeny).

***Thallophyta → Bryophyta → Pteridophyta → Gymnosperm → Angiosperm***

- (b) **Adolph Engler and Karl A.E. Prantl**, two German botanists, adopted their system in "**Die naturalichen Pflanzen famhien**" (1887-1915). It was a German work which was later translated in English. The work had 23 volumes.

#### An outline of Engler and Prantl's System of Classification



**Merits:** In this system families are arranged according to increasing complexity of flowers.

**Demerits:** Monocots were considered primitive to dicots.

According to this system, primitive forms having naked flowers were kept in the beginning. The more advanced families have distinct perianth while the highly evolved families have fused perianth.

- (c) **John Hutchinson**, an English botanist, proposed phylogenetic classification in his famous book '**Families of Flowering plants**' in 1959.

- In Hutchinson's classification:

- Trees and shrubs are considered to be more primitive than herbs
- Dicots have been considered more primitive than monocots.
- Polypetalous, actinomorphic and solitary flowers are considered more primitive than gamopetalous, zygomorphic and inflorescence respectively.

- **An outline of Hutchinson's System of Classification**

**Angiospermae**

**Dicotyledonae**

**Monocotyledonae**

<b>Division :</b>	Lignosae (Woody habit)	Herbaceae (Herbaceous habit)	Calyciferae (Distinct calyx and corolla)	Corolliferae (More or less similar calyx and corolla)	Glumiflorae (Reduced perianth)
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- The divisions include orders that include families. Division does not include classes.

- (d) **Takhtajan** classified **Magnoliophyta** (Angiospermae) into two classes - **Magnoliopsida** (dicotyledons) and **Liliopsida** (Monocotyledons).

- (e) **Oswald Tippo** :

- Proposed the **biggest phylogenetic classification** of plant kingdom.
- This classification is the complete classification of plant kingdom.
- This is the **most acceptable** classification for books and study.

**Plant Kingdom**

↓  
On the basis of embryo      ↓  
**Sub-Kingdom**

**Thallophyta** = Embryo absent  
(10 Divisions)

**Embryophyta** = Embryo present

on the basis of  
vascular tissue

Division

**Atracheata** = Bryophyta  
(Non vascular plants)

**Tracheophyta**  
(Vascular plants)

## BRANCHES OF TAXONOMY

### 1. Classical Taxonomy:

- In this taxonomy, organisms are classified on the basis of natural affinities. These affinities or relationships realise all informations available at the time of collection of plant, e.g., natural systems of classification.

### 2. Numerical Taxonomy/Phenetics/Taximetrics/Adansonian Taxonomy:

- In this taxonomy, there is use of numerical methods for the evaluation of similarities and differences between the species. Firstly, number and codes are assigned to all the characters.